Alibbaa': Jurnal Pendidikan Bahasa Arab
Special Issue Vol. 01 2026
P-ISSN: 2721-1606 | E-ISSN: 2716-4985
doi: https://doi.org/10.19105/ajpba.vi.24704

Enhancing Arabic Speaking Skills Through AI-Assisted Adaptive Vocabulary Games: Evidence from a Classroom Intervention

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Abstract

The development of Arabic speaking skills remains a significant challenge for many secondary school learners, particularly due to limited vocabulary mastery and insufficient opportunities for meaningful oral communication. This study investigates the effectiveness of AI-assisted adaptive vocabulary games in enhancing Arabic speaking skills among secondary school students. Using a classroom intervention design conducted in two instructional cycles, the study involved 31 tenth-grade students at MA Muhammadiyah Kota Bima, Indonesia. Data were collected through speaking performance tests, classroom observations, and learning documentation. The findings revealed a consistent improvement in students' speaking performance, as indicated by an increase in the mean score from 62 in the pre-intervention stage to 68 in Cycle I and 76.25 in Cycle II. Learning mastery also increased substantially from 16.7% to 80.64% by the end of the intervention. Furthermore, the N-Gain score of 0.375 indicated a moderate level of effectiveness. The findings suggest that vocabulary-centered interactive activities can facilitate oral language production by promoting contextual vocabulary use and repeated speaking practice. From an adaptive learning perspective, the study highlights the potential of integrating Generative Artificial Intelligence into vocabulary game design to support more personalized and communicative Arabic language learning environments. The study contributes to the growing discourse on AI-enhanced language learning by demonstrating the pedagogical value of adaptive vocabulary-based interventions for developing Arabic speaking skills.

Keywords: *AI-assisted adaptive vocabulary games; Arabic speaking skills; Arabic language learning; Generative Artificial Intelligence; adaptive learning*

Abstrak

Pengembangan keterampilan berbicara bahasa Arab masih menjadi tantangan bagi banyak peserta didik tingkat menengah, terutama akibat keterbatasan penguasaan kosakata dan minimnya kesempatan untuk berlatih komunikasi lisan secara bermakna. Penelitian ini bertujuan untuk mengkaji efektivitas *AI-assisted adaptive vocabulary games* dalam meningkatkan keterampilan berbicara bahasa Arab peserta didik. Penelitian menggunakan desain intervensi kelas yang dilaksanakan dalam dua siklus pembelajaran dengan melibatkan 31 siswa kelas X MA Muhammadiyah Kota Bima. Data dikumpulkan melalui tes keterampilan berbicara, observasi kelas, dan dokumentasi pembelajaran. Hasil penelitian menunjukkan adanya peningkatan kemampuan berbicara secara konsisten, yang ditandai dengan kenaikan nilai rata-rata dari 62 pada tahap pra-intervensi menjadi 68 pada siklus I dan 76,25 pada siklus II. Tingkat ketuntasan belajar juga meningkat secara signifikan dari 16,7% menjadi 80,64% pada akhir intervensi. Selain itu, nilai N-Gain sebesar 0,375 menunjukkan efektivitas intervensi pada kategori sedang. Temuan penelitian mengindikasikan bahwa aktivitas pembelajaran berbasis kosakata yang interaktif mampu memfasilitasi produksi bahasa lisan melalui penggunaan kosakata yang kontekstual dan latihan berbicara yang berulang. Dari perspektif pembelajaran adaptif, penelitian ini menunjukkan potensi integrasi *Generative Artificial Intelligence* dalam desain permainan kosakata untuk mendukung lingkungan pembelajaran bahasa Arab yang lebih personal dan komunikatif. Penelitian ini berkontribusi pada pengembangan kajian pembelajaran bahasa berbasis AI dengan menunjukkan nilai pedagogis intervensi berbasis kosakata adaptif dalam meningkatkan keterampilan berbicara bahasa Arab.

Kata Kunci: *permainan kosakata adaptif berbantuan ai; keterampilan berbicara bahasa arab; pembelajaran bahasa arab; generative artificial intelligence; pembelajaran adaptif*

Introduction

Speaking skills (*maharah kalam*) constitute one of the core competencies in Arabic language learning, as they enable learners to express ideas, communicate opinions, and engage effectively in various social and academic contexts.[1] Unlike other language skills, speaking requires the simultaneous integration of multiple linguistic components,

[1] Shareef Klaib Alshraideh, Safa, and Haya A. Alhourani. "The Shift toward Fusha (Classical Arabic Language) Reconstruction of the Concept." *Dirasat: Human and Social Sciences* 49, no. 5 (December 2022): 556–67. https://doi.org/10.35516/hum.v49i5.3507.

including vocabulary mastery, grammatical accuracy, pronunciation, fluency, and communication confidence. Therefore, the success of Arabic language learning is measured not only by learners' ability to comprehend texts or master linguistic rules but also by their capacity to use the language actively in oral communication.[2] Nevertheless, numerous studies have identified speaking as one of the most challenging skills for learners to acquire in Arabic language education.

Limited Arabic speaking proficiency is often associated with insufficient vocabulary mastery (*mufradat*). Vocabulary serves as the foundation of language production, functioning as the linguistic resource through which learners construct utterances and convey meaning. Learners with restricted vocabulary knowledge frequently encounter difficulties in forming sentences, developing ideas, and maintaining speaking fluency.[3] As a result, they tend to exhibit hesitation, prolonged pauses, and low confidence when communicating in Arabic. This condition reduces the effectiveness of speaking instruction, as learners remain passive recipients of information rather than active language users.

To address this issue, various game-based learning and gamification approaches have been widely implemented in language education. These approaches are believed to enhance learner motivation, engagement, and enjoyment in the learning process.[4] One common application is the use of vocabulary games, which are designed to expand learners' vocabulary knowledge while increasing the frequency of vocabulary use in communicative activities. Through interactive and

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[2] Ilmiani, Aulia Mustika, Nurul Wahdah, and Mahfuz Rizqi Mubarak. "The Application of Albert Bandura's Social Cognitive Theory: A Process in Learning Speaking Skill." *Ta'lim al-'Arabiyyah: Jurnal Pendidikan Bahasa Arab & Kebahasaaraban* 5, no. 2 (December 2021). https://doi.org/10.15575/jpba.v5i2.12945.

[3] Ilmiani, Aulia Mustika, Nurul Wahdah, and Mahfuz Rizqi Mubarak. "The Application of Albert Bandura's Social Cognitive Theory: A Process in Learning Speaking Skill." *Ta'lim al-'Arabiyyah: Jurnal Pendidikan Bahasa Arab & Kebahasaaraban* 5, no. 2 (December 2021). https://doi.org/10.15575/jpba.v5i2.12945.

Khasawneh, Mohamad Ahmad Saleem. "Language Skills and Their Relationship to Learning Difficulties in English Language from the Teachers' Point of View." *The Journal of Quality in Education* 12, no. 19 (May 2022): 104–13. https://doi.org/10.37870/joqie.v12i19.308.

[4] Husna, Ilya, Zikrawahyuni Maiza, Suci Ramadhanti Febriani, Rahmat Satria Dinata, and Fauzul Fil Amri. "Digital Game-Based Learning: Exploring the Use of Mobile Legends in Arabic Language Skills." *Al-Ta'rib : Jurnal Ilmiah Program Studi Pendidikan Bahasa Arab IAIN Palangka Raya* 12, no. 1 (June 2024): 1–16. https://doi.org/10.23971/altarib.v12i1.8015.

competitive tasks, vocabulary games encourage learners to participate more actively and use the target language with greater confidence. Previous studies have also demonstrated that vocabulary games positively contribute to vocabulary retention, learning motivation, and overall language proficiency.

Despite these advantages, most vocabulary games employed in language classrooms remain static and uniform. Learners are generally exposed to the same materials, difficulty levels, and learning activities regardless of their individual abilities, needs, or learning pace. Consequently, the learning experience becomes less personalized and less responsive to learner diversity. In language learning contexts that require gradual and sustained vocabulary development, the need for adaptive learning systems has become increasingly important.

Recent advances in artificial intelligence, particularly Generative Artificial Intelligence (Generative AI), have created new opportunities for more personalized and adaptive language learning. Technologies such as ChatGPT, Gemini, and other generative AI platforms are capable of dynamically generating learning content, including vocabulary items, dialogues, conversational scenarios, speaking exercises, and personalized feedback.[5] In Arabic language education, these technologies enable teachers to design learning activities that are more flexible and responsive to learners' proficiency levels. Through AI integration, vocabulary games can evolve from static learning tools into adaptive vocabulary games capable of adjusting content difficulty, learning themes, and activity types according to learners' characteristics.

The concept of AI-assisted adaptive vocabulary games offers a novel approach to Arabic speaking instruction by combining the strengths of gamification with the personalization capabilities of Generative AI. This integration provides learners with learning experiences that are more relevant, engaging, and tailored to their needs. Beyond expanding vocabulary knowledge, such an approach has the potential to enhance learner engagement, communication confidence, and the contextual use of vocabulary in oral interaction.

Research on the application of artificial intelligence in language education has expanded rapidly in recent years. Law's review highlighted the potential of Generative AI to create more personalized,

[5] Kundu, Arnab, and Tripti Bej. "AI in School EFL Learning: A Systematic Review of Impact Pathways for Engagement, Achievement, and Satisfaction." *Journal of Language and Education* 11, no. 4 (December 2025): 131–48. https://doi.org/10.17323/jle.2025.22083.

adaptive, and interactive language learning environments through dynamic learning materials, communication exercises, and feedback.[6] Other systematic reviews have found that ChatGPT enhances learner engagement through more authentic and personalized linguistic interactions.[7] Furthermore, Du et al. reported that AI-powered chatbots contribute to improvements in speaking performance, motivation, confidence, and learner engagement.[8] Similar findings were reported in studies investigating ChatGPT-4, which demonstrated positive effects on communication skills through flexible and responsive language practice.[9] More recent empirical reviews have further confirmed that personalization, adaptive learning, and AI-mediated interaction have become central themes in contemporary AI-assisted language learning research.[10]

At the same time, a growing body of research has demonstrated the effectiveness of gamification and vocabulary games in language learning. Zhang et al. found that gamification significantly improves learner motivation, engagement, and language learning outcomes.[11] Marzuki reported that language games enhance speaking skills by fostering more active and participatory communication environments.[12]

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[6] Law, Locky. "Application of Generative Artificial Intelligence (GenAI) in Language Teaching and Learning: A Scoping Literature Review." *Computers and Education Open* 6 (June 2024): 100174. https://doi.org/10.1016/j.caeo.2024.100174.

[7] Aljohani, Nouf J. "ChatGPT in Language Learning: A Systematic Review of Applications and Challenges." *Social Sciences & Humanities Open* 13 (June 2026): 102357. https://doi.org/10.1016/j.ssaho.2025.102357.

[8] Du, Jinming, and Ben Kei Daniel. "Transforming Language Education: A Systematic Review of AI-Powered Chatbots for English as a Foreign Language Speaking Practice." *Computers and Education: Artificial Intelligence* 6 (June 2024): 100230. https://doi.org/10.1016/j.caeai.2024.100230.

[9] Wang, Ying. "A Study on the Efficacy of ChatGPT-4 in Enhancing Students' English Communication Skills." *Sage Open* 15, no. 1 (January 2025). https://doi.org/10.1177/21582440241310644.

[10] Li, Belle, Yaling Lily Tan, Chaoran Wang, and Victoria Lowell. "Two Years of Innovation: A Systematic Review of Empirical Generative AI Research in Language Learning and Teaching." *Computers and Education: Artificial Intelligence* 9 (December 2025): 100445. https://doi.org/10.1016/j.caeai.2025.100445.

[11] Zhang, Songcun, and Zuwati Hasim. "Gamification in EFL/ESL Instruction: A Systematic Review of Empirical Research." *Frontiers in Psychology* 13 (January 2023). https://doi.org/10.3389/fpsyg.2022.1030790.

[12] Marzuki, Abdul Gafur, and Ana Kuliahana. "Using Language Games to Enhance EFL Students' Speaking Skill in Indonesia." *Al-Ta Lim Journal* 28, no. 3 (November 2021): 213–22. https://doi.org/10.15548/jt.v28i3.700.

Similarly, Cancino et al. showed that Kahoot!-based gamification improves vocabulary mastery and learner confidence.[13] Consistent findings were also reported by Hakim, who found that game-based activities strengthen vocabulary use in oral communication while increasing learner engagement.[14] However, most previous studies have treated AI and gamification as separate research domains. AI-related studies have primarily focused on chatbots and automated feedback, whereas gamification research has emphasized motivation, language games, and vocabulary acquisition. Consequently, limited research has specifically integrated Generative AI into the design of adaptive vocabulary games to support the development of Arabic speaking skills.

Against this background, the present study aims to examine the effectiveness of AI-assisted adaptive vocabulary games in enhancing Arabic speaking skills among secondary school learners. The study is expected to contribute theoretically to the growing field of AI-supported Arabic language learning and practically by proposing an innovative instructional model that integrates Generative AI, adaptive learning, and gamification to improve learners' oral communication skills

Method

This study employed a Classroom Intervention Research approach to evaluate the effectiveness of AI-assisted adaptive vocabulary games in enhancing students' Arabic speaking skills. The intervention was implemented through two instructional cycles, each consisting of planning, implementation, observation, and reflection stages. This approach was selected because it enables continuous improvement of instructional practices based on the evaluation results of each cycle, allowing the development of students' speaking skills to be monitored systematically.

The study was conducted at MA Muhammadiyah Kota Bima during the second semester of the 2025/2026 academic year. The

[13] Cancino, Marco, and Camila Viguera. "The Impact of a Gamified Approach on Vocabulary Learning and Vocabulary Self-Efficacy: Evidence from a Chilean Primary EFL School." *Revista de Lingüística y Lenguas Aplicadas* 19 (July 2024): 33–43. https://doi.org/10.4995/rlyla.2024.19932.

[14] عبد الحكيم عبد الرحمن حسين. "Muhaffazât Al-Al'âb al-Raqmiyyah (Gamification) Fî Ta'lîmi al-Lughah al-'Arabiyyah: Dirâsatu al-Abhâts al-Mansyûrah Fî Tathbîqi Muhaffazâti al-Al'âb al-'Arabiyyah Fî Indûnîsiyâ." *Alibbaa': Jurnal Pendidikan Bahasa Arab* 5, no. 1 (July 2024): 1–29.

participants consisted of 31 tenth-grade students enrolled in the Arabic language course. Participants were selected based on preliminary observations indicating that most students experienced difficulties in vocabulary mastery, speaking fluency, pronunciation, and communication confidence when using Arabic.

The instructional intervention was carried out through the implementation of AI-assisted adaptive vocabulary games, designed to help students acquire, understand, and use Arabic vocabulary contextually in speaking activities. In this study, Generative Artificial Intelligence (AI) was utilized to generate vocabulary lists, conversational scenarios, communicative questions, and game-based activities tailored to instructional objectives and students' proficiency levels. The use of AI enabled teachers to develop learning activities that were more adaptive, diverse, and responsive to students' learning needs than conventional vocabulary games.

During the planning stage, the researchers prepared instructional materials, selected vocabulary themes, designed AI-based game activities, and developed research instruments. Vocabulary items and game scenarios were generated with the support of Generative AI platforms to provide diverse learning materials appropriate for secondary-level Arabic language instruction. During the implementation stage, students participated in various adaptive vocabulary game activities that required them to use target vocabulary in dialogues, group games, question-and-answer sessions, and other speaking tasks.

The observation stage was conducted throughout the learning process to identify students' engagement levels, participation in game activities, and progress in speaking performance. The reflection stage was carried out at the end of each cycle to evaluate the effectiveness of the intervention and determine necessary improvements for the subsequent cycle.

Research data were collected through speaking performance tests, classroom observations, and learning documentation. Speaking performance was assessed using an analytical rubric consisting of five major components: vocabulary use, fluency, pronunciation, grammatical accuracy, and communication confidence. Each component was evaluated on a five-point scale, where a score of 1 represented a very low level of performance and a score of 5 indicated excellent performance.

Table 1. Speaking Assessment Rubric

Assessment Component	Weight
Vocabulary Use	25%
Fluency	25%
Pronunciation	20%
Grammatical Accuracy	15%
Communication Confidence	15%
Total	100%

Students' final scores were calculated based on the cumulative scores of all assessment components and subsequently converted to a 0-100 scale. Classroom observations were used to obtain data on student engagement during the learning process, while documentation served as supporting evidence to strengthen the research findings.

The data were analyzed using descriptive quantitative techniques. Mean scores were calculated to examine the development of students' speaking skills across the stages of the study using the following formula:

$$\bar{X} = \frac{\sum X}{N}$$

where:

- $\bar{X}$ = mean score
- ΣX = total score of all students
- N = number of students

The percentage of learning mastery was calculated using:

$$P = \frac{F}{N} \times 100\%$$

where:

- P = percentage of learning mastery
- F = number of students achieving mastery
- N = total number of students

To determine the percentage improvement in speaking performance, the following formula was employed:

$$PI = \frac{Posttest - Pretest}{Pretest} \times 100\%$$

where:

- PI = percentage improvement
- Posttest = score after the intervention
- Pretest = score before the intervention

In addition, the effectiveness of the intervention was examined using the Normalized Gain (N-Gain) to provide a more objective measure of learning improvement. The formula used was:

$$g = \frac{Posttest - Pretest}{100 - Pretest}$$

The interpretation of N-Gain values was based on the following criteria:

N-Gain Range	Interpretation
$g > 0.70$	High
$0.30 \leq g \leq 0.70$	Moderate
$g < 0.30$	Low

The intervention was considered successful when it met three criteria: (1) the mean speaking score reached or exceeded the minimum mastery criterion (MMC) of 75, (2) at least 75% of students achieved learning mastery, and (3) observable improvements occurred in vocabulary use, fluency, pronunciation, grammatical accuracy, and communication confidence throughout the instructional process.

To enhance data validity, methodological triangulation was employed through the combination of test results, classroom observations, and documentation. Data obtained from these sources were compared and analyzed collectively to provide a comprehensive understanding of the impact of AI-assisted adaptive vocabulary games on the improvement of students' Arabic speaking skills.

Results and Discussion

The findings indicate a substantial improvement in students' Arabic speaking skills throughout the instructional intervention. This improvement can be observed through the progression of mean scores and learning mastery rates across the three stages of the study.

Table 2. Development of Arabic Speaking Performance Across Intervention Cycles

Stage	Total Score	Mean Score	Mastery (%)
Pre-Intervention	1,938	62.00	16.70
Cycle I	2,109	68.00	22.50
Cycle II	2,364	76.25	80.64

As shown in Table 1, students' Arabic speaking performance demonstrated a consistent upward trend throughout the intervention. During the pre-intervention stage, the mean score was 62, with a learning mastery rate of only 16.7%. These results indicate that most students had not yet achieved the expected competency standards. The low baseline performance suggests that students' ability to use Arabic vocabulary productively remained limited, resulting in difficulties in developing fluent and meaningful oral communication.

Following the implementation of the intervention in Cycle I, the mean score increased to 68. This six-point improvement indicates that students began adapting to learning activities that required more active vocabulary use. However, the mastery rate reached only 22.5%, suggesting that most students still needed additional time and practice to develop their speaking skills effectively. These findings imply that improvements in speaking ability do not occur immediately but rather emerge through continuous and repeated practice.

More substantial progress was observed in Cycle II. The mean score increased to 76.25, while the mastery rate rose to 80.64%. Compared with the baseline condition, this represents an improvement of 14.25 points, or approximately 22.98%. At the same time, the mastery rate increased by 63.94 percentage points. These findings demonstrate that the majority of students successfully achieved the expected speaking competency standards after completing the intervention.

Further analysis revealed that the improvement pattern was not linear. The gain observed in Cycle I was relatively modest, whereas a considerably larger increase occurred in Cycle II. This pattern suggests that speaking skill development requires an adaptation phase before more noticeable progress can be achieved. Initially, students were still adjusting to the use of vocabulary in communicative contexts. As the frequency of vocabulary use increased through various learning activities, students became more capable of retrieving and employing

vocabulary spontaneously, resulting in greater improvements in speaking performance.

To obtain a more objective measure of intervention effectiveness, a Normalized Gain (N-Gain) analysis was conducted.

Table 3. N-Gain Analysis of Speaking Skill Improvement

Pre-Test	Post-Test	N-Gain	Category
62.00	76.25	0.375	Moderate

As presented in Table 2, the N-Gain value of 0.375 falls within the moderate gain category. This result indicates that the intervention produced a meaningful improvement in students' speaking skills. Although the gain did not reach the high category, it demonstrates that the instructional strategy generated measurable learning progress within a relatively short intervention period.

The effectiveness of the intervention is further supported by the substantial increase in learning mastery, which exceeded 80% by the end of the study. Therefore, the success of the intervention is reflected not only in the improvement of the class mean score but also in the growing number of students who achieved the expected standards of Arabic speaking proficiency. Overall, the findings suggest that the implemented instructional approach contributed positively to the development of students' Arabic speaking skills through enhanced academic performance and collective learning achievement.

Discussion

The findings revealed a consistent improvement in students' Arabic speaking skills throughout the instructional intervention. This improvement was evidenced by the increase in the mean score from 62 during the pre-intervention stage to 76.25 at the end of Cycle II, accompanied by a rise in learning mastery from 16.7% to 80.64%. Furthermore, the N-Gain score of 0.375 indicated that the intervention achieved a **moderate level of effectiveness**. These findings suggest that the instructional approach employed in this study contributed positively to the development of students' Arabic speaking proficiency. More importantly, the gradual improvement observed across cycles indicates

that speaking skills develop cumulatively and require repeated opportunities for practice in meaningful communicative contexts.[15]

The improvement in speaking performance can be explained by the close relationship between vocabulary mastery and language production. In both second-language and foreign-language learning, vocabulary serves as the primary foundation that enables learners to construct meaning and express ideas orally.[16] Limited vocabulary knowledge often becomes a major barrier to effective speaking, even when learners possess adequate grammatical knowledge. When learners lack access to relevant vocabulary, language production tends to be slow, hesitant, and fragmented.[17] Conversely, the easier it becomes for learners to retrieve vocabulary from memory, the greater their ability to engage in spontaneous and sustained communication.

The findings further suggest that improvements in speaking skills do not occur immediately after learners acquire new vocabulary. Instead, improvement emerges through repeated use of vocabulary in communicative activities.[18] The relatively modest gains observed in Cycle I, followed by the more substantial gains in Cycle II, indicate that learners require time to transform passive vocabulary knowledge into active vocabulary that can be readily used in real communication. In other words, vocabulary learning extends beyond recognition and memorization; it also involves meaningful application and reinforcement through continuous practice.[19] This phenomenon explains why the most

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[15] Roziqi, Muhammad Ainur, Murdiono Murdiono, Nur Fuadi Rahman, and Muhammad Arif. "Mapping Of Strategies And Methods For Learning Arabic Speaking Skills." *Ijaz Arabi Journal of Arabic Learning* 8, no. 1 (February 2025). https://doi.org/10.18860/ijazarabi.v8i1.26939.

[16] Teimouri, Yasser, Julia Goetze, and Luke Plonsky. "SECOND LANGUAGE ANXIETY AND ACHIEVEMENT." *Studies in Second Language Acquisition* 41, no. 2 (May 2019): 363–87. https://doi.org/10.1017/S0272263118000311.

[17] Mohamed Mokhtar, Mohd Ieruwan. "Lower Secondary Students' Arabic Speaking Anxiety: A Foreign Language Literacy Perspective." *International Journal of Education and Literacy Studies* 8, no. 4 (October 2020): 33. https://doi.org/10.7575/aiac.ijels.v.8n.4p.33.

[18] Raj Sharma, Lok. "Exploring the Landscape of Challenges and Opportunities in Teaching Speaking Skills." *International Journal of Advanced Multidisciplinary Research and Studies* 4, no. 3 (May 2024): 74–78. https://doi.org/10.62225/2583049X.2024.4.3.2745.

[19] Cervetti, Gina N., Tanya S. Wright, and HyeJin Hwang. "Conceptual Coherence, Comprehension, and Vocabulary Acquisition: A Knowledge Effect?"

significant improvement occurred after students had multiple opportunities to engage in repeated speaking activities across several instructional cycles.[20]

Beyond vocabulary development, the improvement in speaking performance can also be attributed to the characteristics of game-based learning activities. Games create a more interactive learning environment than conventional teacher-centered instruction.[21] Through game activities, learners are not merely recipients of information but active participants in communication, decision-making, and task completion that require language use. Such active engagement provides learners with greater opportunities to employ vocabulary directly in situations that resemble authentic communication.[22] Consequently, learners accumulate richer language-use experiences, which ultimately contribute to the development of their speaking proficiency.[23]

From a psychological perspective, game-based activities also have the potential to reduce language anxiety, which is frequently experienced by learners when speaking in a foreign language.[24] traditional instructional settings, language errors are often perceived as failures, which may generate fear and diminish learners' confidence. In contrast, game-based learning environments tend to treat mistakes as a

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Reading and Writing 29, no. 4 (April 2016): 761–79. https://doi.org/10.1007/s11145-016-9628-x.

[20] Wahab, Wahab, Yuliana Yuliana, Almu Padol, Mustar Mustar, and Ali Musa Lubis. "The Language Division's Efforts in Community-Based Arabic Speaking Skills Training." *Ijaz Arabi Journal of Arabic Learning* 8, no. 3 (September 2025). https://doi.org/10.18860/ijazarabi.v8i3.32555.

[21] Dehghanzadeh, Hojjat, Hashem Fardanesh, Javad Hatami, Ebrahim Talaee, and Omid Noroozi. "Using Gamification to Support Learning English as a Second Language: A Systematic Review." *Computer Assisted Language Learning* 34, no. 7 (September 2021): 934–57. https://doi.org/10.1080/09588221.2019.1648298.

[22] Mahmudah, Menik, Nurhanifansyah Nurhanifansyah, and Syarif Muhammad Syaheed bin Khalid. "Psycholinguistic Approaches to Enhancing Arabic Speaking Proficiency through Comic Strips." *Arabiyatuna: Jurnal Bahasa Arab* 8, no. 2 (November 2024): 805–26. https://doi.org/10.29240/jba.v8i2.11349.

[23] Hadi, Nurul, Nuri Alvina, and Khaled Radhouani. "Ta'zîzu Dâfi'iyyati Thullâbi Riyâdh al-Athfâl Li Tathwîri Mahârât al-Lughah al-'Arabiyyah al-Syafawiyyah Min Khilâli Barâmiji al-Ta'lîm al-Mukatstsaf." *Alibbaa': Jurnal Pendidikan Bahasa Arab* 5, no. 2 (July 2024): 189–214. https://doi.org/10.19105/ajpba.v5i2.12195.

[24] Mohamed Mokhtar, Mohd Ieruwan. "Lower Secondary Students' Arabic Speaking Anxiety: A Foreign Language Literacy Perspective." *International Journal of Education and Literacy Studies* 8, no. 4 (October 2020): 33. https://doi.org/10.7575/aiac.ijels.v.8n.4p.33.

natural part of the learning process. Such conditions create a more supportive and comfortable atmosphere, encouraging learners to take risks in speaking and experiment with newly acquired vocabulary.[25] The substantial increase in learning mastery observed in Cycle II may therefore be interpreted as an indication that learners developed greater confidence in using Arabic for oral communication.

Within the context of contemporary educational technology, the findings of this study can also be understood through the lens of AI-assisted adaptive learning. Although the present study focused on the implementation of vocabulary games in classroom settings, the results highlight the importance of learning activities that provide continuous, contextualized, and learner-responsive vocabulary practice. These principles align closely with the characteristics of adaptive learning systems that are increasingly supported by Generative Artificial Intelligence (GenAI) technologies. Platforms such as ChatGPT, Gemini, and other generative AI applications enable teachers to generate vocabulary variations, dialogues, conversational scenarios, and speaking tasks tailored to learners' proficiency levels.[26] Consequently, instruction no longer needs to be uniform for all students; rather, it can be personalized to accommodate individual learning needs and abilities.

From this perspective, the findings suggest that successful speaking development is determined not merely by the presence of games themselves but by the extent to which learning activities provide opportunities for relevant, repeated, and proficiency-appropriate vocabulary use. Therefore, integrating artificial intelligence into vocabulary game design has the potential to enhance instructional effectiveness by delivering more adaptive and personalized learning materials.[27] Although this study did not directly measure the impact of Generative AI on speaking performance, the findings provide an

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[25] Madondo, Fortunate, and Joseph Tsikira. "Traditional Children's Games: Their Relevance on Skills Development among Rural Zimbabwean Children Age 3–8 Years." Journal of Research in Childhood Education 36, no. 3 (May 2022): 406–20. https://doi.org/10.1080/02568543.2021.1982084.

[26] Wang, Yiyin, Tiancheng Zhang, Le Yao, and Paul Seedhouse. "A Scoping Review of Empirical Studies on Generative Artificial Intelligence in Language Education." *Innovation in Language Learning and Teaching*, June 5, 2025, 1–28. https://doi.org/10.1080/17501229.2025.2509759.

[27] Fui-Hoon Nah, Fiona, Ruilin Zheng, Jingyuan Cai, Keng Siau, and Langtao Chen. "Generative AI and ChatGPT: Applications, Challenges, and AI-Human Collaboration." *Journal of Information Technology Case and Application Research* 25, no. 3 (July 2023): 277–304. https://doi.org/10.1080/15228053.2023.2233814.

empirical foundation for future investigations into the use of AI in developing more dynamic and responsive vocabulary-based learning games.

The findings are also consistent with previous studies demonstrating that game-based approaches enhance learning motivation, learner engagement, and the active use of the target language during instruction.[28] Earlier research has reported that game activities create a more enjoyable learning environment[29] thereby encouraging learners to participate more actively in communicative tasks.[30] The results of the present study reinforce these findings by demonstrating that improvements in speaking skills are reflected not only in higher mean scores but also in the increased number of learners who successfully achieved the expected learning standards.

From a theoretical perspective, this study contributes to the field of Arabic language education by demonstrating that vocabulary mastery and speaking proficiency are closely interconnected and inseparable components of language learning. The findings reveal that learning activities centered on vocabulary use within communicative contexts can bridge the gap between linguistic knowledge and oral communication performance. Accordingly, this study supports the view that speaking development should not rely solely on isolated vocabulary instruction but should be accompanied by activities that allow learners to apply vocabulary in authentic and meaningful communicative situations.[31]

From a practical perspective, the findings offer important implications for Arabic language teachers seeking to develop more

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learner-centered and communication-oriented instruction. Teachers should function not only as providers of knowledge but also as designers of learning experiences that encourage active language use. In the context of rapid technological advancement, Generative AI presents a promising opportunity to support the development of vocabulary games that are more adaptive, personalized, and contextually relevant. Therefore, the integration of game-based learning, vocabulary enhancement, and artificial intelligence technologies may represent a new direction for developing Arabic language instruction that is more effective, interactive, and responsive to the needs of twenty-first-century learners.

Conclusion

This study concludes that the implementation of AI-assisted adaptive vocabulary games contributed positively to the improvement of students' Arabic speaking skills. The findings demonstrated a consistent enhancement in speaking performance, as evidenced by the increase in the mean score from 62 during the pre-intervention stage to 76.25 at the end of Cycle II, accompanied by a rise in learning mastery from 16.7% to 80.64%. These results answer the research question by indicating that learning activities centered on interactive and contextual vocabulary use can effectively support the development of students' speaking skills. The findings further suggest that vocabulary reinforcement through game-based activities enhances learners' ability to access, organize, and utilize vocabulary more effectively in oral communication. From a practical standpoint, the study implies that integrating vocabulary games with adaptive learning approaches offers a promising instructional strategy for improving Arabic speaking proficiency, particularly in communication-oriented learning environments that emphasize active learner participation.

Nevertheless, this study has several limitations. First, it was conducted in a single classroom with a relatively small number of participants, which limits the generalizability of the findings. Second, the study focused primarily on speaking performance without examining other potentially relevant variables such as learning motivation, learner engagement, vocabulary retention, and students' perceptions of AI-supported learning. Third, the study did not directly evaluate the effectiveness of a specific Generative AI platform; therefore, the role of AI was positioned primarily as a pedagogical framework within adaptive learning design. Future studies are therefore recommended to involve

larger samples, employ experimental or quasi-experimental designs, and integrate Generative AI platforms such as ChatGPT or Gemini directly into instructional activities. Further research should also investigate the effects of AI-assisted adaptive vocabulary games on additional variables, including learning motivation, learner engagement, language confidence, and long-term vocabulary acquisition, in order to develop a more comprehensive understanding of the role of artificial intelligence in Arabic language education.

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