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Leveraging Artificial Intelligence-Supported Quizlet Flashcards to Enhance Arabic Vocabulary Acquisition among Madrasah Students

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Abstract

Arabic vocabulary acquisition remains a major challenge for many learners, particularly in contexts where instruction is dominated by memorization and teacher-centered approaches. This study aimed to investigate the implementation of Artificial Intelligence-Supported Quizlet Flashcards in enhancing Arabic vocabulary acquisition among eleventh-grade students at MA Muhammadiyah Kota Bima. The study employed a Classroom Action Research (CAR) design based on the Kemmis and McTaggart model, consisting of planning, action, observation, and reflection stages conducted across two cycles. The participants were 12 students. Artificial Intelligence was utilized as a supporting tool for developing vocabulary materials, contextual example sentences, and learning exercises that were subsequently integrated into Quizlet flashcards. Data were collected through observation, tests, and documentation and analyzed using descriptive quantitative techniques. The findings revealed a consistent improvement in students' vocabulary acquisition throughout the research cycles. The mean score increased from 67 in the pre-cycle stage to 75.17 in Cycle I and 80.67 in Cycle II. Similarly, the learning mastery rate improved from 16.7% in the pre-cycle stage to 50% in Cycle I and reached 83.33% in Cycle II. These findings indicate that AI-Supported Quizlet Flashcards can provide a more interactive, flexible, and engaging learning experience, thereby supporting students' Arabic vocabulary acquisition. The study highlights the potential of integrating AI-assisted learning-material development with digital flashcard platforms to enhance Arabic language learning in madrasah settings.

Keywords: *Arabic vocabulary acquisition; Artificial Intelligence in Education; Quizlet; Mobile-Assisted Language Learning; digital flashcards*

Abstrak

Pemerolehan kosakata bahasa Arab masih menjadi tantangan bagi banyak peserta didik, terutama pada konteks pembelajaran yang didominasi oleh metode hafalan dan pembelajaran berpusat pada guru. Penelitian ini bertujuan untuk mengkaji implementasi Artificial Intelligence-Supported Quizlet Flashcards dalam meningkatkan pemerolehan kosakata bahasa Arab siswa kelas XI MA Muhammadiyah Kota Bima. Penelitian ini menggunakan desain Penelitian Tindakan Kelas (PTK) berdasarkan model Kemmis dan McTaggart yang meliputi tahap perencanaan, tindakan, observasi, dan refleksi yang dilaksanakan dalam dua siklus. Subjek penelitian berjumlah 12 siswa. Artificial Intelligence dimanfaatkan sebagai alat pendukung dalam pengembangan materi kosakata, contoh kalimat kontekstual, dan latihan pembelajaran yang kemudian diintegrasikan ke dalam flashcard Quizlet. Data dikumpulkan melalui observasi, tes, dan dokumentasi serta dianalisis menggunakan teknik deskriptif kuantitatif. Hasil penelitian menunjukkan adanya peningkatan yang konsisten pada pemerolehan kosakata siswa di setiap siklus. Nilai rata-rata meningkat dari 67 pada tahap pra-siklus menjadi 75,17 pada Siklus I dan 80,67 pada Siklus II. Persentase ketuntasan belajar juga meningkat dari 16,7% pada tahap pra-siklus menjadi 50% pada Siklus I dan mencapai 83,33% pada Siklus II. Temuan ini menunjukkan bahwa AI-Supported Quizlet Flashcards mampu menciptakan pengalaman belajar yang lebih interaktif, fleksibel, dan menarik sehingga mendukung peningkatan pemerolehan kosakata bahasa Arab siswa. Penelitian ini menegaskan potensi integrasi pengembangan materi berbantuan AI dengan platform flashcard digital dalam meningkatkan kualitas pembelajaran bahasa Arab di lingkungan madrasah.

Kata Kunci: *pemerolehan kosakata bahasa Arab; Artificial Intelligence in Education; Quizlet; Mobile-Assisted Language Learning; flashcard digital*

Introduction

Vocabulary mastery is a fundamental component of Arabic language learning. Vocabulary serves as the foundation for the development of all language skills, including listening (*istima'*), speaking (*kalam*), reading (*qira'ah*), and writing (*kitabah*).[1] Learners with

[1] Haniff Mohd Tahir, Mohd, Intan Safinas Mohd Ariff Albakri, Airil Haimi Mohd Adnan, Mohamad Syafiq Ya Shaq, and Dianna Suzieanna Mohamad Shah. "The Application of Visual Vocabulary for ESL Students' Vocabulary Learning." *Arab World English Journal* 11, no. 2 (June 2020): 323–38. https://doi.org/10.24093/awej/vol11no2.23.

adequate vocabulary knowledge are better able to comprehend messages, express ideas orally and in writing, and communicate effectively in Arabic. Conversely, limited vocabulary often becomes a major obstacle that hinders learners' ability to understand texts, convey ideas, and participate effectively in language learning.[2] Therefore, enhancing vocabulary mastery remains a primary objective of Arabic language education across educational levels.

Despite its importance, Arabic vocabulary learning continues to face various challenges. Previous studies have shown that many learners struggle to remember, understand, and appropriately use Arabic vocabulary.[3] Learning activities that rely heavily on memorization, teacher-centered instruction, and repetitive exercises often result in low student engagement. Consequently, newly learned vocabulary tends to remain in short-term memory and is easily forgotten. This issue not only affects vocabulary mastery but also influences overall Arabic language proficiency.[4]

A similar situation was identified among eleventh-grade students at MA Muhammadiyah Kota Bima. Preliminary classroom observations revealed that many students experienced difficulties in retaining and understanding previously learned vocabulary. Students tended to forget vocabulary quickly and lacked confidence when required to use it in speaking and writing activities. Furthermore, instruction was predominantly teacher-centered, while the integration of digital learning media remained limited. Initial assessment results indicated that most students had not achieved the school's Minimum Mastery Criterion (KKM). In the pre-cycle stage, the average score was only 67, and only 16.7% of students achieved mastery. These findings highlight the need for instructional innovations that can enhance student engagement while strengthening Arabic vocabulary acquisition.

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[2] Nuralisah, Ai Siti, and Evie Kareviati. "THE EFFECTIVENESS OF USING MEMRISE APPLICATION IN TEACHING VOCABULARY." *PROJECT (Professional Journal of English Education)* 3, no. 4 (July 2020): 494. https://doi.org/10.22460/project.v3i4.p494-500.

[3] Fraidan, Abdullah al, and Meznah Saud Abdulaziz Alsubaie. "Exam Anxiety and Vocabulary Challenges: Insights from Postgraduate Female Students in Open and Closed Book Exams." *Educational Process International Journal* 14, no. 1 (2025). https://doi.org/10.22521/edupij.2025.14.26.

[4] Xu, Qian, Jennifer Richardson, Zhuo Zhang, Zui Cheng, and Fengping Guo. "Using a Mobile Vocabulary Application to Enhance L2 Learners' Vocabulary Acquisition: Possibilities and Challenges." Online Learning 29, no. 3 (September 2025). https://doi.org/10.24059/olj.v29i3.4918.

The rapid development of digital technology has introduced various innovations that can improve the quality of education, including language learning. One of the most prominent developments is Artificial Intelligence (AI).[5] In educational settings, AI can assist teachers in developing learning materials, generating contextual examples, and designing exercises and assessments more efficiently. In language learning, AI can also be utilized to provide vocabulary items, example sentences, and learning activities tailored to learners' needs.[6]

One digital platform widely used for vocabulary learning is Quizlet. This flashcard-based platform offers a variety of interactive features that help students learn and retain vocabulary through repetition and self-directed practice. In addition to being easily accessible through mobile devices, Quizlet supports the principles of Mobile-Assisted Language Learning (MALL), enabling learners to study flexibly across different contexts.[7] The potential of Quizlet can be further enhanced when combined with AI. In the present study, AI was employed to support the development of learning content, including vocabulary lists, contextual example sentences, and practice exercises, which were subsequently integrated into Quizlet. This combination was intended to create a more engaging, interactive, and effective learning environment for Arabic vocabulary acquisition.

Numerous studies have demonstrated the effectiveness of Quizlet in supporting foreign language vocabulary learning. Setiawan and Wiedarti found that Quizlet significantly improved students' motivation in vocabulary learning. Their study involving 65 students revealed that learners became more enthusiastic, less easily bored, more interested in learning, and more capable of completing learning tasks independently

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[5] Humairoh, Sitti Wardatul, Nurul Hadi, and Umi Hanifah. "The AI Revolution in Arabic Language Learning: An Analysis of ChatGPT's Role in Autonomous Learning." *Alibbaa': Jurnal Pendidikan Bahasa Arab* 7, no. 1 (January 2026): 1–19. https://doi.org/10.19105/ajpba.v7i1.22479.

[6] Zaimah, Nely Rahmawati, Risti Kamila Wening Estu, Syarifatul Fitri Hidayah, Syamsul Hadi, and Aiden Button. "Harnessing Gemini for Arabic Mastery: Educators' and Learners' Views." *Alibbaa': Jurnal Pendidikan Bahasa Arab* 5, no. 2 (July 2024): 166–88. https://doi.org/10.19105/ajpba.v5i2.14808.

[7] Waluyo, Budi, and Rahmah Bakoko. "Vocabulary List Learning Supported by Gamification : Classroom Action Research Using Quizlet." *The Journal of AsiaTEFL* 18, no. 1 (April 2021): 289–99. https://doi.org/10.18823/asiatefl.2021.18.1.20.289.

when using Quizlet.[8] These findings were reinforced by Platzer's study involving 165 first-year university students in Austria. Regression analysis revealed that Quizlet contributed significantly to vocabulary acquisition, with its effect slightly exceeding that of learners' initial language proficiency.[9] Similarly, Al-Malki et al. reported that Quizlet significantly enhanced vocabulary acquisition through its digital flashcard features, self-paced learning activities, and interactive exercises that support vocabulary retention.[10]

Beyond the effectiveness of Quizlet, research in Mobile-Assisted Language Learning (MALL) has consistently emphasized the importance of mobile technologies in second-language vocabulary acquisition. Through a meta-analysis of multiple studies, Lin and Lin found that mobile-assisted vocabulary learning had a significant positive effect on second-language learning outcomes.[11] This finding was further supported by Zhou et al., who reported that mobile applications were more effective than traditional instructional approaches in promoting vocabulary learning because they provided more frequent vocabulary exposure, intensive practice opportunities, and greater learning flexibility.[12] Collectively, these studies suggest that the integration of digital technologies and mobile devices can foster more active learning environments and facilitate sustained vocabulary development.

Despite these promising findings, previous research has primarily focused on the effectiveness of Quizlet as a vocabulary learning platform or on the use of mobile technologies in language

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[8] Setiawan, Muhammad Rizky, and Pangesti Wiedarti. "The Effectiveness of Quizlet Application towards Students' Motivation in Learning Vocabulary." *Studies in English Language and Education* 7, no. 1 (March 2020): 83–95. https://doi.org/10.24815/siele.v7i1.15359.

[9] Platzer, Hans. "The Role of Quizlet in Vocabulary Acquisition." *Electronic Journal of Foreign Language Teaching* 17, no. 2 (December 2020). https://doi.org/10.56040/hspt1735.

[10] Abdullah Al-Malki, Moza. "Quizlet: An Online Application to Enhance EFL Foundation Students' Vocabulary Acquisition at Rustaq College of Education, Oman." *Arab World English Journal* 6 (July 2020): 332–43. https://doi.org/10.24093/awej/call6.22.

[11] Lin, Jen-Jiun, and Huifen Lin. "Mobile-Assisted ESL/EFL Vocabulary Learning: A Systematic Review and Meta-Analysis." *Computer Assisted Language Learning* 32, no. 8 (November 2019): 878–919. https://doi.org/10.1080/09588221.2018.1541359.

[12] Zhou, Yonghong, and Mingming Zhou. "A Meta-Analysis on Mobile-Assisted Vocabulary Learning: Do Mobile Applications Help?" *ReCALL* 38, no. 1 (January 2026): 75–93. https://doi.org/10.1017/S0958344025100335.

learning more generally. Studies that integrate Artificial Intelligence as a tool for developing Quizlet-based learning materials in the context of Arabic vocabulary acquisition remain limited, particularly within Indonesian madrasah settings. Given AI's potential to assist teachers in generating vocabulary content, contextual examples, and diverse learning activities, its integration may enrich the implementation of Quizlet in language instruction.

Therefore, this study aims to investigate the implementation of Artificial Intelligence-Supported Quizlet Flashcards in enhancing Arabic vocabulary acquisition among eleventh-grade students at MA Muhammadiyah Kota Bima. Using a Classroom Action Research (CAR) approach, the study evaluates changes in students' learning outcomes following the implementation of Quizlet-based vocabulary instruction supported by AI-generated learning materials. The novelty of this study lies in integrating AI as a learning-material development tool with Quizlet as a digital flashcard platform in Arabic language instruction within a madrasah context. The findings are expected to provide practical insights for Arabic language teachers while contributing to the growing literature on Artificial Intelligence in Education (AIEd), Mobile-Assisted Language Learning (MALL), and technology-enhanced Arabic vocabulary learning.

Method

This study employed a Classroom Action Research (CAR) approach aimed at improving students' Arabic vocabulary acquisition through the implementation of Artificial Intelligence-Supported Quizlet Flashcards. CAR was selected because it enables researchers to systematically implement instructional interventions to enhance both the learning process and learning outcomes in the classroom. The study adopted the Kemmis and McTaggart model, which consists of four main stages: planning, action, observation, and reflection. These stages were carried out cyclically until the predetermined success criteria were achieved.[13]

The study was conducted at MA Muhammadiyah Kota Bima during the second semester of the 2024/2025 academic year. The participants were 12 eleventh-grade students. This class was selected

[13] Stephen Kemmis and Robin McTaggart, *The Action Research Planner*, 3rd ed. (Victoria: Deakin University Press, 1988), 11–14

based on preliminary observations indicating that students' Arabic vocabulary proficiency remained relatively low and that the majority of students had not met the school's Minimum Mastery Criterion (KKM). Therefore, the class was considered to require an instructional intervention that could improve Arabic vocabulary acquisition more effectively.

The research was conducted in two cycles. Each cycle consisted of two instructional sessions and one evaluation session. During the planning stage, the researcher prepared instructional materials, including teaching modules, vocabulary materials, observation instruments, and achievement tests. At this stage, Artificial Intelligence was utilized as a supporting tool to generate learning content, such as vocabulary lists, contextual example sentences, vocabulary exercises, and various learning activities, which were subsequently integrated into the Quizlet platform. The materials were then organized into digital flashcards accessible through mobile devices and computers.

The action stage involved implementing vocabulary instruction using Quizlet enriched with AI-assisted learning content. The lessons began with the introduction of new vocabulary through digital flashcards, followed by practice activities using Quizlet features such as *Learn*, *Match*, and *Test*. Students were encouraged to interact actively with the learning materials through various activities designed to strengthen vocabulary retention. Throughout the process, the teacher acted as a facilitator, guiding students during the learning activities.

The observation stage was conducted simultaneously with the implementation of the instructional intervention. During this stage, an observer monitored students' learning activities, their level of participation in using Quizlet, and their responses to the instructional media. Observation data were recorded using observation sheets prepared prior to the study. In addition, documentation in the form of photographs and field notes was collected as supporting evidence.

The reflection stage was conducted after each cycle had been completed. The researcher analyzed the observation results and students' test scores to identify both achievements and challenges encountered during the instructional process. The findings from the reflection stage served as the basis for revising and improving the instructional

intervention in the subsequent cycle, thereby ensuring continuous improvement in the quality of learning.

Data were collected through observation, tests, and documentation. Observation was used to obtain information regarding students' learning activities during the instructional process. Tests were administered to measure students' Arabic vocabulary acquisition following the implementation of Artificial Intelligence-Supported Quizlet Flashcards. In this study, Artificial Intelligence was not treated as an independent variable; rather, it functioned as a supporting tool for learning-material development. AI technology was utilized to assist in generating vocabulary lists, contextual example sentences, and supplementary exercises, which were subsequently integrated into Quizlet. Therefore, the primary instructional intervention remained the use of Quizlet Flashcards, while AI served as a supporting mechanism to enrich learning content and facilitate instructional design.

The data were analyzed using descriptive quantitative techniques. The analysis aimed to determine the development of students' vocabulary acquisition across the research cycles by calculating the mean score and the percentage of learning mastery. The mean score was calculated using the following formula:

$$\bar{X} = \Sigma X / N$$

where $\bar{X}$ represents the mean score, ΣX represents the total score obtained by all students, and N represents the number of students.

The percentage of learning mastery was calculated using the following formula:

$$P = (F / N) \times 100\%$$

where P represents the percentage of learning mastery, F represents the number of students who achieved the Minimum Mastery Criterion (KKM), and N represents the total number of students.

Furthermore, improvements in learning outcomes across cycles were analyzed by comparing the mean scores obtained during the pre-cycle, Cycle I, and Cycle II stages. This analysis was conducted to determine the effectiveness of Artificial Intelligence-Supported Quizlet Flashcards in enhancing students' Arabic vocabulary acquisition. The study was considered successful if at least 80% of the students achieved scores above the Minimum Mastery Criterion established by the school.

Results and Discussion

Prior to the instructional intervention, preliminary observations and a diagnostic test were conducted to identify the initial condition of Arabic vocabulary acquisition among eleventh-grade students at MA Muhammadiyah Kota Bima. The observations revealed that most students experienced difficulties in remembering and understanding previously learned vocabulary. In addition, students tended to be less active during classroom instruction because learning activities were largely dominated by teacher explanations and conventional vocabulary memorization techniques.

The diagnostic test results indicated that students' Arabic vocabulary proficiency remained relatively low. Of the 12 students who participated in the test, only two achieved scores above the school's Minimum Mastery Criterion (KKM), while the remaining ten students failed to meet the required standard. The mean score in the pre-cycle stage was 67, with a learning mastery rate of only 16.7%.

Table 1. Baseline Condition of Students' Arabic Vocabulary Acquisition

Indicator	Result
Number of students	12
Mean score	67
Students achieving mastery	2
Students not achieving mastery	10
Mastery percentage	16.7%

These findings indicate that students' Arabic vocabulary proficiency remained below the expected learning target, highlighting the need for instructional interventions to improve vocabulary acquisition.

Implementation of AI-Supported Quizlet Flashcards in Cycle I

Cycle I was conducted through the stages of planning, action, observation, and reflection. During the planning stage, the researcher prepared vocabulary materials and developed digital flashcards using the Quizlet platform. The learning content integrated into Quizlet was enriched with Artificial Intelligence-generated vocabulary variations, contextual example sentences, and supplementary exercises relevant to the instructional objectives.

During the action stage, students learned vocabulary through the digital flashcards available on Quizlet. They also participated in learning activities using the *Learn*, *Match*, and *Test* features. Throughout the instructional process, students demonstrated greater enthusiasm compared to their previous learning experiences. Observation results indicated that most students actively participated in classroom activities. However, some students still experienced difficulties adapting to the digital platform and therefore required additional guidance.

The post-test results at the end of Cycle I revealed an improvement in students' Arabic vocabulary acquisition. The mean score increased to 75.17, while six students achieved mastery, representing 50% of the class.

Table 2. Arabic Vocabulary Acquisition in Cycle I

Indicator	Result
Number of students	12
Mean score	75.17
Students achieving mastery	6
Students not achieving mastery	6
Mastery percentage	50%

Although the results demonstrated improvement compared to the baseline condition, the success criteria had not yet been fully achieved. Consequently, instructional improvements were implemented in Cycle II.

Implementation of AI-Supported Quizlet Flashcards in Cycle II

Cycle II was conducted based on the reflections derived from Cycle I. The instructional improvements focused on increasing the intensity of vocabulary practice, optimizing the use of Quizlet features, and providing more intensive support to students who continued to experience learning difficulties.

During the implementation stage, students again participated in vocabulary learning using the revised Quizlet Flashcards. They appeared more familiar with the digital learning platform and demonstrated higher levels of participation in various learning activities. Furthermore, students showed greater ability to remember and use the vocabulary they had learned compared to the previous cycle.

The post-test results at the end of Cycle II indicated a more substantial improvement. The mean score increased to 80.67. Of the 12

participating students, 10 achieved scores above the KKM, while only two students remained below the mastery threshold. Consequently, the mastery rate increased to 83.33%.

Table 3. Arabic Vocabulary Acquisition in Cycle II

Indicator	Result
Number of students	12
Mean score	80.67
Students achieving mastery	10
Students not achieving mastery	2
Mastery percentage	83.33%

These findings indicate that the implementation of AI-Supported Quizlet Flashcards enhanced students' Arabic vocabulary acquisition more effectively than the initial instructional condition.

Comparison of Learning Outcomes Across Cycles

The development of students' Arabic vocabulary acquisition can be observed through a comparison of mean scores and mastery percentages across all stages of the study.

Table 4. Comparison of Learning Outcomes Across Research Cycles

Stage	Mean Score	Mastery Percentage
Pre-Cycle	67	16.7%
Cycle I	75.17	50%
Cycle II	80.67	83.33%

Table 4 demonstrates a consistent improvement throughout the research cycles. The mean score increased from 67 in the pre-cycle stage to 75.17 in Cycle I and further increased to 80.67 in Cycle II. Similarly, the mastery rate rose from 16.7% in the pre-cycle stage to 50% in Cycle I and eventually reached 83.33% in Cycle II.

Percentage of Learning Improvement

The improvement in learning outcomes was further analyzed by comparing the mean scores across the research cycles. The results revealed that the increase from the pre-cycle stage to Cycle I was 12.19%, while the increase from Cycle I to Cycle II was 7.31%.

Table 5. Percentage of Learning Improvement

Comparison	Percentage Increase
Pre-Cycle → Cycle I	12.19%
Cycle I → Cycle II	7.31%

These findings indicate that students' Arabic vocabulary acquisition improved progressively across the research cycles. The increase in mean scores and mastery rates reflects a positive development in vocabulary acquisition following the implementation of AI-Supported Quizlet Flashcards.

Discussion

The findings of this study indicate that the implementation of Artificial Intelligence-Supported Quizlet Flashcards positively contributed to the Arabic vocabulary acquisition of eleventh-grade students at MA Muhammadiyah Kota Bima. This improvement was reflected in the increase in students' mean scores from 67 in the pre-cycle stage to 75.17 in Cycle I and 80.67 in Cycle II. Likewise, the mastery rate increased substantially from 16.7% in the pre-cycle stage to 50% in Cycle I and ultimately reached 83.33% in Cycle II. These findings suggest that Quizlet, as a digital flashcard platform, can facilitate Arabic vocabulary acquisition more effectively than conventional approaches primarily based on memorization and teacher-centered instruction.

The improvement in students' vocabulary acquisition can be explained by the characteristics of Quizlet, which incorporates the principles of repetition and retrieval practice.[14] Repeated exposure to newly learned words is a crucial factor in transferring information into long-term memory.[15] Through Quizlet's flashcard features, students repeatedly interacted with vocabulary items in various learning activities. This process enabled learners not only to recognize vocabulary passively but also to recall and apply it in different contexts. Consequently, the learning process became more effective in strengthening vocabulary retention than traditional memorization methods, which often result in short-term recall only.[16]

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[14] Solhi Andarab, Mehdi. "Learning Vocabulary through Collocating on Quizlet." *Universal Journal of Educational Research* 7, no. 4 (April 2019): 980–85. https://doi.org/10.13189/ujer.2019.070409.

[15] Yang, Yu-Fen, Wen-Min Hsieh, Wing-Kwong Wong, Yi-Chun Hong, and Siao-Cing Lai. "Reducing Students' Foreign Language Anxiety to Improve English Vocabulary Learning in an Online Simulation Game." *Computer Assisted Language Learning* 37, no. 3 (March 2024): 410–32. https://doi.org/10.1080/09588221.2022.2039203.

[16] Webb, Stuart, Takumi Uchihara, and Akifumi Yanagisawa. "How Effective Is Second Language Incidental Vocabulary Learning? A Meta-Analysis." *Language Teaching* 56, no. 2 (April 2023): 161–80. https://doi.org/10.1017/S0261444822000507.

In addition to supporting repeated practice, Quizlet provided a more interactive learning experience. While conventional instruction often positions students as passive recipients of information, Quizlet-based learning requires active engagement with learning materials. This active involvement was evident throughout the intervention, as students demonstrated greater enthusiasm in participating in classroom activities and completing the exercises available on the platform. Increased participation suggests that digital learning media can create a more engaging learning environment and encourage learners to become actively involved in the process of Arabic vocabulary acquisition.[17]

These findings can also be interpreted through the perspective of Mobile-Assisted Language Learning (MALL). MALL emphasizes the use of mobile devices to facilitate flexible learning beyond the constraints of time and place.[18] In the present study, Quizlet was accessible through students' smartphones, allowing them to review vocabulary outside formal classroom hours. Such flexibility provided additional opportunities for independent practice and reinforced vocabulary knowledge acquired during classroom instruction.[19] This situation contrasts with traditional learning environments, which are typically limited to scheduled classroom sessions and provide fewer opportunities for continued practice.

Another factor contributing to the improvement in learning outcomes was the gamified nature of Quizlet. Features such as *Learn*, *Match*, and *Test* create learning experiences that resemble game-based activities, thereby increasing student motivation. Elements of competition, challenge, and immediate feedback encouraged students to

[17] Al-Abdullatif, Ahlam Mohammed, and Merfat Ayesh Alsubaie. "Using Digital Learning Platforms for Teaching Arabic Literacy: A Post-Pandemic Mobile Learning Scenario in Saudi Arabia." *Sustainability* 14, no. 19 (September 2022): 11868. https://doi.org/10.3390/su141911868.

[18] Khuluq, Muchsinul, Mamluatul Hasanah, Muasshomah Muasshomah, and Nurul Imamah. "Mobile-Assisted Language Learning Apps: The Analysis of Duolingo." *Al-Ta'rib : Jurnal Ilmiah Program Studi Pendidikan Bahasa Arab IAIN Palangka Raya* 12, no. 2 (December 2024): 229–46. https://doi.org/10.23971/altarib.v12i2.8806.

[19] Kazu, İbrahim Yaşar, and Cemre Kurtoğlu Yalçın. "Investigation of the Effectiveness of Hybrid Learning on Academic Achievement: A Meta-Analysis Study." *International Journal of Progressive Education* 18, no. 1 (February 2022): 249–65. https://doi.org/10.29329/ijpe.2022.426.14.

participate more enthusiastically in learning tasks.[20] According to gamification theory, integrating game elements into educational activities enhances learner engagement and motivation because learning is no longer perceived as a monotonous task.[21] Consistent with this perspective, students in this study appeared more motivated and interested in learning Arabic vocabulary through Quizlet than through traditional memorization-based instruction.

The findings of this study are consistent with previous research reporting the effectiveness of Quizlet in enhancing foreign language vocabulary learning.[22] Digital flashcards have been shown to improve vocabulary retention through the combined effects of visualization, repetition, and structured practice. Furthermore, studies on technology-enhanced learning have demonstrated that interactive digital media can increase students' motivation and engagement throughout the learning process.[23] Therefore, the present findings further support the argument that digital technologies can serve as effective alternatives for addressing challenges in Arabic vocabulary instruction.[24]

Although this study employed Quizlet as the primary learning platform, it also incorporated Artificial Intelligence to support the development of instructional materials. It is important to note that AI was not treated as an independent variable. Instead, it functioned as a supporting tool for designing vocabulary content, generating contextual example sentences, and creating supplementary learning activities integrated into Quizlet. Consequently, AI served as an instructional

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[20] Luo, Zhanni. "Gamification for Educational Purposes: What Are the Factors Contributing to Varied Effectiveness?" *Education and Information Technologies* 27, no. 1 (January 2022): 891–915. https://doi.org/10.1007/s10639-021-10642-9.

[21] Foroutan Far, Fariba, and Mahboubeh Taghizadeh. "Comparing the Effects of Digital and Non-Digital Gamification on EFL Learners' Collocation Knowledge, Perceptions, and Sense of Flow." *Computer Assisted Language Learning* 37, no. 7 (September 2024): 2083–115. https://doi.org/10.1080/09588221.2022.2146724.

[22] Bueno-Alastuey, M. Camino, and Katalin Nemeth. "Quizlet and Podcasts: Effects on Vocabulary Acquisition." *Computer Assisted Language Learning* 35, no. 7 (September 2022): 1407–36. https://doi.org/10.1080/09588221.2020.1802601.

[23] Zhang, Qi, and Zhonggen Yu. "Meta-Analysis on Investigating and Comparing the Effects on Learning Achievement and Motivation for Gamification and Game-Based Learning." *Education Research International* 2022 (August 2022): 1–19. https://doi.org/10.1155/2022/1519880.

[24] Muassomah, Muassomah, and Irwan Abdullah. "Learning with Technology: New Experiences for Indonesian Children During COVID-19." 2021. https://doi.org/10.2991/assehr.k.210421.120.

support tool that enabled teachers to produce richer, more diverse, and more contextually relevant learning materials.

The role of AI in this study demonstrates its practical potential for supporting Arabic language teachers in lesson preparation.[25] One challenge frequently faced by teachers is the limited time available to develop engaging and varied instructional materials. By utilizing AI, the preparation of learning materials can be conducted more efficiently without compromising content quality. Teachers nevertheless remain responsible for reviewing, verifying, and adapting AI-generated materials before implementation. Therefore, AI should not be viewed as a replacement for teachers but rather as a complementary tool that enriches learning resources and enhances instructional design.[26]

From a pedagogical perspective, the findings offer several implications for Arabic language teaching in madrasah settings. First, teachers should consider integrating digital learning media to enhance student engagement. Second, technologies such as Quizlet provide practical solutions because they require minimal infrastructure and can be accessed through students' existing mobile devices. Third, the use of Artificial Intelligence to support instructional material development offers new opportunities for teachers to create more innovative, contextualized, and learner-centered content. Consequently, the integration of digital learning platforms and AI-assisted instructional design may represent a promising strategy for improving the quality of Arabic language education in the era of digital transformation.

Overall, the findings demonstrate that Artificial Intelligence-Supported Quizlet Flashcards can facilitate the improvement of Arabic vocabulary acquisition through a learning environment that is more interactive, flexible, and engaging. The observed improvement in learning outcomes not only reflects the effectiveness of Quizlet as a digital learning platform but also highlights the potential of Artificial Intelligence as a supporting tool for the development of Arabic language

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[25] Shobeiry, Maria, and Ehsan Namaziandost. "The Impact of AI-Mediated Gamified Flipped Learning on Adult English Language Learners' Vocabulary Learning and Motivation in Mobile-Assisted Language Learning Contexts." *Computer Assisted Language Learning*, February 3, 2026, 1–25. https://doi.org/10.1080/09588221.2026.2625215.

[26] Liu, Qing, Jingju Chou, and Hong Feng. "Effect of Teachers' Self-Efficacy with Generative AI and Reflection on Students' Second Language Achievement." *Computer Assisted Language Learning*, June 8, 2025, 1–22. https://doi.org/10.1080/09588221.2025.2498095.

learning materials. These findings contribute to the growing body of research on Artificial Intelligence in Education (AIEd), Mobile-Assisted Language Learning (MALL), and technology-enhanced Arabic vocabulary instruction.

Conclusion

This study demonstrates that the implementation of Artificial Intelligence-Supported Quizlet Flashcards can enhance Arabic vocabulary acquisition among eleventh-grade students at MA Muhammadiyah Kota Bima. The improvement was reflected in the increase in students' mean scores from 67 in the pre-cycle stage to 75.17 in Cycle I and 80.67 in Cycle II. Similarly, the learning mastery rate increased significantly from 16.7% in the pre-cycle stage to 50% in Cycle I and reached 83.33% in Cycle II. These findings indicate that the use of Quizlet as a digital flashcard-based learning platform, supported by AI-assisted content development, can create a more interactive, flexible, and engaging learning experience, thereby facilitating the improvement of students' Arabic vocabulary acquisition.

This study offers both theoretical and practical implications for the development of technology-enhanced Arabic language learning, particularly in the context of integrating Artificial Intelligence in Education (AIEd), Mobile-Assisted Language Learning (MALL), and digital flashcard-based vocabulary instruction. From a practical perspective, the findings suggest that Arabic language teachers can utilize Quizlet supported by AI-assisted learning-material development as an effective and easily implementable instructional strategy in madrasah settings. The significance of this study lies in its attempt to integrate AI as an instructional support tool in vocabulary learning, an approach that remains relatively underexplored within the context of Arabic language education in Indonesia. Nevertheless, this study is limited by its relatively small sample size, its focus on a single madrasah, and its use of a Classroom Action Research design aimed at improving instructional practices within a specific classroom context. Therefore, future studies are recommended to involve larger participant groups, explore more diverse educational settings, and examine the effects of AI-supported learning materials on other aspects of Arabic language learning, such as learning motivation, language skills development, long-term vocabulary retention, and AI-driven adaptive learning.

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