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Integrating Active Learning within an AI-Supported Gamified Environment through Zep Quiz to Improve Arabic Language Achievement

Ahmad Sucipto Mulyo Utomo¹, Robiyah Nur², Damanhuri³, Erni Zuliana⁴

^{1,2,3,4} *Universitas Islam Negeri Raden Intan Lampung, Indonesia*

Corresponding E-mail: ahmadsucipto.mu@gmail.com

Abstract

This study investigates the integration of Active Learning into an AI-supported gamified environment through Zep Quiz to improve Arabic language achievement among seventh-grade students at MTs Negeri 1 Bandar Lampung. The study employed Classroom Action Research (CAR) based on the Kemmis and McTaggart model, consisting of two cycles involving 32 students. Data were collected through classroom observations, learning achievement tests, and documentation. Quantitative data were analyzed using mean scores, classical mastery percentages, and N-Gain, while qualitative data were analyzed through observations of student engagement during the learning process. The findings reveal that the integration of Active Learning and Zep Quiz successfully enhanced both student engagement and Arabic language achievement. The average score increased from 52.38 in the pre-cycle stage to 78.13 in Cycle I and 87.50 in Cycle II. Similarly, classical mastery improved from 28.13% to 65.63% and eventually reached 90.63%, exceeding the predetermined success criterion of 85%. The N-Gain score of 0.74 indicates a high level of improvement. These findings suggest that AI-supported gamified learning environments can effectively support Active Learning and foster meaningful improvements in Arabic language learning outcomes.

Keywords: *AI-Supported Learning, Active Learning, Gamification, Zep Quiz, Arabic Language Achievement*

Abstrak

Penelitian ini bertujuan untuk mengkaji integrasi Active Learning dalam AI-supported gamified environment melalui Zep Quiz untuk meningkatkan capaian belajar bahasa Arab peserta didik kelas VII MTs Negeri 1 Bandar Lampung. Penelitian menggunakan pendekatan Penelitian Tindakan Kelas (PTK) model Kemmis dan McTaggart yang dilaksanakan dalam dua siklus dengan melibatkan 32 peserta didik. Data dikumpulkan melalui observasi, tes hasil belajar, dan dokumentasi. Data kuantitatif dianalisis menggunakan nilai rata-rata, persentase ketuntasan klasikal, dan N-Gain, sedangkan data kualitatif dianalisis melalui observasi keterlibatan peserta didik selama pembelajaran berlangsung. Hasil penelitian menunjukkan bahwa integrasi Active Learning dan Zep Quiz berhasil meningkatkan keterlibatan peserta didik sekaligus capaian belajar bahasa Arab. Nilai rata-rata meningkat dari 52,38 pada tahap pra-siklus menjadi 78,13 pada siklus I dan 87,50 pada siklus II. Ketuntasan klasikal juga meningkat dari 28,13% menjadi 65,63% dan mencapai 90,63% pada siklus II, melampaui indikator keberhasilan sebesar 85%. Nilai N-Gain sebesar 0,74 menunjukkan peningkatan dalam kategori tinggi. Temuan ini mengindikasikan bahwa AI-supported gamified learning environment dapat mendukung implementasi Active Learning secara efektif serta meningkatkan hasil belajar bahasa Arab peserta didik.

Kata Kunci: *AI-Supported Learning, Active Learning, Gamifikasi, Zep Quiz, Hasil Belajar Bahasa Arab*

Introduction

Arabic occupies a central position in Islamic education as it serves as the language of the Qur'an, Hadith, and classical Islamic literature, which constitute the primary sources of learning for Muslim students.¹ Beyond its role in understanding religious teachings, Arabic is also an international language widely used in educational, social, cultural, and global communication contexts.² Therefore, Arabic language instruction in Islamic educational institutions aims not only to develop linguistic competence but also to equip students with the ability to comprehend and use Arabic effectively in both academic and practical settings.

¹ Hamsira M. Harad, and Benjier H. Arriola. "Implementation of Arabic Language and Islamic Values Education (ALIVE)." *THE American Journal of Humanities and Social Sciences Research (THE AJHSSR)* 5, no. 3 (2022): 47–57.

² Hamed Sedghi, Soheyla Mohseny nejad, Seyyed Adnan Eshkevari, Pouran Rezaei choshali, and Hossein Talebzadeh. "Identifying the Speaking Proficiency Level of Arabic Learners in Accordance with the International Guidelines of ACTFL for Assessing Proficiency in Foreign Languages." *Research in Arabic Language* 12, no. 25 (January 2020): 1–22.

Amid rapid technological advancement, education has entered an era of digital transformation characterized by the increasing integration of intelligent technologies into teaching and learning processes. The emergence of Artificial Intelligence in Education (AIED) has stimulated various educational innovations that promote more interactive, personalized, and learner-centered learning experiences.³ Contemporary learning environments no longer rely solely on conventional face-to-face instruction but increasingly utilize digital technologies capable of providing immediate feedback, facilitating dynamic interactions, and enhancing student engagement throughout the learning process.

One manifestation of learning innovation in the age of artificial intelligence is the application of gamification in digital learning environments.⁴ Gamification refers to the integration of game elements into educational activities to enhance students' motivation, engagement, and learning experiences. Within technology-enhanced learning contexts, gamification has evolved into a component of AI-supported learning environments that utilize digital systems to create more engaging and interactive learning experiences. Through mechanisms such as challenges, competition, rewards, instant feedback, and progress visualization, gamification encourages students to participate actively in the learning process.⁵

One platform that supports such a gamified learning environment is Zep Quiz. This platform offers an interactive quiz-based learning experience within a virtual environment that enables students to interact directly with learning materials and their peers.⁶ Features such as real-time feedback, automated score tracking, immersive digital interaction,

³ 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>.

⁴ Khuluq, Muchsinul, and Nurul Imamah. "Enhancing Arabic Reading Skills: A Prezi Program-Based Learning Material Development for Integrated Islamic Elementary Schools in Indonesia." *Journal of Arabic Language Learning and Teaching (JALLT)* 2, no. 1 (March 2024): 33–58. <https://doi.org/10.23971/jallt.v2i1.157>.

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

⁶ Husen, Fitria Afifah, and Fitria Wulandari. "The Influence of Zep Quiz Educational Game Media on Elementary School Students' Understanding of Science Concepts on the Material of Changes in the State of Objects." Preprint, August 27, 2025. <https://doi.org/10.21070/ups.9137>.

and game-based learning activities make Zep Quiz relevant for supporting twenty-first-century learning. From a digital learning perspective, these features reflect the characteristics of an AI-supported gamified environment designed to enhance student engagement and learning experiences.

Nevertheless, the integration of digital technology alone does not guarantee successful learning outcomes. The effectiveness of technology-enhanced instruction largely depends on the pedagogical strategies employed by teachers.⁷ In this regard, Active Learning is considered an effective approach for maximizing the educational potential of digital technologies. Active Learning positions students as active participants in the learning process through activities that encourage critical thinking, discussion, problem-solving, and knowledge construction. Consequently, integrating Active Learning with technology-supported gamified learning environments has the potential to create more meaningful learning experiences while improving students' academic achievement.

Despite these opportunities, Arabic language instruction in many madrasahs continues to face several challenges. Preliminary observations and interviews with Arabic language teachers at MTs Negeri 1 Bandar Lampung revealed that instruction remains predominantly reliant on conventional media, including textbooks, whiteboards, and visual aids. The use of interactive digital learning media remains limited, resulting in suboptimal levels of student participation, enthusiasm, and engagement. This condition has contributed to low learning achievement. Initial assessment data indicated that students' average scores remained below the Minimum Mastery Criterion (KKM), while the level of classical mastery had not yet reached the target established by the school. These findings highlight the need for instructional innovations capable of enhancing student engagement and improving Arabic language learning outcomes.

Previous studies have demonstrated that the integration of gamification and active learning positively influences student engagement and academic achievement. Murillo-Zamorano et al. found that gamification within active learning settings improved student satisfaction, skill development, and academic performance in higher

⁷ Anggeraini, Yentri. "LANGUAGE TEACHING IN THE DIGITAL AGE: TEACHERS' VIEWS AND ITS CHALLENGES." *Research and Innovation in Language Learning* 3, no. 3 (October 2020): 163. <https://doi.org/10.33603/rill.v3i3.3444>.

education.⁸ Likewise, Li's meta-analysis revealed that gamification significantly enhances learning outcomes, motivation, and engagement across various educational levels.⁹ Similar findings were reported by Zeng et al., whose meta-analysis confirmed the positive impact of gamification on academic achievement across different educational contexts and subject areas.¹⁰

Recent developments indicate that gamification is increasingly being integrated with artificial intelligence to create more adaptive and interactive learning environments. Salmanova reported that the integration of AI and gamification enhances learner motivation, engagement, and language learning experiences through personalized learning mechanisms and real-time feedback.¹¹ Furthermore, a systematic review conducted by Niyazova et al. demonstrated that gamified AI-supported digital learning environments can improve student engagement, personalized learning, and instructional effectiveness across diverse educational settings.¹² However, most previous studies have focused on general education, English language learning, or higher education contexts. Research examining how Active Learning can be integrated into an AI-supported gamified environment through platforms such as Zep Quiz to enhance Arabic language

⁸ Murillo-Zamorano, Luis R., José Ángel López Sánchez, Ana Luisa Godoy-Caballero, and Carmen Bueno Muñoz. "Gamification and Active Learning in Higher Education: Is It Possible to Match Digital Society, Academia and Students' Interests?" *International Journal of Educational Technology in Higher Education* 18, no. 1 (March 2021): 15. <https://doi.org/10.1186/s41239-021-00249-y>.

⁹ Li, Minzi, Siyu Ma, and Yuyang Shi. "Examining the Effectiveness of Gamification as a Tool Promoting Teaching and Learning in Educational Settings: A Meta-Analysis." *Frontiers in Psychology* 14 (October 2023). <https://doi.org/10.3389/fpsyg.2023.1253549>.

¹⁰ Zeng, Jiyuan, Daner Sun, Chee-Kit Looi, and Andy Chun Wai Fan. "Exploring the Impact of Gamification on Students' Academic Performance: A Comprehensive Meta-analysis of Studies from the Year 2008 to 2023." *British Journal of Educational Technology* 55, no. 6 (November 2024): 2478–502. <https://doi.org/10.1111/bjet.13471>.

¹¹ Salmanova, Shehla. "Gamification and AI in Language Learning – A New Era of Digital Education." *Acta Globalis Humanitatis et Linguarum* 2, no. 1 (February 2025): 262–69. <https://doi.org/10.69760/aghel.02500134>.

¹² Niyazova, Gulzhan Zholaushievna, Balzhan Meirbekkyzy Duisekeyeva, Dinara Kadirkhankyzy Berdi, Indira Bakhytovna Usembayeva, and Aknur Amangeldiyevna Mindetbayeva. "The Effects of Gamified AI-Supported Digital Learning Environments on Personalized Learning and Student Engagement in School Education: A Systematic Review and Meta-Analysis." *Frontiers in Education* 11 (April 2026). <https://doi.org/10.3389/educ.2026.1754080>.

achievement in madrasah settings remains limited. This gap provides the rationale for the present study.

Addressing this gap, the present study offers a novel contribution by integrating Active Learning into an AI-supported gamified environment through the use of Zep Quiz in Arabic language instruction. This integration is expected not only to enhance student engagement during the learning process but also to improve Arabic language achievement.

Accordingly, this study aims to investigate the implementation of Active Learning within an AI-supported gamified environment through Zep Quiz and to examine its impact on students' Arabic language achievement at MTs Negeri 1 Bandar Lampung. Specifically, the study addresses two research questions: (1) How is Active Learning implemented within an AI-supported gamified environment through Zep Quiz in Arabic language instruction? and (2) To what extent does this implementation improve students' Arabic language achievement?

Method

This study employed a Classroom Action Research (CAR) approach based on the Kemmis and McTaggart model, which consists of four main stages: planning, action, observation, and reflection.¹³ This model was selected because it enables researchers to systematically improve instructional practices through iterative action cycles until the intended learning objectives are achieved. In this study, the intervention involved integrating Active Learning into an AI-supported gamified learning environment through the use of the Zep Quiz platform in Arabic language instruction.

The study was conducted at MTs Negeri 1 Bandar Lampung during the second semester of the 2025/2026 academic year. The participants were 32 seventh-grade students from Class VII-D. The class was selected purposively based on preliminary observations indicating low levels of student participation in Arabic language learning and unsatisfactory learning outcomes that had not yet reached the expected level of mastery.

The research was conducted from January to February 2026 and consisted of two action cycles. Each cycle comprised two instructional meetings and followed the stages of planning, action, observation, and

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

reflection. During the planning stage, the researcher developed Active Learning-based instructional materials, designed learning activities using Zep Quiz, prepared observation instruments, and developed pre-test and post-test assessments. During the action stage, Arabic language instruction was implemented using Active Learning strategies supported by Zep Quiz as an AI-supported gamified learning environment. Students participated in various active learning activities, including discussions, problem-solving tasks, collaborative group work, and interactive quiz challenges designed to enhance their engagement and participation throughout the learning process.

The observation stage was conducted to monitor instructional implementation, teacher performance, and student engagement during classroom activities. The observed aspects included students' attention to learning activities, participation in discussions, responses to questions, involvement in Zep Quiz activities, and interactions throughout the learning process. Subsequently, the reflection stage was carried out at the end of each cycle to evaluate the outcomes of the intervention, identify challenges encountered during implementation, and formulate improvements for the subsequent cycle.

Data were collected through observation, learning achievement tests, and documentation. Observation was used to obtain data on student engagement during the learning process. Learning achievement data were collected through pre-tests and post-tests administered before and after the intervention to measure improvements in Arabic language achievement. Documentation was employed to complement the research data through photographs, instructional records, and other supporting documents.

The collected data were analyzed using both quantitative and qualitative techniques. Quantitative analysis was conducted on pre-test and post-test results by calculating the class mean score, the percentage of learning mastery, and improvements in learning outcomes across cycles. To strengthen the analysis of learning improvement, the N-Gain score was calculated as an indicator of the effectiveness of the intervention. Qualitative analysis was used to interpret observational data concerning student engagement and the implementation of the instructional process throughout the study.

The success criteria were determined based on classical learning mastery. The intervention was considered successful when at least 85% of students achieved the Minimum Mastery Criterion (MMC) score of 79. In addition, improvements in student engagement throughout the

learning process were used as a supporting indicator of the successful implementation of Active Learning within an AI-supported gamified learning environment through Zep Quiz.

Results and Discussion

This study aimed to integrate Active Learning into an AI-supported gamified environment through the use of Zep Quiz to improve students' Arabic language achievement. Prior to the intervention, a preliminary observation was conducted to examine the existing condition of Arabic language instruction in Class VII-D at MTs Negeri 1 Bandar Lampung. The findings revealed that the instructional process was predominantly based on conventional media, including textbooks, whiteboards, and simple visual aids. This condition contributed to low levels of student engagement during classroom activities. Most students tended to be passive, participated minimally in discussions, and demonstrated limited attention to the instructional content. Consequently, learning achievement remained below the expected level of mastery.

These findings were reinforced by the pre-test results administered before the intervention. The analysis showed that the mean score was only 52.38, with a classical mastery level of 28.13%. Of the 32 students participating in the study, only nine achieved the Minimum Mastery Criterion (MMC) score of 79, while the remaining twenty-three students failed to meet the required standard.

Table 1. Student Learning Achievement in the Pre-Cycle Stage

Category	Number of Students	Percentage
Mastery (≥ 79)	9	28.13%
Non-Mastery (< 79)	23	71.87%
Total	32	100%

Class Mean Score = 52.38

The findings indicate that the majority of students experienced difficulties in understanding Arabic language materials. Therefore, an instructional intervention was required to enhance student engagement and improve learning achievement.

As an improvement effort, Active Learning supported by Zep Quiz as an AI-supported gamified environment was implemented. During Cycle I, students participated in various active learning activities that required direct involvement in the learning process. Instruction shifted from a teacher-centered approach to a student-centered model through discussions, collaborative work, material exploration, and

interactive quiz challenges delivered through Zep Quiz. The interactive digital environment enabled students to receive immediate feedback, monitor their scores in real time, and interact with their peers in a more engaging learning atmosphere.

Classroom observations during Cycle I indicated positive behavioral changes among students. They demonstrated greater attention to classroom activities and became more actively involved in learning tasks. However, some students still experienced difficulties adapting to the digital platform and had not yet participated optimally in discussions and quiz activities.

The increase in student engagement during Cycle I was reflected in the observation results presented below.

Table 2. Observation Results of Teacher Activity and Student Engagement in Cycle I

Observed Aspect	Mean Score	Category
Teacher Activity	2.53	Fair
Student Engagement	2.69	Fair

These findings indicate that the implementation of Active Learning within an AI-supported gamified learning environment began to enhance student engagement, although its effectiveness had not yet reached the desired level. This condition was largely attributable to the need for additional support in helping students utilize the available digital learning features effectively.

The positive impact of the intervention was also evident in the post-test results. The mean score increased substantially from 52.38 to 78.13. Furthermore, the number of students achieving mastery increased from nine to twenty-one students.

Table 3. Student Learning Achievement in Cycle I

Category	Number of Students	Percentage
Mastery (≥ 79)	21	65.63%
Non-Mastery (< 79)	11	34.37%
Total	32	100%

Class Mean Score = 78.13

Although a considerable improvement was observed, the level of classical mastery in Cycle I remained below the predetermined success criterion of 85%. Therefore, the intervention was continued in Cycle II with several improvements based on reflection results, including optimizing the use of Zep Quiz, providing additional guidance for struggling students, strengthening collaborative activities, and improving time management during instruction.

The implementation of Cycle II demonstrated greater progress than Cycle I. Students became increasingly familiar with Zep Quiz and more actively engaged in learning activities. Peer interaction intensified, discussions became more dynamic, and participation in quiz challenges increased significantly. The gamified learning environment, supported by instant feedback and learning progress visualization, successfully enhanced students' attention, motivation, and engagement throughout the instructional process.

This improvement was reflected in the observation results shown below.

Table 4. Observation Results of Teacher Activity and Student Engagement in Cycle II

Observed Aspect	Mean Score	Category
Teacher Activity	3.13	Good
Student Engagement	3.62	Good

The findings indicate a substantial improvement in instructional quality compared to Cycle I. Student engagement increased from the "fair" category to the "good" category, suggesting that the integration of Active Learning and Zep Quiz created a more participatory learning environment and encouraged active involvement in Arabic language learning.

The increase in student engagement was followed by improvements in learning achievement. Post-test results in Cycle II showed that the mean score increased to 87.50, while the number of students achieving mastery rose to twenty-nine students, representing 90.63% of the class.

Table 5. Student Learning Achievement in Cycle II

Category	Number of Students	Percentage
Mastery (≥ 79)	29	90.63%
Non-Mastery (< 79)	3	9.37%
Total	32	100%

Class Mean Score = 87.50

These findings indicate that the success criterion was achieved, as the level of classical mastery exceeded the target of 85%. Consequently, the intervention was considered successful, and no additional cycle was required.

To provide a more comprehensive overview of students' learning improvement, learning achievement across all stages of the study was compared, as presented in Table 6.

Table 6. Comparison of Students' Learning Achievement Across Research Stages

Stage	Mean Score	Classical Mastery
Pre-Cycle	52.38	28.13%
Cycle I	78.13	65.63%
Cycle II	87.50	90.63%

Table 6 demonstrates a consistent upward trend in students' learning achievement throughout the research cycles. The mean score increased by 25.75 points from the pre-cycle stage to Cycle I and improved by an additional 9.37 points in Cycle II. Similarly, the level of classical mastery increased substantially from 28.13% at the baseline stage to 90.63% at the end of the intervention.

The effectiveness of the intervention was further confirmed through the N-Gain analysis. Based on the mean scores obtained in the pre-cycle stage and Cycle II, the calculated N-Gain score was 0.74, which falls within the high category. This finding indicates that integrating Active Learning into an AI-supported gamified learning environment through Zep Quiz made a substantial contribution to improving students' Arabic language achievement.

Overall, the findings demonstrate that integrating Active Learning with Zep Quiz as an AI-supported gamified learning environment not only enhanced student engagement throughout the learning process but also significantly improved Arabic language achievement. The increase in student engagement, reflected in higher levels of participation, attention, and enthusiasm, contributed to the consistent improvement in learning outcomes across both research cycles. These findings suggest that technology-supported gamified learning environments can serve as an effective instructional alternative for promoting more interactive, participatory, and achievement-oriented Arabic language learning.

Discussion

The findings indicate that integrating Active Learning into an AI-supported gamified learning environment through Zep Quiz significantly enhanced both student engagement and Arabic language achievement. This improvement was reflected in increased classroom participation, a rise in classical mastery from 28.13% in the pre-cycle stage to 65.63% in Cycle I and 90.63% in Cycle II, and an increase in the mean score from 52.38 to 87.50 by the end of the study. These findings suggest that combining student-centered pedagogical strategies with a gamified

digital learning environment creates a more effective learning experience than conventional teacher-centered instruction.

The improvement in learning achievement can be explained by the fundamental characteristics of Active Learning, which positions students as active participants in the learning process. Unlike traditional instruction, where students primarily receive information passively, Active Learning encourages learners to engage in discussions, express ideas, solve problems, and construct knowledge through interaction with learning materials and peers.¹⁴ Such active participation enables students to process information more deeply, resulting in more meaningful understanding and improved knowledge retention. These findings are consistent with the constructivist perspective, which argues that knowledge is actively constructed through meaningful learning experiences rather than transmitted directly from teachers to learners.¹⁵

Beyond the pedagogical contribution of Active Learning, the improvement in learning achievement was also supported by the role of Zep Quiz as an AI-supported gamified learning environment. In this study, Zep Quiz functioned not merely as a quiz-delivery platform but as a digital learning environment that provided interactive features capable of enriching students' learning experiences. Automated scoring, instant feedback, game-based challenges, learning progress visualization, and real-time interaction created a more engaging learning atmosphere than conventional classroom instruction.¹⁶ These characteristics align with the concept of AI-supported learning environments, which emphasize the role of intelligent digital technologies in creating responsive, interactive, and learner-centered educational experiences. Accordingly, technology in this study functioned as a pedagogical enabler that

¹⁴ Souissi, Mayssa. *Harnessing Generative AI to Enhance Critical Thinking and Active Learning in a Second-Year English Language Project for Engineering Students: A Case Study*. 2026. https://doi.org/10.1007/978-3-032-16635-7_25.

¹⁵ Song, Chuanxiang, Seong-Yoon Shin, and Kwang-Seong Shin. "Optimizing Foreign Language Learning in Virtual Reality: A Comprehensive Theoretical Framework Based on Constructivism and Cognitive Load Theory (VR-CCL)." *Applied Sciences* 13, no. 23 (November 2023): 12557. <https://doi.org/10.3390/app132312557>.

¹⁶ Shortt, Mitchell, Shantanu Tilak, Irina Kuznetcova, Bethany Martens, and Babatunde Akinkuolie. "Gamification in Mobile-Assisted Language Learning: A Systematic Review of Duolingo Literature from Public Release of 2012 to Early 2020." *Computer Assisted Language Learning* 36, no. 3 (March 2023): 517–54. <https://doi.org/10.1080/09588221.2021.1933540>.

strengthened instructional implementation rather than merely serving as a medium for content delivery.¹⁷

Another important finding was the significant increase in student engagement throughout the intervention. Classroom observation data showed that student engagement improved from the fair category in Cycle I to the good category in Cycle II. During the implementation, students demonstrated greater attention to instructional activities, participated more actively in classroom discussions, responded more frequently to teachers' questions, and showed stronger motivation to complete the interactive challenges provided through Zep Quiz. These findings suggest that student engagement served as the primary mechanism linking the instructional strategy to improved learning achievement. In other words, the improvement in Arabic language achievement was not generated directly by the use of technology itself but by technology's ability to foster higher levels of participation, attention, and motivation during the learning process.¹⁸

This increase in student engagement can also be interpreted through the lens of gamification theory, which posits that game elements stimulate both intrinsic and extrinsic motivation.¹⁹ Features such as challenges, rewards, competition, and immediate feedback encouraged students to participate more actively in classroom activities. As students became motivated to achieve higher scores and monitor their progress in real time, they developed a stronger commitment to participating in learning activities. Consequently, the classroom evolved into a more dynamic, interactive, and student-centered learning environment. Therefore, increased student engagement can be regarded as one of the

¹⁷ Ismail, Heba, Moutasim el Ayoubi, Mohammad Qassem, and Fares al Areefi. "Assessing the Impact of Gamification Tools' Usability on Student Engagement: A Comparative Study in Engineering Education." *2024 4th Interdisciplinary Conference on Electrics and Computer (INTCEC)*, June 11, 2024, 1–8. <https://doi.org/10.1109/INTCEC61833.2024.10603117>.

¹⁸ 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>.

¹⁹ Gao, Ya, and Lin Pan. "Learning English Vocabulary through Playing Games: The Gamification Design of Vocabulary Learning Applications and Learner Evaluations." *The Language Learning Journal* 51, no. 4 (July 2023): 451–71. <https://doi.org/10.1080/09571736.2023.2217828>.

primary factors contributing to improved Arabic language achievement.²⁰

The improvement in students' academic performance further indicates that the integration of Active Learning and Zep Quiz effectively supported deeper learning processes. In Arabic language instruction, successful learning depends not only on memorizing vocabulary or grammatical rules but also on students' sustained interaction with learning materials. Through collaborative discussions, material exploration, and interactive quiz activities, students engaged more frequently in retrieval practice, which involves recalling previously learned information. Previous research has consistently shown that retrieval practice is an effective strategy for strengthening long-term retention and conceptual understanding.²¹ Furthermore, the instant feedback provided by Zep Quiz enabled students to identify and correct misconceptions immediately, thereby accelerating the learning process.

The findings also reinforce previous studies highlighting the effectiveness of Active Learning in improving student participation and academic achievement. Earlier research consistently reported that Active Learning promotes greater classroom participation, enhances teacher–student interaction, and facilitates deeper conceptual understanding.²² The present findings confirm these conclusions within the context of Arabic language instruction in Islamic secondary schools. Likewise, this study supports previous research demonstrating that Zep Quiz enhances learning motivation, student engagement, and content mastery through gamified instructional approaches.

Nevertheless, the present study extends previous research by offering a more integrated perspective on technology-enhanced Arabic language learning. While earlier studies generally examined Active

²⁰ Govender, Terence, and Joan Arnedo-Moreno. "A Survey on Gamification Elements in Mobile Language-Learning Applications." *Eighth International Conference on Technological Ecosystems for Enhancing Multiculturality* (New York, NY, USA), October 21, 2020, 669–76. <https://doi.org/10.1145/3434780.3436597>.

²¹ Hadi Mogavi, Reza, Bingcan Guo, Yuanhao Zhang, Ehsan-UI Haq, Pan Hui, and Xiaojuan Ma. "When Gamification Spoils Your Learning: A Qualitative Case Study of Gamification Misuse in a Language-Learning App." *Proceedings of the Ninth ACM Conference on Learning @ Scale* (New York, NY, USA), June 2022, 175–88. <https://doi.org/10.1145/3491140.3528274>.

²² Al-Khresheh, Mohammad Hamad. "The Cognitive and Motivational Benefits of Gamification in English Language Learning: A Systematic Review." *The Open Psychology Journal* 18, no. 1 (March 2025). <https://doi.org/10.2174/0118743501359379250305083002>.

Learning and Zep Quiz as separate instructional approaches, this study demonstrates that integrating both within an AI-supported gamified learning environment produces more comprehensive educational outcomes. The findings indicate that Active Learning provides the pedagogical foundation for meaningful student participation, whereas Zep Quiz functions as the digital learning environment that strengthens engagement and enriches learning experiences. The synergy between these pedagogical and technological components ultimately contributes to sustained improvements in student engagement and Arabic language achievement.

Overall, the findings suggest that successful learning is determined not merely by the adoption of technology or instructional strategies independently but by the effective integration of both within the instructional process. Integrating Active Learning into an AI-supported gamified learning environment through Zep Quiz proved capable of creating a more interactive, participatory, and meaningful Arabic language learning experience. These findings highlight the potential of technology-supported gamified learning environments as an innovative instructional approach for improving the quality of Arabic language education in the era of digital transformation, particularly by fostering sustained student engagement and enhanced learning achievement.

Conclusion

This study concludes that integrating Active Learning into an AI-supported gamified learning environment through the use of Zep Quiz effectively improved the Arabic language achievement of seventh-grade students at MTs Negeri 1 Bandar Lampung. The findings address the first research question by demonstrating that Active Learning was implemented through various student-centered learning activities, including discussions, collaborative group work, material exploration, and interactive quiz challenges delivered via Zep Quiz. These activities were supported by real-time feedback, automated scoring, and digital interaction, all of which encouraged greater student engagement throughout the learning process. The second research question was answered by the substantial improvement in students' learning achievement, as reflected in the increase in the mean score from 52.38 in the pre-cycle stage to 78.13 in Cycle I and 87.50 in Cycle II, alongside an improvement in classical mastery from 28.13% to 90.63%. Moreover, the observed increase in student engagement indicates that improvements in learning achievement were attributable not only to the use of technology but also to the effective integration of student-centered pedagogical strategies within a technology-supported gamified learning environment.

The findings offer both theoretical and practical implications for the advancement of Arabic language education in the era of digital transformation. Theoretically, this study reinforces the view that integrating student-centered pedagogical approaches with AI-supported gamified learning environments can simultaneously enhance student engagement and academic achievement. Practically, the findings suggest that Zep Quiz can serve as an effective digital learning environment for supporting the implementation of Active Learning in Arabic language instruction. Nevertheless, this study has several limitations, including the use of a Classroom Action Research design involving only one class at a single educational institution, the relatively short duration of the intervention, and the focus on student engagement and cognitive learning achievement as the primary outcome measures. Therefore, future research is recommended to involve larger and more diverse samples, employ experimental or mixed-methods designs, and investigate additional variables such as learning motivation, self-regulated learning, digital engagement, and technology acceptance to provide a more comprehensive understanding of the effectiveness of AI-supported gamified learning environments in Arabic language education.

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