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Enhancing Students' Vocabulary Mastery through AI-Based Quizizz: A Classroom Action Research at SMA Budi Agung Medan

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ABSTRACT
Purpose – This study aims to improve students' vocabulary mastery in descriptive texts through Artificial Intelligence (AI) Based Quizizz, a gamified and interactive learning tool. It addresses the challenge of low vocabulary retention and aims to boost engagement and motivation in English learning.
Method – Using a Classroom Action Research (CAR) design, the study was conducted in two cycles with tenth-grade students at SMA Budi Agung Medan. Data were collected through vocabulary tests, observation sheets, and interviews. Quantitative data were analyzed descriptively, while qualitative data were examined thematically to assess changes in students' attitudes, motivation, and participation.
Findings – The integration of AI based Quizizz led to significant improvements in students' vocabulary mastery and active engagement. The game-based features and real-time feedback created a student-centered learning environment, enhancing vocabulary retention and motivation.
Research Implications – This study underscores the potential of AI-driven gamification tools like Quizizz in enhancing English learning. It suggests further research on its use in other language skills and its long-term impact on motivation and performance.

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Introduction

Vocabulary is a foundational element of language proficiency, playing a critical role in students' ability to comprehend texts, express ideas, and engage in meaningful communication. As stated by Sari & Pandiangan (2021), a person's success in using language, both orally and in writing, largely depends on their vocabulary mastery. In the context of English language learning, vocabulary acquisition is essential for developing the four core skills: speaking, writing, reading, and listening. Without adequate vocabulary, students struggle to understand content, express themselves clearly, and perform well academically.

At the senior high school level, particularly for the tenth-grade students, vocabulary mastery is crucial for both academic success and effective communication. However, observations at SMA Swasta Budi Agung Medan indicate that many students struggle with vocabulary acquisition. Key challenges include low motivation, limited exposure to vocabulary beyond the classroom, and traditional, teacher-centered methods that lack engagement. The reliance on rote memorization and repetition often leads to poor retention and limited application of vocabulary in real-world contexts. Similar challenges have been observed in Indonesian EFL settings, where traditional methods have been shown to hinder vocabulary retention and transferability (Putra, 2023).

Traditional methods such as copying word lists or drilling definitions are no longer effective in today's digital age, particularly for Generation Z learners who are highly accustomed to interactive and technology-based experiences. Therefore, a shift toward more dynamic, engaging, and contextualized vocabulary learning is needed. In this regard, the use of educational technology, particularly Artificial Intelligence (AI), offers promising potential. Lee & Kang (2022) highlight that AI in language learning can adapt materials to individual learners' proficiency levels, deliver instant feedback, and promote higher engagement through personalized learning pathways. Moreover, recent studies Rahimi et al. (2023) emphasize that AI-powered gamification platforms significantly enhance vocabulary retention, learner autonomy, and motivation when compared to traditional instruction.

One such platform is quizizz, an AI-integrated gamified learning tool that allows educators to create interactive quizzes, assign tasks, and monitor student progress in real time. Unlike static methods, quizizz incorporates game-like features such as points, timers, avatars, and leaderboards, which make learning more enjoyable and competitive. Compared to other platforms like kahoot, wordwall, or duolingo, quizizz offers several advantages: Personalized Learning Paths: AI in quizizz can adjust question difficulty and provide feedback tailored to each learner's performance. Asynchronous and Synchronous Flexibility: Unlike Kahoot, which is mostly live, quizizz allows both real-time and homework-based activities.Rich Analytics: quizizz provides comprehensive insights on

student performance, making it easier for teachers to diagnose and respond to learning gaps. Integration with AI-Generated Content: Recent updates allow teachers to generate quizzes automatically based on text input, saving time and enhancing relevance.

A study by Amin (2021) found that Quizizz not only increased student engagement but also improved vocabulary retention significantly, especially when combined with interactive feedback and repetition cycles. More recently, Sulaiman et al. (2025) demonstrated that students using AI-enhanced quizizz outperformed their peers in vocabulary post-tests, showing better recall and application of new words in context.

Despite these promising developments, there is still limited empirical research conducted in Indonesian high school settings, particularly in the context of using AI-integrated quizizz for vocabulary learning. Most existing studies focus on general engagement or conceptual understanding, without addressing specific vocabulary challenges faced by EFL students in urban schools like SMA Swasta Budi Agung Medan. Therefore, this research seeks to fill the gap by implementing the AI-Based Quizizz Application in a classroom action research (CAR) design to improve the vocabulary mastery of tenth-grade students. This study not only aims to assess the effectiveness of the tool but also to explore how AI-driven gamification can transform the vocabulary learning experience in a meaningful and pedagogically sound manner.

Methods

This study employed a Classroom Action Research (CAR) design following the model proposed by (Kemmis & MCTaggart, 1992), which consists of four cyclical stages: planning, acting, observing, and reflecting. The research was conducted at SMA Budi Agung Medan, located on Jalan Platina Raya No. 7, Rengas Pulau, Medan Marelan. The participants were 30 tenth-grade students from the 2024/2025 academic year, comprising 14 males and 16 females. The primary objective of this research was to improve students' vocabulary mastery through the implementation of AI-Based quizizz in learning descriptive texts. Each cycle of the research involved designing instructional plans, conducting teaching and learning activities using Quizizz AI, observing students' engagement and performance, and reflecting on the outcomes to determine necessary improvements for the subsequent cycle.

The implementation of this classroom action research was divided into two cycles, each comprising the four main stages. Before Cycle 1, a preliminary study was conducted to identify students' difficulties in understanding and memorizing English vocabulary. During the planning stage, the researcher and the English teacher collaboratively designed lesson plans, teaching materials, and observation sheets. The instructional content focused on descriptive texts, with the topic "Your Favorite Idol" used in Cycle 1 and "Places I Want to Visit" in Cycle 2. In the action stage, the researcher implemented learning activities using quizizz AI to enhance students' vocabulary comprehension.

Students were guided to identify unfamiliar words in the text, learn their meanings, and practice using them in sentences before engaging in interactive vocabulary exercises through the quizizz AI platform.

Throughout the observation stage, both the researcher and the teacher observed the students' learning process, focusing on their participation, motivation, and interaction. Field notes and observation sheets were used to record classroom activities and student engagement. The reflection stage was conducted after each cycle to evaluate the learning outcomes and identify strengths and weaknesses in the implementation. The findings from the first cycle were used as the basis for revising the teaching plan and improving strategies for the second cycle.

The success of this research was determined based on quantitative and qualitative indicators. Quantitatively, the implementation was considered successful if at least 75% of students achieved the minimum mastery criterion (MMC) of 75 in the vocabulary post-test. Qualitatively, improvement was identified through students' increased motivation, participation, and engagement during the learning process, supported by data from interviews and observation results.

Data were collected through several instruments, namely vocabulary tests, observation sheets, interviews, field notes, and documentation. The vocabulary test was administered before and after each cycle and consisted of 25 multiple-choice items covering three aspects: word meaning recognition, synonym–antonym comprehension, and contextual word usage. Each correct answer was scored three points, with a total possible score of 100. The content validity of the test was confirmed by expert judgment from two English teachers. Observation sheets were used to assess student activity and engagement, interviews were conducted to gather students' and teachers' perceptions regarding the use of Quizizz AI, while field notes and documentation were used to record the classroom atmosphere and collect visual and written evidence during the learning process.

The collected data were analyzed using descriptive quantitative and qualitative thematic analysis. The quantitative analysis involved calculating the mean score and the percentage of students who achieved the MMC using the formula P=(F/N)×100%, P = (F/N) × 100\% P=(F/N)×100%, where P represents the percentage of students meeting the MMC, F the number of students achieving it, and N the total number of students. Meanwhile, the qualitative analysis involved organizing, coding, and interpreting the data from observations, interviews, and field notes to identify recurring patterns and themes related to students' participation, motivation, and responses to the use of AI – Based quizizz. These analyses were then used to interpret the improvement of students' vocabulary mastery across the two cycles.

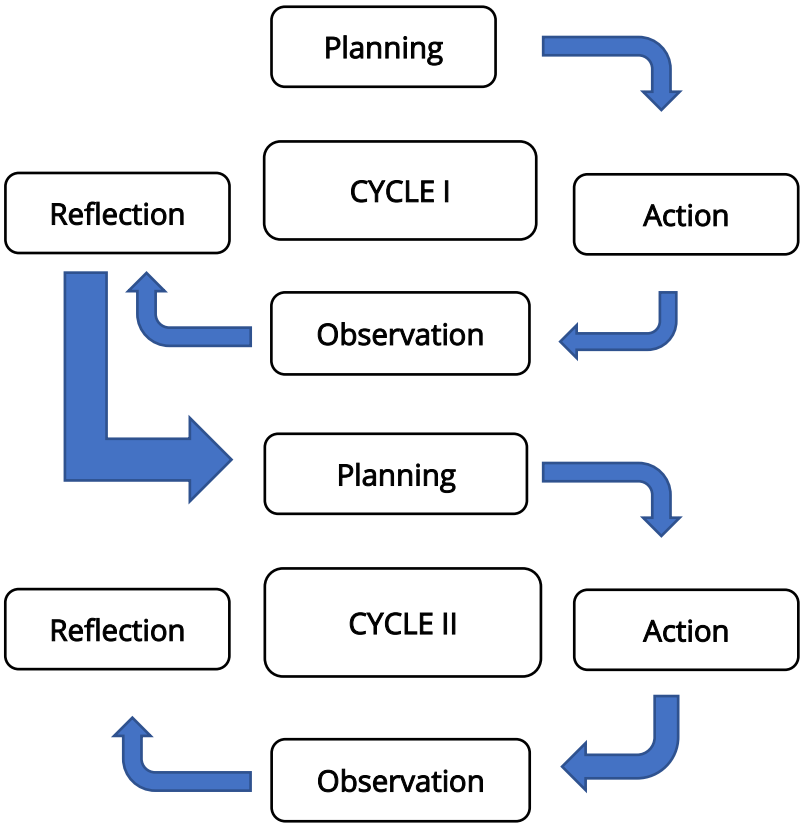

Figure 1. Cycle Diagram modified from the Kemmis and McTaggart Model (Arikunto, 2010)

Result

The results of this study indicated a significant improvement in students' ability to understand descriptive texts after the implementation of the Artificial Intelligence (AI) based quizizz application. Data were obtained from the pre-test, post-test 1 in Cycle I, and post-test 2 in Cycle II. These results demonstrated the gradual progress of students' vocabulary mastery and comprehension of descriptive texts across the two cycles.

1. Pre-Test in Preliminary Study

The pre-test results showed that students' vocabulary mastery in descriptive texts was still unsatisfactory. Most students struggled to recognize the meaning of words, identify supporting details, and interpret implied information in the texts. Their limited vocabulary hindered their ability to comprehend descriptive passages effectively. The average pre-test score was 53.43, with only a small number of students achieving the Minimum Mastery Criterion (MMC) of 75.

Table 1. Students' MMC Scores in Pre-Test

No.	Category	Value range	Frequency	%
1.	Excellent	80-100	6	20%
2.	Good	75-79	2	6,67%
3.	Fair	60-74	9	30%
4.	Poor	50-59	4	13,33%
5.	Bad	0-49	9	30%
		Total	30	100%

2. Post-Test 1 in Cycle 1

During Cycle I, the researcher implemented AI Based Quizizz in teaching descriptive text using the topic "Your Favorite Idol." Compared to the pre-test, the average score increased to 73.87, with 63.33% of students achieving the MMC. Although progress was observed, some students still faced challenges in mastering new words and applying them in appropriate contexts.

Table 2. Students' MMC Scores in Post-Test 1

No.	Category	Value range	Frequency	%
1.	Very Good	80-100	13	43,33%
2.	Good	75-79	6	20%
3.	Enough	60-74	8	26,67%
4.	Low	50-59	1	3,33%
5.	Very Low	0-49	2	6,67%
		Total	30	100%

3. Post-Test 2 in Cycle 2

In Cycle II, improvements were made to the lesson plan, focusing on group collaboration and extended practice with Quizizz AI using the topic "Places I Want to Visit." Students became more engaged and interactive during learning activities. The average score rose to 83.04, and 26 students (86.67%) achieved the MMC, meeting the research success criteria.

Table 3. Students' MMC Scores in Pos-Test 2

No.	Category	Value range	Frequency	%
1.	Very Good	80-100	21	70%
2.	Good	75-79	5	16.67%
3.	Enough	60-74	2	6,67%
4.	Low	50-59	1	3,33%
5.	Very Low	0-49	1	3,33%
		Total	30	100%

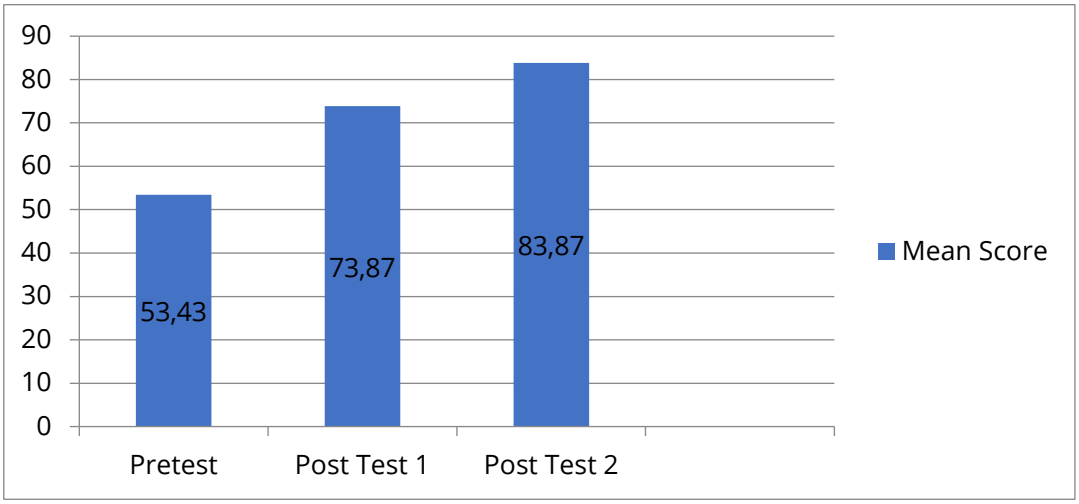

Figure 2. The Mean Score of Students' Pre-test, Post Test 1, and Post Test 2

Discussion

The findings of this study revealed a significant enhancement in students' vocabulary mastery of descriptive texts after the integration of Quizizz Artificial Intelligence (AI) into classroom learning. The mean score increased from 53.43 in the pre-test to 73.87 in Cycle I and 83.04 in Cycle II. Similarly, the proportion of students achieving the Minimum Mastery Criterion (MMC) rose from 23.33% in the pre-test to 63.33% in Cycle I and 86.67% in Cycle II. This steady improvement indicates that Quizizz AI effectively supported students in acquiring and applying new vocabulary, while simultaneously improving their comprehension of descriptive texts. The adaptive and interactive nature of Quizizz AI enabled students to receive real-time feedback, correct errors promptly, and engage in self-directed learning (Darmawan et al., 2020). This result is in line with previous studies that have highlighted the role of technology in improving language proficiency (Degirmenci, 2021).

From a motivational standpoint, these results can be interpreted through the lens of Self-Determination Theory (SDT), which posits that learners' motivation is enhanced when their psychological needs for autonomy, competence, and relatedness are satisfied. Quizizz AI fulfills these needs by allowing students to control their own pace (autonomy), experience a sense of progress through immediate feedback (competence), and engage collaboratively with peers via gamified competition (relatedness). The gamification elements such as points, leaderboards, and timed challenges stimulate intrinsic motivation, making vocabulary learning both enjoyable and purposeful (Dakhi, 2019). The gamified structure of Quizizz has been shown to boost student engagement and motivation, aligning with findings from Amin (2021), who suggested that competitive, interactive learning environments positively influence students' learning outcomes.

Consequently, the learning process becomes more student-centered, fostering both persistence and deeper retention of vocabulary items. The outcomes of this study align with prior research on gamified and AI-assisted learning. M. Amin (2021) demonstrated that gamification increases students' engagement and vocabulary achievement by integrating interactive and competitive elements into instruction. Lee & Kang (2022) further emphasized that AI-based tools enhance learner motivation and performance through adaptive feedback mechanisms that cater to individual needs. Similarly, Agustin (2022) found that the use of Quizizz in EFL contexts encouraged active participation and improved vocabulary retention due to its interactive and enjoyable interface. The current study extends these findings by providing empirical evidence from a classroom action research context, confirming that Quizizz AI not only improves vocabulary mastery but also enhances motivation and classroom engagement (Degirmenci, 2021).

Pedagogically, the results suggest several practical implications for English language teachers and educational policymakers. Teachers are encouraged to integrate AI-based gamified platforms such as Quizizz into vocabulary instruction to promote active learning, immediate assessment, and individualized support (Darmawan et al., 2020). The data-driven insights provided by Quizizz AI allow educators to identify students' weaknesses and adjust instruction accordingly. For policymakers, these findings highlight the importance of incorporating AI literacy and gamified methodologies into the English curriculum to foster innovation and technological adaptability in language learning environments (Degirmenci, 2021). This aligns with the growing trend of integrating technology into education to make learning more dynamic and responsive to students' needs.

Despite the overall success, several challenges were identified during the implementation. Some students faced technical barriers, including unstable internet connections and difficulties accessing the platform. Additionally, a few learners required more guidance in interpreting AI-generated feedback effectively. To address these issues in future applications, teachers should ensure stable technological infrastructure, provide pre-activity orientation sessions, and maintain a balance between individual and collaborative quiz formats. Continuous reflection and refinement are necessary to sustain improvements and fully leverage the pedagogical potential of AI-driven gamification in vocabulary instruction. These insights are consistent with challenges highlighted by Darmawan et al. (2020), who noted the importance of addressing technical barriers to ensure effective use of digital learning tools.

Conclusion

The results of this classroom action research demonstrated that the integration of Quizizz Artificial Intelligence (AI) significantly enhanced the vocabulary mastery of tenth-grade students at SMA Budi Agung Medan. Students' achievement showed consistent

progress throughout the research cycles, as the average score increased from 53.43 in the pre-test to 73.87 in Cycle I and 83.04 in Cycle II. Similarly, the proportion of students who met the Minimum Mastery Criterion (MMC) rose from 23.33% in the pre-test to 63.33% in Cycle I and 86.67% in Cycle II. These results confirm that Quizizz AI effectively supported vocabulary acquisition and contributed to students' overall language development. In addition to quantitative improvement, qualitative findings also revealed positive changes in motivation, engagement, and self-confidence when learning vocabulary through AI-based gamification.

The findings of this study provide valuable implications for English language instruction. The use of Quizizz AI creates an interactive, student-centered learning environment that aligns with modern pedagogical practices emphasizing engagement and autonomy. Teachers can adopt Quizizz AI as a supplementary tool to reinforce vocabulary learning through gamified practice and real-time assessment. Its features—such as instant feedback, adaptive question levels, and competitive modes—encourage students to learn actively and continuously monitor their progress. Therefore, integrating AI-based gamification into English language teaching can enhance both cognitive and affective learning outcomes, making vocabulary instruction more effective, enjoyable, and sustainable.

Although the implementation of Quizizz AI proved effective in improving vocabulary mastery, future studies are recommended to expand its application to other language skills, such as grammar, reading comprehension, or writing. Further research could also explore long-term retention effects, comparing Quizizz AI with other AI-driven platforms to determine which features most effectively foster language development. Additionally, investigating teachers' perceptions, classroom management strategies, and technological readiness in various educational settings could provide deeper insight into optimizing AI-assisted learning environments. Such investigations will help strengthen the pedagogical foundation for integrating artificial intelligence into English language education.

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