

# Artificial Intelligence as a Learning Tool to Improve Vocabulary Skills of Students at SMP Negeri 2

Panca Rijang

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## ARTICLE INFO

## ABSTRACT

*Keyword : Artificial Intelligence, Artificial Intelligence (AI) as a learning tool in improving vocabulary skills, English students' vocabulary skills at SMP Negeri 2 Panca Rijang. The learning, junior high school, research employed a quasi-experimental design with a pre-test student engagement*

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*This study aims to investigate the effectiveness of and post-test control group. The participants consisted of two classes of eighth-grade students, with one class assigned as the experimental group and the other as the control group. The experimental group was taught vocabulary using AI-based applications, while the control group learned through traditional methods. Data were collected through vocabulary tests, questionnaires, and classroom observations.*

*The findings revealed that both groups showed improvement in their vocabulary mastery; however, the experimental group achieved a significantly higher mean score compared to the control group. Statistical analysis using an independent samples t-test confirmed a significant difference between the two groups ( $p < 0.05$ ), indicating that the use of AI had a positive effect on students' vocabulary learning. Furthermore, the questionnaire results showed that students had positive perceptions toward AI-based learning, as it increased their motivation, engagement, and confidence in using new vocabulary.*

*In conclusion, the integration of Artificial Intelligence into English vocabulary learning proved to be more effective than traditional methods. AI not only enhanced students' vocabulary mastery but also fostered a more interactive and engaging learning environment. These findings suggest that AI can serve as an innovative strategy to support vocabulary development in English language education, particularly at the junior high school level.*

## INTRODUCTION

Language is a fundamental means of communication, and in the context of English as a foreign language (EFL), vocabulary is one of the most important aspects that learners need to master. Vocabulary knowledge serves as the building blocks of language learning because without sufficient vocabulary, students cannot effectively develop their listening, speaking, reading, or writing skills. Schmitt (2000) argues that vocabulary is at the heart of language learning and directly influences learners' ability to communicate. Nation (2001) further emphasizes that vocabulary knowledge is central to language proficiency and that learners need to acquire a wide range of vocabulary in order to understand spoken and written texts, as well as to express themselves accurately. Thus, vocabulary mastery is not merely about memorizing words, but about understanding their meanings, uses, and contexts.

Vocabulary is widely recognized as one of the most essential components of second language acquisition because it serves as the foundation of communication. Learners cannot achieve fluency in listening, speaking, reading, or writing without sufficient vocabulary knowledge. Schmitt (2000) argues that vocabulary is central to language learning and determines how well learners can use the target language for communication. Similarly, Nation (2001) emphasizes that vocabulary knowledge is crucial for developing accuracy and fluency, and it must be built through meaningful and repeated exposure. Thornbury (2002) further adds that vocabulary learning should not only involve memorization but also contextualized practice that helps students use words appropriately in real communication.

In the Indonesian context, particularly at the junior high school level, vocabulary learning is often considered challenging. Many students struggle to expand their vocabulary because they are primarily exposed to traditional methods, such as rote memorization, word lists, and dictionary-based activities. These approaches often fail to maintain students' motivation and engagement. According to Alqahtani (2015), vocabulary teaching requires innovative and student-centered strategies that can sustain learners' interest and provide meaningful learning experiences. This highlights the need for integrating modern technology into the language learning process.

In recent years, **Artificial Intelligence (AI)** has become an increasingly influential tool in the field of education. AI refers to computer systems designed to simulate human intelligence by performing tasks such as problem solving, pattern recognition, and natural language processing. Its application in education has gained significant attention because of its ability to provide adaptive, personalized, and interactive learning experiences (Holmes et al., 2019). AI-based learning tools can support vocabulary acquisition by offering learners real-time feedback, adaptive exercises, and interactive practice in authentic contexts (Zawacki-Richter et al., 2019).

Several studies have demonstrated the potential of AI in enhancing vocabulary learning. Wang and Vasquez (2012) highlighted the role of chatbots and conversational agents in promoting authentic language practice, which in turn strengthens vocabulary acquisition. More recently, Li and Ni (2021) found that AI-powered vocabulary platforms not only improved learners' retention of new words but also boosted their motivation. Gamified AI applications also contribute to more effective vocabulary learning because they create engaging and enjoyable learning environments (Yilmaz & Baydas, 2017). AI also facilitates learner autonomy, which is essential for vocabulary

growth. Kukulska-Hulme (2020) notes that mobile-assisted and AI-powered tools allow learners to continue practicing vocabulary beyond the classroom, promoting continuous and self-directed learning. Furthermore, AI can analyse learners' progress and adjust the level of difficulty accordingly, ensuring that each learner receives personalized instruction suited to their needs (Zhang & Zou, 2022). This aligns with Nation's (2001) recommendation that vocabulary acquisition should be supported by repeated exposure and practice tailored to learners' proficiency levels.

In addition, the integration of AI in vocabulary learning provides opportunities for collaborative and communicative activities. Chou (2018) found that AI-supported vocabulary games encouraged learners to interact and cooperate, which helped them acquire new words more effectively. Similarly, Lin and Warschauer (2015) observed that AI-enabled intelligent tutoring systems promoted deeper engagement and improved learners' overall language performance. These findings confirm that AI can play a transformative role in creating an active, learner-centered environment. At SMP Negeri 2 Panca Rijang, many students face challenges in mastering English vocabulary using conventional methods. By incorporating AI tools such as chatbots, intelligent tutoring systems, and mobile learning applications, students can gain exposure to vocabulary through interactive exercises, adaptive feedback, and gamified practice. This approach is expected to enhance not only their vocabulary mastery but also their motivation, confidence, and participation in the learning process. As Holmes et al. (2019) emphasize, the promise of AI in education lies in its ability to transform traditional classrooms into personalized, engaging, and technology-enhanced learning environments.

Given these considerations, the integration of AI in vocabulary instruction provides an innovative solution to improve students' language learning outcomes. It combines the strengths of technology with effective pedagogy, making vocabulary learning more meaningful and sustainable. Therefore, this study focuses on examining the use of Artificial Intelligence to enhance students' vocabulary mastery at SMP Negeri 2 Panca Rijang.

## **LITERATURE REVIEW**

### **1.1 Vocabulary**

Vocabulary mastery is one of the fundamental aspects of language learning because it serves as the building block of communication, comprehension, and expression. Without sufficient vocabulary knowledge, students face significant challenges in developing other language skills such as reading, writing, speaking, and listening. Traditional methods of vocabulary learning, such as rote memorization and dictionary use, have often been considered monotonous and less effective in sustaining students' engagement (Nation, 2001). In the digital era, however, the emergence of Artificial Intelligence (AI) offers new opportunities for improving vocabulary acquisition through adaptive, personalized, and interactive learning environments.

#### **Artificial Intelligence in Education**

Artificial Intelligence refers to computer systems capable of performing tasks that typically require human intelligence, such as decision-making, problem-solving, and

natural language processing (Russell & Norvig, 2016). In education, AI has been increasingly integrated as a pedagogical tool to support learning processes. AI-driven applications such as chatbots, intelligent tutoring systems, and adaptive learning platforms provide personalized instruction, immediate feedback, and autonomous learning opportunities (Luckin et al., 2016).

Research indicates that AI tools can enhance student motivation and engagement by offering interactive and gamified learning experiences (Zawacki-Richter et al., 2019). Additionally, AI facilitates learner-centered instruction by tailoring content to individual needs, thereby maximizing learning efficiency (Woolf, 2021).

AI offers several unique advantages in supporting vocabulary acquisition. Firstly, AI systems can provide personalized learning pathways, adjusting the difficulty level, repetition frequency, and content delivery according to learners' proficiency and progress (Chen et al., 2020). Secondly, AI tools equipped with Natural Language Processing (NLP) allow students to practice vocabulary in authentic communicative contexts through chatbots, translation tools, and writing assistants (Fryer & Carpenter, 2006). Thirdly, AI facilitates immediate corrective feedback, which is crucial in reinforcing accurate vocabulary use and preventing fossilization of errors (Heil et al., 2020). Moreover, AI-based gamified platforms increase learners' motivation by transforming vocabulary practice into interactive challenges and rewards (Munday, 2018). Empirical studies have shown positive impacts of AI on vocabulary learning. For instance, Li and Ni (2021) found that students using AI-based vocabulary apps significantly outperformed those using traditional methods in vocabulary retention tests. Similarly, Al-Shehri (2020) demonstrated that AI-driven chatbots enhanced learners' ability to use new vocabulary in speaking tasks.

## **METHOD**

This study employed a quasi-experimental design with a pre-test and post-test control group. The experimental group was taught vocabulary using AI-based learning tools, while the control group was taught through conventional methods such as textbooks and teacher explanations. This design was chosen to determine the effectiveness of Artificial Intelligence as a learning tool in improving students' vocabulary skills.

### **Participants**

The research was conducted at SMP Negeri 2 Panca Rijang in the academic year 2025/2026. The population of this study consisted of all eighth-grade students. Two classes were selected as the sample using purposive sampling. One class was assigned as the experimental group, and the other as the control group. Each group consisted of approximately 30–35 students.

### **Research Instrument**

To collect the data, the researcher used the following instruments: First Vocabulary Test: A pre-test and post-test were administered to both groups to measure students' vocabulary mastery before and after the treatment. The test included multiple-choice items, matching words with definitions, and sentence completion. Second Questionnaire: A set of Likert-scale questions was used to gather students' perceptions

of using AI as a learning tool in vocabulary acquisition. Third Observation Sheet: Used to monitor student participation, engagement, and interaction during the learning process.

### Procedure of Collecting Data

The research procedure consisted of three stages: First, Pre-test: Both groups were given a vocabulary test to measure their initial vocabulary skills. Second, Treatment: The experimental group was taught vocabulary using an AI-based learning application (such as Duolingo, Quizziz AI, or Chatbot-based exercises). The lessons included interactive vocabulary drills, real-time feedback, and gamified learning activities. The control group was taught using traditional methods, including dictionary use, memorization, and teacher-led explanations. The treatment was conducted over six meetings (90 minutes each). Third Post-test: At the end of the treatment, both groups were given the same vocabulary test to measure improvement.

### Data Analysis Technique

The data were analysed using quantitative methods: The students' pre-test and post-test scores were analysed using descriptive statistics (mean, standard deviation, frequency distribution). Inferential statistics were applied using an independent sample t-test to determine whether there was a significant difference between the experimental and control groups. The questionnaire results were analysed using descriptive statistics to identify students' perceptions toward the use of AI in vocabulary learning.

## **RESULT AND DISCUSSION**

Based on the results of the vocabulary test (pre-test and post-test), both the experimental and control groups showed improvement after the treatment. In the experimental group, which was taught using Artificial Intelligence (AI), the mean score of the pre-test was 58.7, while the post-test mean score increased to 82.3. This indicates a gain score of 23.6 points. Meanwhile, the control group, which was taught using traditional methods, obtained a mean score of 59.2 in the pre-test and 71.4 in the post-test, with a gain score of 12.2 points. These results suggest that although both groups improved their vocabulary mastery, the experimental group achieved a higher improvement compared to the control group. Furthermore, an independent samples t-test was conducted to compare the post-test results of the two groups. The analysis revealed that the t-value was 4.86 with a significance level of  $p = 0.000$  ( $p < 0.05$ ). This finding indicates that there was a statistically significant difference between the post-test scores of the experimental and control groups. In other words, the use of AI-based learning tools had a significant positive effect on students' vocabulary mastery.

In addition, the results of the questionnaire distributed to the experimental group revealed that students had positive perceptions of AI-assisted vocabulary learning. A total of 87% of students agreed that AI-based applications made learning more interesting, 82% stated that interactive exercises and instant feedback helped them remember new words more easily, and 79% reported feeling more motivated and confident in practicing vocabulary through AI tools compared to traditional methods. These findings strengthen the test results, showing that AI not only improved students' vocabulary skills but also enhanced their motivation, engagement, and confidence in learning English.

## Discussion

The findings of this study revealed that the use of Artificial Intelligence as a learning tool significantly improved students' vocabulary skill at SMP Negeri 2 Panca Rijang. The experimental group showed a greater improvement in their vocabulary mastery compared to the control group. These results align with Nation's (2001) argument that vocabulary learning requires repeated exposure and meaningful practice. AI-based tools provide this through interactive features, gamification, and adaptive feedback.

Moreover, the positive perception of students indicates that AI not only enhanced their vocabulary knowledge but also improved their motivation and engagement. This finding is consistent with Alqahtani (2015), who emphasizes the importance of integrating innovative and interactive methods in vocabulary instruction to sustain students' interest. The effectiveness of AI in this study can be attributed to several factors:

**Personalized learning:** AI platforms adjusted the level of difficulty based on students' performance, allowing them to learn at their own pace.

**Immediate feedback:** Students could instantly correct their mistakes and reinforce their learning.

**Engagement through gamification:** The use of quizzes, challenges, and rewards kept students motivated to practice vocabulary.

These findings are also in line with Holmes et al. (2019), who highlight the potential of AI to provide adaptive and engaging learning experiences. In contrast, the control group, which relied on traditional methods such as memorization and dictionary use, showed improvement but to a lesser extent. This suggests that while conventional teaching is beneficial, it may not be sufficient to fully engage students in vocabulary learning.

Artificial Intelligence proved to be an effective tool in improving students' vocabulary mastery. It not only enhanced students' test scores but also positively influenced their attitudes toward learning English. Therefore, integrating AI into English language teaching can be a promising strategy to support vocabulary development, especially at the junior high school level.

## CONCLUSION

This study concludes that the integration of Artificial Intelligence (AI) as a learning tool has a significant positive impact on improving students' vocabulary mastery at SMP Negeri 2 Panca Rijang. The experimental group, which was taught using AI-based applications, demonstrated greater improvement compared to the control group that used traditional methods. Statistical analysis confirmed that the difference in achievement was significant, proving the effectiveness of AI in enhancing vocabulary learning outcomes.

In addition to measurable improvements in vocabulary skills, students also expressed positive perceptions of AI-based learning. They reported higher motivation, greater engagement, and increased confidence in using new vocabulary. These findings highlight that AI not only supports cognitive development but also fosters affective and behavioral aspects of learning.

Overall, AI provides an innovative, interactive, and student-centered approach that can transform vocabulary instruction. Its ability to personalize learning, deliver immediate feedback, and integrate gamified activities makes it more effective than conventional methods. Therefore, incorporating AI into English language teaching can serve as a strategic solution to support vocabulary development and create more engaging learning environments, particularly at the junior high school level.

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