

CHATGPT FOR EFL GRAMMAR AND VOCABULARY: ITS EFFECTIVENESS AND STUDENTS' PERCEPTIONS

Fathurrahman Arrozi^{1*}, Sunarti², Abdul Halim³

¹2211102421030@umkt.ac.id, ²sun377@umkt.ac.id, ³aha918@umkt.ac.id

UNIVERSITAS MUHAMMADIYAH KALIMANTAN TIMUR

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ABSTRACT

Grammar and vocabulary are fundamental components of English proficiency, yet many Indonesian EFL learners continue to struggle with mastering these skills. The growing use of artificial intelligence in education has positioned ChatGPT as a potential tool for enhancing language learning through interactive and personalized feedback. This study investigates the effectiveness of ChatGPT in enhancing grammar and vocabulary mastery among 10th grade students at a secondary school in Samarinda and explores students' perceptions of its use. A mixed-method design was employed, involving 24 students selected through total sampling and assigned to experimental and control groups using cluster random sampling. The study employed pre-tests and post-tests for quantitative data collection and semi-structured interviews to obtain qualitative insights. The findings indicate that students who received ChatGPT-assisted instruction achieved significantly higher grammar and vocabulary scores compared to those taught using traditional methods. In addition, students demonstrated significant improvement within the experimental group from pre-test to post-test. Qualitative findings reveal positive student perceptions, highlighting increased motivation, confidence, and engagement in learning English. These results suggest that ChatGPT can serve as an effective supplementary tool for grammar and vocabulary instruction in EFL classrooms.

Keywords: Artificial Intelligence, ChatGPT, EFL Learning, Grammar Mastery, Vocabulary Mastery

A. INTRODUCTION

In today's globalized world, English functions as a lingua franca in education, science, and international communication (Wu et al., 2023). As a result, English as a Foreign Language (EFL) education has become a major priority in many non-English-speaking countries. To achieve effective communication in English, learners must develop strong foundational language components, particularly grammar and vocabulary. Grammar enables learners to express ideas, thoughts, and feelings accurately in both spoken and written communication (Normawati, 2023). While vocabulary supports meaning-making and allows learners to

participate confidently in interactions. Without sufficient mastery of grammar and vocabulary, learners often experience difficulties across all four language skills: listening, speaking, reading, and writing (Alsaedi, 2024). According to Yuliawati (2021), vocabulary represents a fundamental component of language that includes understanding word meanings and usage. Limited vocabulary knowledge often restricts learners' communicative competence and slows overall language development (Durazno Abril et al., 2025). Akramy et al., (2022) believe, there will be a big obstacle to learning a language when the students have lack of vocabulary knowledge. Grammar functions as a cognitive mechanism that relies on a variety of knowledge sources, encompassing both lexical characteristics and an awareness of contemporary issues (Ali et al., 2025). Akhter et al., (2021) emphasized that grammatical competence is vital for language learners, as it enhances their abilities across all four language skills. Daskan, (2023) argued that English grammar is challenging to learn because its rules often involve multiple exceptions, which complicates mastery for language learners. Inadequate grammar and vocabulary skills reduce students' confidence in participating in conversations, presentations, and cross-cultural exchanges, thereby limiting their opportunities in higher education, the workplace, and international collaboration. Consequently, greater English proficiency contributes to improved employment prospects as well as more effective professional and academic communication (Shaikh et al., 2023)

Despite their importance, grammar and vocabulary remain challenging for many EFL learners especially for students in non-English speaking countries such as Indonesia, limited grammar and vocabulary proficiency often hinders both academic success and broader communication skills. At the senior high school level in Indonesia, difficulties in grammar and vocabulary remain common. Raja (2018) argues that traditional learning methods rely heavily on teacher-centered instruction and provide limited opportunities for students to actively participate in classroom activities. Similarly, Losi (2024) suggests that such learning conditions contribute to low student motivation and engagement, with many learners perceiving English as a difficult subject.

Technology-enhanced learning tools have become increasingly popular in language education, especially following the introduction of ChatGPT (Xiao & Zhi, 2023). ChatGPT operates as a conversational agent that generates human-like responses, provides instant feedback, and simulates authentic communication experiences (Son 2025). Fernández Cerero et al., (2025) further highlighted that ChatGPT's advanced language processing capabilities position it as an innovative tool in contemporary education. Alsadoon (2021) mentions, its integration into EFL classrooms provides learners with opportunities to practice language interactively, receive corrective feedback, and develop confidence in using English without the fear of judgment from teachers. Moreover, ChatGPT aligns with modern educational needs by providing personalized learning paths, adaptive feedback, and authentic language use, making it an increasingly attractive supplement to traditional classroom instruction (Aldowsari & Aljebreen, 2024).

Advances in artificial intelligence, particularly ChatGPT, offer new possibilities for addressing these challenges by providing instant feedback, personalized learning, and support for improving written output (Dinh, 2025). Kucuk (2024) thinks in grammar learning, ChatGPT helps students identify and correct errors while providing explanations of rules. vocabulary learning, ChatGPT can generate examples, create practice exercises, and support contextual understanding of new words. Empirical evidence has shown promising results for ChatGPT in enhancing grammar and vocabulary. Haggag (2023)

demonstrated that a ChatGPT-based program improved students' grammar accuracy in descriptive writing. Similarly, Kucuk (2024) found that students at Tishk International University who used ChatGPT made significantly greater gains in grammar scores compared to those taught traditionally. Vita Losi (2024) also revealed that high school students in SMAN 2 Binjai had positive perceptions of ChatGPT, describing it as enjoyable and motivating. Despite these promising findings, research on ChatGPT in EFL contexts has mostly focused on university and junior high school students, leaving senior high school learners underexplored. Furthermore, most studies investigate grammar and vocabulary separately, while few address how ChatGPT can simultaneously enhance both skills in high school settings. This gap highlights the need for research to emphasize the importance of examining ChatGPT as a comprehensive instructional tool for simultaneously developing grammar and vocabulary among 10th grade students. Accordingly, the following research questions guide the study:

1. To what extent does the use of ChatGPT improve tenth-grade students' grammar and vocabulary mastery compared to traditional instruction?
2. What are students' perceptions of using ChatGPT as a learning tool for grammar and vocabulary?

B. METHOD

This study utilizes a mixed-method design to investigate the use of ChatGPT in enhancing grammar and vocabulary among 10th grade students at SMK Muhammadiyah Loa Kulu. The mixed-methods approach is chosen because it allows the researcher to not only measure the effect of ChatGPT quantitatively but also explore students' perceptions qualitatively, giving a more holistic view of the learning process (Creswell, 2023). In this study, the quantitative component focuses on determining whether ChatGPT have a measurable impact on students' grammar and vocabulary performance, while the qualitative component seeks to understand students' attitudes, motivation, and experiences during the learning process. The population of this study consists of all 10th-grade students at SMK Muhammadiyah Loa Kulu. The total population of this study was selected as sample of the study. In this study, the sample consisted of 24 students from grade 10 taken from two different programs: TKJ/TSM, and MP. The sampling method used is total sampling, which is appropriate when the population is relatively small and the entire group can feasibly be studied to ensure complete representation of participants (Etikan, 2016). Meanwhile, the method for selecting the groups for the control and experimental classes is cluster random sampling, which is suitable when participants are naturally divided into groups or classes, allowing each cluster to be randomly assigned to a treatment condition (Cohen et al., 2018). The MP group is designated as the control group, while the TKJ/TSM students are assigned to the experimental group. Each class consisted of 12 students, providing a balanced structure for comparison between conventional and ChatGPT-assisted instruction.

The instruments used in this study consisted of quantitative and qualitative tools. The quantitative instruments were grammar and vocabulary tests, which were administered as pre-tests and post-tests to measure students' learning outcomes. The test items were adapted from standardized English proficiency questions to ensure relevance to the students' proficiency level and alignment with the study objectives. The pre-test was conducted before the treatment to assess students' initial grammar and vocabulary mastery, while the post-test was administered after the treatment to measure any improvement resulting from the instructional intervention. In addition, a qualitative instrument in the form of semi-structured

interviews was used to obtain deeper insights into students' experiences and perceptions of using ChatGPT during the learning process. The interviews were conducted with students from the experimental group after the post-test and were designed to explore learners' engagement, motivation, and challenges related to grammar and vocabulary learning.

The pre-test was conducted at the beginning of the study to determine the students' baseline proficiency levels, while the post-test was administered at the end of the treatment to measure improvement. The primary goal of the post-test was to evaluate whether ChatGPT had a significant impact on students' grammar and vocabulary acquisition compared to traditional methods. During the treatment phase, the control group followed conventional textbook-based lessons, while the experimental group used ChatGPT for tasks such as prompt creation, AI-assisted quizzes, and feedback checking. Following the post-test, semi-structured interviews were carried out with students in the experimental group to obtain in-depth information about their experiences using ChatGPT in the learning process. The interviews examined students' perceptions, motivation, and challenges related to grammar and vocabulary learning. All interviews were audio-recorded and transcribed verbatim for qualitative analysis. This approach enables the researcher to capture not only the content of students' responses but also the tone and emphasis, which can provide valuable insights into their learning attitudes.

Data analysis began with testing the normality of the quantitative data using a normality test, followed by descriptive statistics to summarize students' grammar and vocabulary scores. To examine the effectiveness of ChatGPT compared to traditional instruction, an independent-samples t-test was conducted to identify significant differences between the experimental and control groups, as the scores were obtained from two separate groups receiving different instructional treatments. In addition, a paired-samples t-test was used to compare the experimental group's pre-test and post-test scores in order to measure within-group improvement after the implementation of ChatGPT.

C. FINDINGS AND DISCUSSION

1. The Effectiveness of ChatGPT on Students' Grammar and Vocabulary Mastery

To examine whether the improvement in the experimental group differed significantly from that of the control group, an independent-sample t-test was conducted on the post-test scores. Table 1 presents the results of the independent-sample t-tests comparing the post-test grammar and vocabulary scores between the experimental group and the control group. Prior to interpreting the t-test results, Levene's Test for Equality of Variances was examined to ensure that the assumption of homogeneity of variance was met. The results indicated that the variance between groups was not significantly different for grammar ($p = 0.680$) or vocabulary ($p = 0.200$), allowing the use of the "equal variances assumed" values for both analyses.

Table 1. Independent Samples Test

POST TEST		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
GRAMMAR	Equal variances assumed	.174	.680	-2.902	24	.008	-13.385	4.613	-22.905	-3.864
	Equal variances not assumed			-2.902	23.405	.008	-13.385	4.613	-22.918	-3.851
VOCABULARY	Equal variances assumed	1.738	.200	-3.533	24	.002	-16.000	4.529	-25.347	-6.653
	Equal variances not assumed			-3.533	20.364	.002	-16.000	4.529	-25.436	-6.564

The independent-sample t-test results revealed a statistically significant difference in grammar post-test scores between the experimental and control groups, with $t(24) = -2.902$ and $p = 0.008$. The negative t-value indicates that the mean score of the experimental group was higher than that of the control group. The mean difference of -13.385 suggests that students who received ChatGPT-assisted instruction achieved notably higher grammar scores than those who were taught using traditional instructional methods. This finding indicates that the integration of ChatGPT contributed positively to students' grammar performance when compared across instructional approaches.

Similarly, the independent-sample t-test for vocabulary post-test scores showed a statistically significant difference between the two groups, $t(24) = -3.533$, $p = 0.002$. The mean difference of -16.000 demonstrates that the experimental group outperformed the control group in vocabulary mastery by a considerable margin. This result suggests that ChatGPT-assisted learning was particularly effective in supporting vocabulary acquisition, potentially due to features such as contextualized explanations, repeated exposure, and immediate feedback. Furthermore, a paired-sample t-test was conducted to determine whether there was a significant improvement within the experimental group itself.

Table 2. Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRE TEST GRAMMAR - POST TEST GRAMMAR	-11.538	12.387	3.436	-19.024	-4.053	-3.359	12	.006
Pair 2	PRE TEST VOCABULARY - POST TEST VOCABULARY	-8.615	10.751	2.982	-15.112	-2.118	-2.889	12	.014

Table 2 shown, the results of the paired-sample t-tests conducted to examine changes in grammar and vocabulary scores within the experimental group before and after the implementation of ChatGPT-assisted instruction. This analysis aimed to determine whether students demonstrated significant improvement over time as a result of the treatment. The paired-sample t-test results showed a statistically significant improvement in students' grammar scores from pre-test to post-test, with $t(12) = -3.359$ and $p = 0.006$. The negative mean difference indicates that post-test grammar scores were higher than pre-test scores. This finding suggests that students experienced meaningful gains in grammar proficiency after participating in ChatGPT-assisted learning activities. The result demonstrates that ChatGPT was effective in supporting students' understanding of grammatical structures over the course of the intervention. In addition, the paired-sample t-test revealed a statistically significant increase in vocabulary scores from pre-test to post-test, with $t(12) = -2.889$ and $p = 0.014$. The negative mean difference similarly indicates improvement in students' vocabulary mastery following the treatment. This finding suggests that consistent interaction with ChatGPT, including vocabulary explanation and usage practice, contributed to students' vocabulary development.

The quantitative findings demonstrate that ChatGPT-assisted instruction significantly enhanced students' grammar and vocabulary mastery compared to conventional teaching methods. As shown in table 1, the experimental group obtained a higher mean post-test score than the control group, with the difference reaching statistical significance ($p < .05$). This finding indicates that the integration of ChatGPT provided measurable learning advantages beyond traditional instruction. Similar outcomes have been reported in previous studies (Aldowsari & Aljebreen, 2024), which found that AI-based tools, including ChatGPT, positively influence EFL learners' language performance by offering immediate feedback and adaptive explanations, and also (Luu & Bui, 2025) find that the qualitative data demonstrated that the majority of students appreciated the tool's convenience, supportive learning environment, and personalization, which helped them improve their vocabulary learning process.

Further evidence of ChatGPT's effectiveness is observed in the paired-sample t-test results presented in table 2, where the experimental group showed a statistically significant improvement from pre-test to post-test ($p < .001$). This substantial score increase confirms that students' grammar and vocabulary performance improved after sustained exposure to ChatGPT-assisted learning. These findings corroborate existing literature on the pedagogical potential of ChatGPT in vocabulary instruction. Durazno Abril et al., (2025) reported that ChatGPT positively influenced learners' vocabulary acquisition by improving

comprehension, creativity, and long-term retention, as well as fostering effective learning strategies. Likewise, Kucuk, (2024) identified a marked improvement in learners' performance, with mean scores increasing from 60.47 in the pre-test to 87.00 in the post-test, reflecting a 26.53% gain. Collectively, these findings support the growing body of evidence that ChatGPT can serve as a valuable supplementary tool in EFL vocabulary learning.

2. Students' Perceptions of Using ChatGPT

This section presents the qualitative findings derived from semi-structured interviews conducted with students from the experimental group. The interview data were analyzed using thematic analysis to explore students' perceptions, learning experiences, and challenges when using ChatGPT as a learning tool for grammar and vocabulary. The analysis resulted in five major themes: learning engagement, learning support, learning process and strategies, personal improvement, and learning challenges.

Table 3. Qualitative Thematic analysis

Theme	Code	Code Description	Participant
Learning Engagement	Enjoyable Learning	Learning feels more enjoyable and structured	P1, P2, P3, P4, P5
	Active Interaction	Students actively ask questions and try answers	P2, P3, P5
Learning Support	Grammar Explanation	ChatGPT provides clear grammar explanations	P1, P3, P5
	Vocabulary Development	ChatGPT supports vocabulary learning and usage	P4
Learning Process and strategies	Pattern Understanding	Grammar is understood through patterns	P2, P5
	Independent Learning	Students overcome difficulties independently	P1, P5
Personal improvement	Increased Motivation	Learning increases motivation	P2, P5
	Learning Confidence	Students feel more confident using English	P3
Challenge	Grammar Difficulty	Difficulty distinguishing similar grammar forms	P3, P4

The qualitative findings presented in Table 3 reveal generally positive student perceptions toward the use of ChatGPT in learning grammar and vocabulary. Several dominant themes emerged from the interview data, including learning engagement, learning support, learning process, motivation, confidence, challenges, and suggestions for improvement. Students consistently reported that ChatGPT-assisted learning created a more enjoyable and interactive learning environment, as it allowed them to ask questions freely and receive immediate explanations. One student stated, "Learning English became more enjoyable because I could ask questions without being afraid of making mistakes" (P1), while another noted that "ChatGPT made the lesson more interactive and easier to follow" (P3).

In terms of learning support, students highlighted ChatGPT's effectiveness in explaining grammatical concepts and supporting vocabulary development through clear examples and contextual usage. Several participants emphasized that understanding grammar through patterns rather than memorization made learning easier and more meaningful. As expressed by one participant, "I understand grammar better because ChatGPT explains the patterns, not just the rules" (P2). Similarly, vocabulary learning was perceived as more effective when examples were linked to daily situations, as noted by P4: "The vocabulary examples are related to daily life, so they are easier to remember." These responses indicate that ChatGPT facilitated deeper cognitive engagement with language structures.

The findings also demonstrate that ChatGPT encouraged independent learning strategies, as students relied on the tool to clarify difficulties beyond traditional classroom instruction. Increased motivation and confidence were frequently mentioned, particularly in writing and simple conversational tasks. One student reported, "I feel more confident writing sentences because I can check my mistakes immediately" (P5). However, despite these positive perceptions, students acknowledged ongoing challenges, such as distinguishing similar grammatical forms, particularly tenses and prepositions. In addition, participants suggested incorporating more real-life practice activities, such as dialogues or simulations, to further enhance learning outcomes, as reflected in the statement, "I hope there are more conversation practices using real situations" (P3).

The quantitative findings addressing Research Question 1 indicate that the use of ChatGPT significantly improved students' grammar and vocabulary mastery. These results are further supported and explained by the qualitative findings related to Research Question 2. Students' perceptions reveal that ChatGPT facilitated clearer explanations, increased engagement, and encouraged independent learning, which helps explain the observed improvements in test performance. The qualitative findings summarized in table 3 further support the quantitative results by revealing positive student perceptions toward ChatGPT-assisted learning. Students reported increased engagement, motivation, and confidence, suggesting that affective factors played a role in supporting learning outcomes. These findings are consistent with previous studies that identified increased learner motivation and reduced anxiety as key benefits of AI-assisted language learning environments (Alsadoon, 2021). Aldowsari & Aljebreen, (2024) also Find the increased engagement may explain why students in the experimental group demonstrated greater improvement than those in the control group. Moreover, students' reports of independent learning strategies and self-directed problem-solving indicate that ChatGPT encouraged learner autonomy. This aligns with prior research suggesting that AI tools foster self-regulated learning by allowing students to control the pace and depth of their learning (Losi et al., 2024). However, qualitative data also revealed challenges, particularly in distinguishing similar grammatical structures. This finding supports earlier research emphasizing that AI tools should complement, rather than replace, teacher guidance to ensure conceptual clarity and effective scaffolding (Son et al., 2025).

D. CONCLUSION

This study examined the effectiveness of ChatGPT as a tool for enhancing grammar and vocabulary mastery among secondary school students. The findings from the quantitative analysis demonstrated that students who received ChatGPT-assisted instruction achieved significantly higher grammar and vocabulary scores compared to those taught through conventional methods. In addition, students in the experimental group showed significant

improvement from pre-test to post-test, indicating that ChatGPT contributed meaningfully to students' language development over the course of the intervention. The qualitative findings further revealed that the students generally held positive perceptions toward the use of ChatGPT in learning English. Students reported that ChatGPT has made learning more engaging, interactive, and less intimidating, while also supporting clearer understanding of grammar concepts and vocabulary usage. Increased motivation and confidence were also identified as important outcomes, although some challenges related to grammatical complexity and technical issues were noted. Overall, the results suggest that ChatGPT as a tool can serve as an effective supplementary learning tool for grammar and vocabulary instruction when integrated alongside traditional teaching practices. Its ability to provide immediate feedback, personalized explanations, and flexible learning opportunities makes it particularly valuable in EFL contexts. This study will hopefully contribute to the growing research on AI-assisted language learning by providing empirical evidence from a vocational secondary school setting and highlighting the potential of ChatGPT to support both linguistic achievement and learner engagement.

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