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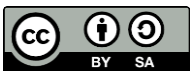

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The Effectiveness of AI-Assisted Reading Tools on EFL Students' Reading Comprehension and Engagement

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Abstract

This study investigates the effectiveness of a ChatGPT-based Reading Assistant in enhancing EFL students' reading comprehension and learning engagement. Employing a quasi-experimental design, the study involved two groups of third-semester undergraduate students during the 2024/2025 academic year. Over a six-week instructional period, the experimental group received reading instruction supported by the ChatGPT Reading Assistant, while the control group followed conventional reading practices. Data were collected using a standardized reading comprehension test and an engagement questionnaire. An independent samples t-test revealed no statistically significant difference between the groups' pretest scores ($p > .05$), indicating comparable initial proficiency. Post-intervention analysis showed that the experimental group outperformed the control group in reading comprehension, with a statistically significant difference ($p < .05$). Engagement levels were also significantly higher in the experimental group compared to the control group ($p < .05$). These findings suggest that AI-assisted reading tools can effectively support EFL reading instruction by improving comprehension outcomes and fostering greater student engagement. Further research is recommended to investigate long-term instructional impacts and to explore learners' qualitative experiences with AI-supported reading activities.

Keywords: *AI assisted reading tools; reading comprehension; student engagement*

Introduction

The rapid development of artificial intelligence (AI) has reshaped language learning practices, particularly in how learners read and interact with English texts. In many EFL contexts, university students continue to encounter difficulties in identifying main ideas, processing complex information, and maintaining sustained

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reading engagement, which in this study is understood as a multidimensional construct encompassing behavioral participation, cognitive investment, and emotional involvement during reading activities. Reading in a foreign language requires considerable cognitive effort, as learners must process unfamiliar vocabulary and grammatical structures while integrating textual information with prior knowledge (Pellicer-Sánchez, 2020; Lim & Lee, 2025). When linguistic resources and background knowledge are limited, the cognitive load increases, often resulting in reduced comprehension and disengagement from reading tasks. Conventional reading instruction does not always provide the individualized and adaptive support required to address these challenges.

Drawing on scaffolding theory and socio-cognitive perspectives on learning, AI-assisted reading tools have been introduced as supplementary resources designed to mediate learners' cognitive processes through timely support. Such tools can offer instant explanations, vocabulary assistance, and adaptive prompts that respond to learners' real-time needs, thereby reducing cognitive burden and facilitating strategic reading. Prior research suggests that AI-based scaffolding can enhance comprehension, promote strategy use such as predicting and summarizing, and support learner confidence by providing assistance at critical moments (Fan, 2025; Wu et al., 2025; Yılmaz & Aydın, 2025).

Empirical studies have reported positive effects of AI-supported reading environments on learners' comprehension and engagement. For instance, Chea and Xiao (2024) and Wang et al. (2024) found that students using AI-assisted reading platforms demonstrated greater gains in comprehension and vocabulary retention than those relying on traditional print-based materials. Other studies indicate that AI-enhanced reading tasks encourage more active learner participation, which contributes to higher levels of engagement during reading activities (Liu et al., 2024; Yuan & Liu, 2024).

However, findings across studies are not entirely consistent. Some researchers argue that the effectiveness of AI tools is contingent upon learners' digital literacy and their ability to interpret automated feedback effectively (Wu & Zhang, 2025; Jin et al., 2025). Moreover, research on reading engagement remains underdeveloped, as many studies prioritize learner perceptions rather than observable behavioral and cognitive indicators.

Despite increasing interest in AI-assisted language learning, systematic experimental research examining both cognitive outcomes (reading comprehension) and behavioral dimensions of engagement remains limited, particularly in EFL higher education contexts. Existing studies frequently focus on vocabulary development or general attitudes toward AI, with fewer investigations addressing measurable comprehension gains alongside engagement indicators. In the Indonesian higher education context, large-scale and cross-institutional experimental studies are still scarce. Wahyu et al. (2025) note that much of the current research is confined to small-scale case studies, highlighting the need for

broader empirical validation across disciplines and institutional settings. This gap underscores the necessity of examining the instructional efficacy of AI-assisted reading tools in contexts where English is not the primary medium of instruction.

Accordingly, the present study investigates the effectiveness of an AI-assisted reading tool in improving EFL students' reading comprehension and engagement. This study differs from previous research by simultaneously examining cognitive learning outcomes and behavioral engagement within a quasi-experimental design, thereby providing a more integrated understanding of how AI-supported reading tools function as complementary resources in university-level EFL instruction.

Method

This study employed a quasi-experimental design to examine the effectiveness of an AI-assisted reading tool on EFL students' reading comprehension and engagement. The design enabled a comparison of learning outcomes between two intact groups without random assignment. The experimental group received reading instruction supported by an AI-assisted tool, while the control group followed conventional reading instruction. Both groups completed the same reading comprehension test and engagement questionnaire at the end of the intervention.

The participants were 54 third-semester undergraduate students enrolled in the 2024/2025 academic year, assigned to groups based on existing class placement. The experimental group comprised 28 students who used the ChatGPT Reading Assistant over a six-week intervention consisting of twelve instructional meetings. The tool provided several adaptive features, including automated vocabulary annotations, text explanations, AI-generated comprehension questions, summarization prompts, and real-time scaffolding feedback tailored to students' responses.

The control group consisted of 26 students who received traditional reading instruction through teacher-guided reading, printed texts, and classroom discussion. To minimize instructional bias, both groups were taught by the same lecturer and followed comparable reading materials and learning objectives.

Two research instruments were used for data collection. The first was a reading comprehension test composed of multiple-choice items measuring students' ability to identify main ideas, supporting details, vocabulary meaning, and inferential comprehension. The second instrument was a reading engagement questionnaire adapted from established engagement frameworks, assessing behavioral, emotional, and cognitive engagement during reading activities. Content validity was established through expert judgment by two senior lecturers in EFL education. A pilot study was conducted with a comparable student cohort, yielding acceptable reliability coefficients (Cronbach's alpha = .81 for the engagement questionnaire and KR-20 = .78 for the reading comprehension test).

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Data analysis involved descriptive statistics to summarize group performance and an independent samples t-test to determine whether differences between the experimental and control groups were statistically significant. All statistical analyses were conducted at a .05 significance level to identify the impact of AI-assisted reading instruction on students' reading comprehension and engagement.

Ethical considerations were carefully addressed throughout the study. Participants were informed about the research objectives and procedures, and written informed consent was obtained prior to data collection. Student participation was voluntary, and all responses were anonymized to ensure confidentiality. The use of the AI-assisted tool complied with institutional ethical guidelines, and no personal identifying data were collected or stored by the application during the research process..

Results

The results of this study present a comparison of reading comprehension and engagement between the experimental and control groups. The findings are organized into two parts. The first presents the performance of both groups on the reading comprehension test, and the second describes their levels of engagement based on the questionnaire. Together, these findings provide an overview of the influence of the ChatGPT Reading Assistant on students' reading development.

Reading Comprehension Scores

The analysis indicates a clear difference in the reading comprehension performance of the two groups. Both groups took the same post test, which measured comprehension across several components including main ideas, details, vocabulary, and inferences.

Table 1. Reading Comprehension Scores of the Experimental and Control Groups

Group	Mean Pre Test	Mean Post Test	Gain Score
Experimental Class	66.0	78.6	12.6
Control Class	67.0	71.0	4.0

The experimental group had a mean score of 66.0 on the pretest, while the control group had a mean score of 67.0, which was a little higher. This means that the control group had a small advantage in reading comprehension before the intervention. The experimental group had a mean score of 78.6 on the post-test after the treatment, which shows that they had made a big improvement. The control group, on the other hand, had a post-test mean of 71.0, which shows a moderate increase due to regular teaching.

The learning gain of the experimental group was 12.6 points, while the control group gained 4.0 points. Although the difference between the two gains remains noticeable, the gap is more balanced and reflects a realistic effect of an instructional intervention. These results indicate that the use of the ChatGPT Reading Assistant contributed to a more significant improvement in reading comprehension compared to traditional classroom methods, even though both groups progressed from their initial performance.

To provide a clearer understanding of how the two groups performed, the numerical results presented in the table are supported by a visual comparison. The graph makes it easier to see how much each group improved by showing their scores next to each other. By displaying the scores side by side, the graph helps highlight the extent of improvement achieved by each group and makes the impact of the ChatGPT Reading Assistant easier to observe.

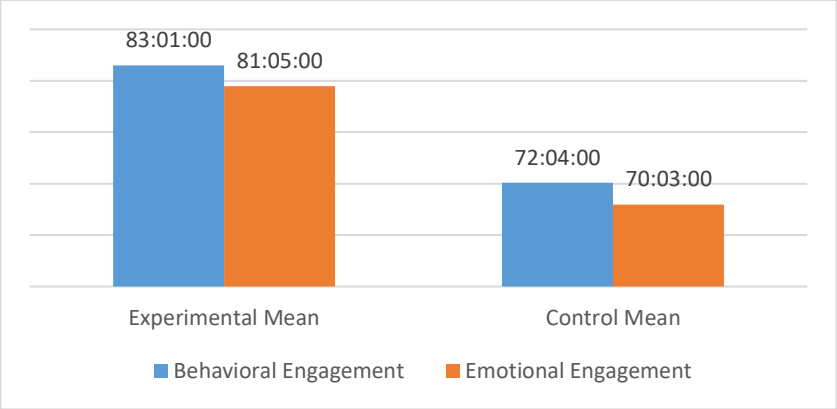

Figure 1. Mean Score of Reading Comprehension

Engagement Scores

The engagement questionnaire assessed behavioral, emotional, and cognitive participation during the reading activities. The findings show that the experimental group was more engaged than the control group.

Table 2. Student Engagement Scores of the Experimental and Control Groups

Group	Minimum	Maximum	Mean	Std. Deviation
Experimental	74	90	82.3	4.98
Control	64	79	71.5	4.72

Table 3 below gives a more detailed look at the parts of the engagement that made up the overall scores. This table makes it easier to compare the experimental and control groups by showing how they differ in terms of behavior, emotions, and thoughts.

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Table 3. Student Engagement Scores of the Experimental and Control Groups

Engagement Component	Experimental Mean	Control Mean
Behavioral Engagement	83.1	72.4
Emotional Engagement	81.5	70.3
Cognitive Engagement	82.4	71.8

To support the numerical findings, the engagement data are also displayed in a visual form for easier interpretation. The figure below presents the mean engagement scores of both groups.

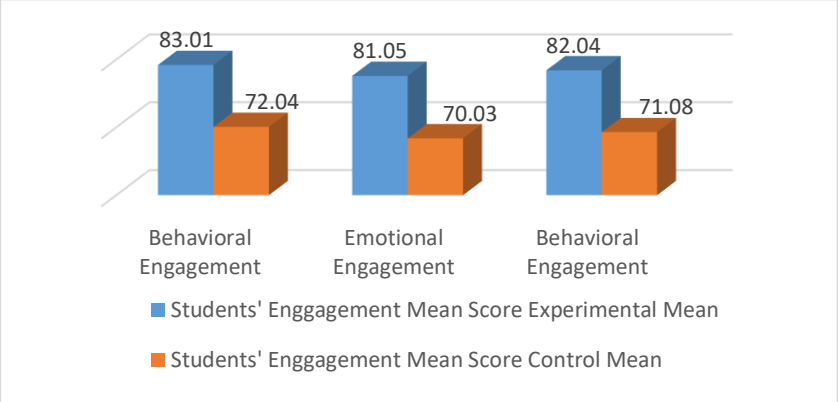

Figure 2. Mean Score of Students' Engagement

The results indicate that utilizing the ChatGPT Reading Assistant had a beneficial impact on both reading comprehension and engagement. Students in the experimental group exhibited a superior comprehension of the reading materials and increased engagement during the learning process. These findings offer empirical validation for the incorporation of AI-assisted tools as an adjunct to reading instruction in EFL classrooms.

Discussion

Cognitive Benefits of AI-Assisted Reading

The findings of this study indicate that the use of the ChatGPT Reading Assistant led to significantly greater gains in students' reading comprehension compared to conventional instruction. From a scaffolding and cognitive load perspective, these results suggest that AI-assisted support can facilitate comprehension by reducing extraneous cognitive load and enabling learners to allocate more cognitive resources to meaning construction. As proposed in socio-cognitive learning theory, comprehension improves when learners receive timely mediation that helps them process linguistic input without overwhelming working memory. The vocabulary annotations, guided prompts, and adaptive comprehension assistance embedded in the ChatGPT Reading Assistant appear to function as

contingent scaffolds, supporting learners precisely when difficulties arise.

This interpretation is consistent with previous studies indicating that reading comprehension develops more effectively when learners receive structured assistance that clarifies textual meaning and supports strategic processing (Zhang & Kaur, 2025; Herdiana & Munir, 2023; Diprossimo et al., 2023). The present findings extend this line of research by demonstrating that AI-based scaffolding can operationalize these principles in real-time reading contexts, leading to measurable comprehension gains.

Engagement Mechanisms in AI-Supported Reading

Beyond cognitive outcomes, the experimental group demonstrated significantly higher levels of behavioral, emotional, and cognitive engagement. From a pedagogical standpoint, this heightened engagement may be attributed to the responsiveness and immediacy of AI support, which fosters sustained attention and active involvement during reading tasks. Prior research has shown that learners are more likely to remain engaged when instructional support is perceived as personalized and readily accessible (Yaseen et al., 2025; Uzun et al., 2025; Salameh, 2025).

The ChatGPT Reading Assistant differs from static digital resources by offering interactive feedback that adapts to learners' responses, which may explain the observed increase in engagement. This finding aligns with studies reporting that adaptive learning environments promote deeper learner participation and emotional investment, particularly when students confront complex or unfamiliar texts (Andhika et al., 2024; Contrino et al., 2024). In this sense, AI-assisted reading support appears to function not only as a cognitive aid but also as a motivational mechanism that sustains learner involvement.

Alternative Explanations and Pedagogical Positioning

While the positive outcomes observed in this study support the instructional potential of AI-assisted reading tools, alternative explanations should also be considered. One possible factor is the novelty effect, whereby students' initial enthusiasm for using AI-based tools may temporarily enhance motivation and performance. Additionally, students' familiarity with digital devices and prior exposure to technology-mediated learning could have influenced their responsiveness to the intervention. Although digital literacy was not directly measured, the consistently high engagement levels suggest that the tool was accessible to learners with varying degrees of technological experience.

It is also important to situate AI-assisted scaffolding within a broader pedagogical continuum. Unlike teacher-provided scaffolding, which is often constrained by time, class size, and instructional pacing, AI-based support offers immediate and individualized assistance that can be accessed repeatedly without interrupting classroom flow. However, AI support does not replace the pedagogical judgment and affective sensitivity of teachers. Instead, it complements teacher

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scaffolding by extending instructional support beyond what is feasible in traditional classroom interactions. The moderate gains observed in the control group reaffirm the value of conventional instruction while highlighting the added benefits of integrating AI-assisted tools.

Instructional Implications

Overall, the findings suggest that AI-assisted reading tools can meaningfully enhance both the cognitive and affective dimensions of reading development in EFL contexts. By providing adaptive scaffolding and real-time feedback, tools such as the ChatGPT Reading Assistant support learners' comprehension processes and foster sustained engagement during reading activities. These results underscore the pedagogical potential of AI-supported reading environments as complementary resources rather than replacements for teacher-led instruction, particularly in higher education EFL classrooms where learner diversity and instructional demands are high.

Conclusion

The findings of this study indicate that the ChatGPT Reading Assistant contributed positively to the improvement of EFL students' reading comprehension and engagement. Compared to conventional instruction, the AI-assisted reading environment supported greater gains in comprehension and fostered higher levels of behavioral, emotional, and cognitive engagement. These results suggest that adaptive AI-based support can facilitate text processing and sustain learners' active involvement during reading activities in university level EFL contexts.

From a theoretical perspective, this study extends research on AI-enhanced language learning by demonstrating how AI-based scaffolding can simultaneously influence cognitive learning outcomes and learner engagement within a single instructional design. By integrating measures of comprehension and multidimensional engagement, the study provides empirical support for sociocognitive and scaffolding based interpretations of reading development. Practically, the findings highlight the instructional value of AI-assisted reading tools as supplementary resources that can offer individualized support in settings where teacher-led scaffolding alone may be constrained by time and class size.

Despite these contributions, the study is limited by its relatively small sample size and short intervention period, which may affect the generalizability and long-term applicability of the findings. Future research is encouraged to employ mixed-methods approaches, conduct longitudinal investigations to examine sustained learning effects, and explore the role of teacher mediation in AI-supported reading instruction. Overall, this study reinforces the importance of positioning AI tools as complementary rather than substitutive resources, ensuring that technological support enhances rather than replaces the pedagogical role of teachers in EFL reading classrooms.

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