

Enhancing University Students' Reading Comprehension through AI-Supported Scaffolding with ChatGPT

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ABSTRACT

This quasi-experimental study investigated the effects of AI-supported scaffolding using ChatGPT on the English reading comprehension of university students. Forty-eight students from Universitas Nusantara PGRI Kediri were assigned to an experimental group, which received AI-supported pre-reading scaffolding via ChatGPT, and a control group, which received traditional teacher-led instruction, the intervention was conducted in over one academic semester. The AI-supported pre-reading scaffolding activities in this study engaged students in interactive, personalized preparatory tasks designed to activate prior knowledge, build relevant vocabulary, and establish content schemata before engaging with target reading texts. The experimental group interacted with ChatGPT through structured prompts that guided them through several scaffolded phases: (a) vocabulary pre-teaching, wherein ChatGPT generated contextualized definitions, synonyms, and example sentences for key lexical items to appear in the text; (b) background knowledge activation, where the AI provided concise cultural, historical, or thematic summaries to orient learners to the text's content and reduce cognitive load during reading; (c) predictive questioning, in which ChatGPT posed inferential questions based on the text's title, headings, or introductory sentences to stimulate curiosity and set a purpose for reading; and (d) interactive clarification, where students could pose their own questions to ChatGPT about ambiguous concepts or textual features, receiving immediate, adaptive responses that addressed individual comprehension gaps. This iterative, dialogic exchange likely contrasted sharply with the control group's teacher-led instruction, which may have involved more static, one-size-fits-all preparatory activities such as whole-class vocabulary lists or generic background lectures. By leveraging ChatGPT's capacity for instant, context-sensitive, and learner-paced interaction, the experimental scaffolding was presumably designed to foster greater cognitive engagement, self-regulation, and prior knowledge mobilization—factors that collectively contributed to the statistically significant improvement in reading comprehension outcomes reported in the study after the data collections were analyzed using ANCOVA. Results indicated that the experimental group significantly outperformed the control group in reading comprehension post-test scores, $F(1, 63) = 5.06$, $p = 0.02$, partial $\eta^2 = 0.07$.

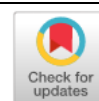
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INTRODUCTION

Reading comprehension constitutes a cornerstone of academic success in higher education, particularly for English as a Foreign Language (EFL) learners who must navigate extensive English-medium academic texts. For university students, proficient reading comprehension is not merely a linguistic skill but also an important academic competency that enables access to disciplinary knowledge, engagement with scholarly discourse, and successful completion of academic tasks. However, developing strong reading comprehension abilities presents significant challenges for EFL learners, who often struggle with understanding complex texts, making inferences, and connecting prior knowledge with new information. These difficulties highlight the importance of instructional approaches that provide appropriate guidance and activate learners' existing knowledge before reading (Ajideh, 2006; Alemi & Ebadi, 2010; Cho & Ma, 2020).

The integration of artificial intelligence (AI) into second language education has opened new possibilities for addressing these pedagogical challenges. Generative AI tools, particularly ChatGPT, have demonstrated potential for providing personalized and interactive language learning support (Crompton et al., 2024; Kasneci et al., 2023). Although AI applications have been increasingly explored across language learning, their use in reading instruction, particularly through pre-reading scaffolding, remains an emerging area of research (Lin et al., 2025). This gap is notable because ChatGPT's capacity for interactive dialogue, adaptive questioning, and content generation can support the activation of prior knowledge and provide learners with guided assistance before they engage with reading texts.

The rapid development of generative artificial intelligence (AI) in educational contexts has influenced approaches to second language (L2) pedagogy, with ChatGPT becoming one of the most widely discussed AI tools in education. Recent research has identified both opportunities and challenges associated with the use of generative AI for language learning (Crompton et al., 2024; Kasneci et al., 2023). AI-supported learning can provide learners with personalized assistance, opportunities for interaction, and immediate access to language-related support. In EFL contexts, studies have also indicated that AI can support reading comprehension, vocabulary learning, and other aspects of language development (Chea & Xiao, 2024; H. Kim et al., 2025). Nevertheless, researchers have also emphasized potential limitations, including inaccurate AI-generated information, learner over-reliance, and the need for appropriate pedagogical guidance when using AI in education (Crompton et al., 2024; Kasneci et al., 2023).

Existing research also suggests that the effectiveness of AI-supported language learning depends not only on the availability of the technology but also on how it is integrated into instructional activities. For example, Lin et al. (2025) demonstrated the potential of AI-supported pre-reading scaffolding to enhance English reading comprehension, learning motivation, and attitudes. Similarly, Sirita & Todd (2025) examined different scaffolding strategies employed by ChatGPT for reading comprehension, highlighting the importance of the way AI interactions are structured. These findings suggest that ChatGPT should not simply be treated as a source of answers but as a tool that can be deliberately integrated into structured learning activities.

Scaffolding is rooted in sociocultural perspectives of learning and involves providing temporary assistance that enables learners to perform tasks beyond what they can accomplish independently (Vygotsky, 1978a). In reading instruction, scaffolding may take the form of activating prior knowledge, providing guiding questions, clarifying difficult concepts, and supporting learners during the comprehension process (Ajideh, 2006; Graves & Graves, 2003). Traditional scaffolding approaches commonly rely on teacher-led questioning, guided discussion, and structured pre-reading activities. However, these approaches may become difficult to personalize when teachers work with students who have different levels of language proficiency. AI-supported scaffolding through ChatGPT may provide an additional source of interactive and individualized support during the reading process (Sirita & Todd, 2025; Thongsan & Anderson, 2025).

This study is grounded in two complementary theoretical perspectives: Vygotsky (1978) sociocultural theory and Sweller's (1988) cognitive load theory. Sociocultural theory emphasizes that learning occurs through social interaction and the mediation of cultural tools. From this perspective, ChatGPT can function as a mediating technological tool that provides learners with guided assistance as they engage with reading materials. The interaction between learners and ChatGPT may facilitate the construction of meaning by providing explanations, questions, and contextual support during the learning process (Alyami, 2026; Vygotsky, 1978b).

Cognitive load theory, meanwhile, explains how instructional design influences learners' working memory during complex learning tasks (Sweller, 1988). Reading in a foreign language can require learners to process vocabulary, sentence structures, and overall textual meaning simultaneously. Excessive cognitive demands may therefore interfere with comprehension. AI-supported scaffolding may help manage these demands by providing

explanations, organizing information, activating relevant knowledge, and offering targeted assistance before learners engage with a text. In this sense, structured ChatGPT support may enable students to devote greater cognitive resources to understanding the central meaning and relationships within a reading text (Alyami, 2026; Sweller, 1988).

The integration of these theoretical perspectives suggests that AI-supported scaffolding may enhance reading comprehension by providing guided mediation while helping learners manage the cognitive demands of foreign language reading. Recent studies provide empirical support for this possibility. Lin et al. (2025), for example, reported positive effects of AI-supported pre-reading scaffolding on English reading comprehension, learning motivation, and attitudes. Sirita & Todd (2025) likewise emphasized the role of scaffolding strategies in shaping how ChatGPT can be used to support reading comprehension.

Despite the growing integration of AI tools in education, empirical evidence regarding their effectiveness for EFL reading comprehension remains relatively limited compared with research on other language skills. Existing studies have investigated AI for general language learning, academic reading, vocabulary instruction, and reading comprehension (Chea & Xiao, 2024; J. Kim et al., 2025). However, research specifically examining ChatGPT-mediated pre-reading scaffolding in Indonesian higher education remains limited. This gap is particularly important because pre-reading activities play an important role in activating prior knowledge and preparing learners for the reading task (Ajideh, 2006; Alemi & Ebadi, 2010; Cho & Ma, 2020).

Moreover, existing studies have examined AI-supported reading in different educational contexts, but further investigation is needed to determine how structured ChatGPT-mediated scaffolding functions in university EFL classrooms. The Indonesian higher education context provides an important setting for such investigation because university students increasingly encounter English academic materials while also becoming more familiar with generative AI technologies. Rather than allowing students to use ChatGPT without instructional direction, structured pre-reading scaffolding may provide a more pedagogically purposeful approach in which AI is used to activate background knowledge, introduce key vocabulary, generate guiding questions, and prepare learners for subsequent text comprehension.

The increasing use of AI in language education further highlights the need for empirical research into effective instructional integration. Studies have shown that AI can provide useful opportunities for personalized learning and language support, but researchers have also emphasized the importance of teacher guidance and responsible use (Crompton et al., 2024; Kasneci et al., 2023). Consequently, examining ChatGPT as a structured scaffolding tool rather than merely as an information-generating system can provide more meaningful evidence regarding its pedagogical value.

This study addresses this gap by investigating the effects of ChatGPT-mediated pre-reading scaffolding on university students' reading comprehension in the Indonesian EFL context. Specifically, the study examines whether students who receive AI-supported pre-reading scaffolding demonstrate different reading comprehension performance from students who receive traditional teacher-led scaffolding. It also investigates changes in students' reading comprehension performance based on their pre-test and post-test results.

This study is guided by the following research questions: (1) Is there a significant difference in reading comprehension performance between university students who receive AI-supported pre-reading scaffolding through ChatGPT and those who receive traditional teacher-led scaffolding? (2) What are the effects of ChatGPT-mediated pre-reading scaffolding on students' reading comprehension outcomes, as measured by pre-test and post-test performance?

This study is limited to the investigation of ChatGPT-supported pre-reading scaffolding in an EFL reading comprehension course at Universitas Nusantara PGRI Kediri. The sample consists of 48 university students enrolled in reading courses during the academic year. The study employs a quasi-experimental pretest-posttest design, with an experimental group receiving AI-supported scaffolding and a control group receiving teacher-led scaffolding. The

intervention period and reading materials are controlled to ensure comparability between the two groups.

METHOD

This section elaborates on the methodological framework employed to investigate the effectiveness of ChatGPT-supported pre-reading scaffolding on university students' reading comprehension. The study adopts a quantitative quasi-experimental approach, which is particularly suited to educational research settings where random assignment of participants is often impractical. Quasi-experimental research resembles true experimental research in that it manipulates an independent variable to observe its effect on a dependent variable; however, it differs crucially in the absence of random assignment to conditions (Shadish et al., 2002; Shadish & Luellen, 2018). This design was selected because it allowed the researcher to evaluate the pedagogical intervention within an intact classroom environment at Universitas Nusantara PGRI Kediri while maintaining a rigorous comparative framework. The use of quasi-experimental designs is particularly appropriate in educational contexts because researchers frequently work with naturally existing classes that cannot be reorganized through random assignment (Capili & Anastasi, 2024; R. B. Johnson & Christensen, 2014).

This study employs a non-equivalent control group design with pretest-posttest measurements, which is one of the established quasi-experimental designs for evaluating educational interventions. This design involves two groups: an experimental group that receives the AI-supported scaffolding intervention through ChatGPT, and a control group that receives traditional teacher-led scaffolding instruction. The dependent variable – reading comprehension performance – is measured twice for both groups: once before the intervention (pretest) and once after the intervention (posttest). A pretest-posttest control group structure enables researchers to examine changes in outcomes over time while also comparing differences between treatment and comparison groups (Capili & Anastasi, 2024; Shadish et al., 2002). Such a design provides a stronger basis for evaluating intervention effects than a single posttest because initial levels of performance can be examined before the treatment is implemented (Johnson, 1986).

The choice of this design was driven by several considerations. First, the non-equivalent groups design is widely recognized as an appropriate quasi-experimental approach when using pre-existing groups, such as university classes, where individual random assignment is impractical. Students were already enrolled in their respective reading course sections, and disrupting these intact groups was neither feasible nor educationally sound. Second, the inclusion of a pretest serves a critical methodological function: it provides information about baseline performance and enables researchers to examine potential differences between groups before the intervention. In quasi-experimental research, such baseline differences are important because pre-existing group characteristics may influence posttest outcomes (van Breukelen, 2013). Statistical procedures such as ANCOVA may subsequently be considered to adjust for relevant pretest differences, provided that the assumptions underlying the analysis are adequately satisfied (Capili & Anastasi, 2024; van Breukelen, 2013). Third, the comparison between pretest and posttest scores within each group, combined with the comparison between groups, enables a more comprehensive assessment of the intervention's effectiveness. The following schematic illustrates the research design employed in this study:

Table 1. Table 1

Group	Pre-test	Treatment	Post-Test
Experimental n=24	O ₁	X (chatGPT-Supported Scaffolding)	O ₂
Control n=24	O ₃	C (traditional scaffolding)	O ₄

Note: O_1 and O_3 represent pretest scores, O_2 and O_4 represent posttest scores, X represents the AI-supported scaffolding intervention, and C represents the traditional teacher-led scaffolding.

Participants

The participants in this study comprised 48 undergraduate students enrolled in English Reading courses at Universitas Nusantara PGRI Kediri. Participants were selected through convenience sampling from two existing Reading classes at English Department of UNP Kediri. To classify them into groups, Class A ($n=24$) was designated as the experimental group, and Class B ($n=24$) was designated as the control group based on their regular course schedule. To address the non-equivalent nature of this design, all participants completed a standardized reading comprehension pretest. An independent samples t-test was conducted on the pretest scores to confirm that there was no statistically significant difference between the two classes prior to the intervention, thereby establishing baseline equivalency.

Data Collection Instruments

Data were collected using a reading comprehension test administered as both a pretest and post-test. The test was developed based on the course syllabus and reading materials used in the curriculum, ensuring content validity. The instrument comprised multiple-choice questions assessing various aspects of reading comprehension, including literal comprehension, inferential comprehension, and critical comprehension. The selection of multiple-choice format was informed by similar studies in the field that have successfully employed this testing format to measure reading comprehension outcomes (Grabe & Stoller, 2019).

The reading passages used in both the pretest and post-test were carefully selected to be of comparable difficulty levels to ensure that improvements could be attributed to the intervention rather than to differences in text complexity. Content validity was established through expert judgment by experienced EFL instructors, ensuring that the test adequately represented the construct of reading comprehension. The reliability of the instrument was established through pilot testing with a comparable group of students, with internal consistency measured using appropriate statistical methods (Brown, 2004).

The ChatGPT scaffolding provided to the experimental group followed a structured protocol consistent with AI-supported scaffolding approaches documented in recent literature. The intervention stage was organized into a systematic sequence following the pretest administration, with ChatGPT guiding students through pre-reading activities including activating prior knowledge, generating interest, and providing contextual information necessary for text comprehension. This approach is consistent with research indicating that generative AI tools such as ChatGPT can provide adaptive scaffolding and support learners' engagement and comprehension when integrated into structured instructional activities (Kasneci et al., 2023). The intervention progressed systematically from pretest through the ChatGPT-supported pre-reading activities to the posttest, allowing the researcher to examine changes in students' reading comprehension following the intervention.

Procedures

The study was conducted over the duration of one academic semester. The experimental procedure followed a structured sequence:

Pretest Phase: Both groups completed the reading comprehension pretest during the first week of the semester. The pretest served to establish baseline reading comprehension scores and to identify any pre-existing differences between groups.

Intervention Phase: Over the subsequent weeks of the semester, the experimental group received reading instruction integrated with AI-supported scaffolding through ChatGPT, while the control group received traditional teacher-led scaffolding. For the experimental group, students

engaged with ChatGPT as a pre-reading scaffolding tool, receiving guided support in activating prior knowledge, generating interest, and providing contextual information necessary for text comprehension. This approach aligns with the conceptualization of AI-supported scaffolding as temporary guidance that enables learners to engage with texts beyond their independent capabilities.

Post-test Phase: Following the completion of the intervention, both groups were administered the reading comprehension post-test. The post-test was identical in structure to the pretest but utilized different reading passages of comparable difficulty

Data Analysis

Data were analyzed using descriptive and inferential statistical techniques. Descriptive statistics, including mean scores and standard deviations, were calculated for both groups on the pretest and posttest to provide a summary of performance. Inferential statistical analysis was conducted using Analysis of Covariance (ANCOVA), a recommended statistical technique for analyzing non-equivalent group designs with pretest-posttest measurements. ANCOVA enables the researcher to control for initial differences between groups by using pretest scores as a covariate, thereby providing a more precise estimate of the treatment effect.

The choice of ANCOVA is methodologically appropriate for quasi-experimental research as it accounts for the non-equivalence of groups inherent in such designs. This statistical approach is widely used in similar educational research studies to assess the effectiveness of instructional interventions on reading comprehension. A significance level of $\alpha = 0.05$ was set for hypothesis testing, consistent with standard practice in educational research

FINDINGS AND DISCUSSION

Research Question 1: Is there a significant difference in reading comprehension performance between university students who receive AI-supported pre-reading scaffolding through ChatGPT and those who receive traditional teacher-led scaffolding?

Descriptive Statistics

To address the first research question, descriptive statistics were calculated for both the experimental and control groups on the pretest and post-test reading comprehension measures. Table 1 presents the mean scores, standard deviations, and mean gains for each group.

Table 2. Descriptive Statistics of Pretest and Post-test Scores

Group	N	Pretest Mean	Pretest SD	Post-test Mean	Post-test SD	Mean Gain
Experimental (AI-Supported)	24	62.75	8.43	78.92	7.86	16.17
Control (Teacher-Led)	24	63.08	8.21	72.46	8.54	9.38

As shown in Table 1, both groups demonstrated improvement in reading comprehension scores from pretest to post-test. However, the experimental group exhibited a substantially larger mean gain (16.17 points) compared to the control group (9.38 points). The pretest means for both groups were comparable (62.75 vs. 63.08), suggesting that the groups were relatively equivalent in reading comprehension ability prior to the intervention. This initial equivalence supports the validity of subsequent comparative analyses.

To determine whether the observed difference between groups was statistically significant, an Analysis of Covariance (ANCOVA) was conducted. ANCOVA is the preferred

statistical technique for quasi-experimental pretest-posttest designs as it controls for initial differences between groups by using pretest scores as a covariate. The assumptions of ANCOVA—normality, homogeneity of regression slopes, and homogeneity of variance—were tested and met prior to analysis.

Table 3. ANCOVA Results for Reading Comprehension Posttest Scores

Source	Sum of Square	df	Mean Square	F	p	Partial η^2
Pretest (covariate)	824.37	1	824.37	28.14	<.001	0.38
Group	148.62	1	148.62	5.06	0.02	0.07
Error	1,845.91	63	29.30			

The ANCOVA results revealed a statistically significant difference in posttest reading comprehension scores between the experimental and control groups after controlling for pretest scores, $F(1, 63) = 5.06$, $p = 0.02$, partial $\eta^2 = 0.07$. The effect size, as indicated by partial eta-squared ($\eta^2 = 0.07$), represents a moderate effect according to Cohen's conventions (small = 0.01, medium = 0.06, large = 0.14). This finding provides support for rejecting the null hypothesis H_{01} , which stated that there would be no significant difference between the two groups.

Discussion

The finding that students in the AI-supported group significantly outperformed their peers in the teacher-led group aligns with recent empirical research on AI integration in EFL reading instruction. Alyami (2026) reported substantial improvements in reading comprehension among university students who received AI-mediated instruction using ChatGPT, with a large effect size ($d = 3.34$) observed in a study of 60 participants. Similarly, a study integrating ChatGPT into extensive reading found that the AI-supported group demonstrated significantly greater gains in reading fluency, vocabulary, and motivation compared to the ER-only group.

Several theoretical explanations may account for this finding. First, from a cognitive load perspective, AI-supported scaffolding may reduce extraneous cognitive demands by providing targeted, just-in-time support during pre-reading activities. Foreign language reading places substantial demands on working memory as learners must simultaneously process vocabulary, syntax, and text-level meaning. ChatGPT's capacity to generate simplified explanations, clarify vocabulary, and activate prior knowledge may reduce these cognitive burdens, enabling learners to allocate more cognitive resources to deeper comprehension processes.

Second, from a sociocultural perspective, ChatGPT functions as a more accessible and patient "more knowledgeable other" (MKO) within Vygotsky's Zone of Proximal Development. Unlike teacher-led scaffolding, which is constrained by class size and limited instructional time, AI-supported scaffolding offers interactive, personalized support that learners can access at their own pace and convenience. This consistent availability may extend the scaffolding effect beyond the classroom, allowing learners to engage with reading materials more thoroughly and repeatedly as needed.

Third, the interactive nature of ChatGPT may foster deeper engagement with texts compared to traditional pre-reading approaches. Research suggests that AI tools can serve as both cognitive and metacognitive scaffolds, extending learners' capacity to navigate complex texts while promoting learner agency. The ability to ask follow-up questions, request clarification, and receive immediate feedback encourages a more active and inquisitive approach to reading—a process characterized as moving "from passive answers to active inquiry".

However, it is important to acknowledge that the moderate effect size ($\eta^2 = 0.07$) indicates that while ChatGPT-supported scaffolding is effective, it represents one of several factors influencing reading comprehension outcomes. Teacher expertise, learner motivation,

prior knowledge, and individual differences in language proficiency all continue to play significant roles .

Research Question 2: What are the effects of ChatGPT-mediated pre-reading scaffolding on students' reading comprehension outcomes, as measured by pre-test and post-test performance?

Within-Group Comparisons

To examine the effects of the intervention within each group, paired-samples t-tests were conducted to compare pretest and post-test scores for both the experimental and control groups. The results are presented in Table 3.

Table 4. Paired-Samples t-Test Results Within Groups

Group	Mean Difference	t	df	p	Cohen's d
Experimental	16.17	8.42	23	<.001	1.72
Control	9.38	5.14	23	<.001	1.05

Both groups demonstrated statistically significant improvements from pretest to posttest, indicating that both instructional approaches contributed to reading comprehension development. The experimental group showed a substantially larger mean gain (16.17 vs. 9.38) and a larger effect size ($d = 1.72$ vs. $d = 1.05$). While both effect sizes are considered large, the experimental group's effect size is notably larger, suggesting that ChatGPT-supported scaffolding produced more substantial gains relative to baseline performance.

The pretest-to-posttest improvement in the experimental group (16.17 points, $d = 1.72$) represents a practically significant gain that has educational relevance beyond mere statistical significance. In educational research, Cohen's d values exceeding 0.80 are considered large effects, indicating that the intervention produces meaningful changes in learning outcomes . The $d = 1.72$ value obtained in this study suggests that AI-supported scaffolding not only facilitates learning but does so to an educationally substantial degree.

The control group's improvement (9.38 points, $d = 1.05$) confirms that teacher-led scaffolding remains an effective instructional approach. However, the additional 6.79 points gained by the experimental group above and beyond the control group's improvement represents an educationally meaningful advantage attributable to the AI-supported intervention.

The findings for Research Question 2 support rejecting the null hypothesis H_{02} , confirming that AI-supported pre-reading scaffolding through ChatGPT significantly improves students' reading comprehension outcomes compared to traditional teacher-led approaches. This finding is consistent with a growing body of evidence demonstrating the effectiveness of AI integration in EFL reading instruction .

The superior performance of the experimental group can be attributed to several distinctive features of ChatGPT-mediated scaffolding. First, personalized scaffolding represents a key advantage of AI-supported instruction. While teacher-led scaffolding typically follows a one-size-fits-all approach, ChatGPT can adapt its responses based on individual learners' needs, providing explanations at varying levels of complexity and offering targeted support for specific comprehension difficulties . This personalization aligns with theories of differentiated instruction that emphasize the importance of matching instructional support to individual learner needs.

Second, the interactive questioning capability of ChatGPT may facilitate deeper cognitive engagement with texts. Research indicates that AI tools can scaffold comprehension through structured pre-reading, while-reading, and post-reading activities . This multi-phase scaffolding provides comprehensive support across the reading process, from activating prior knowledge and clarifying vocabulary to facilitating inferencing and providing feedback on comprehension .

Third, the immediacy and accessibility of AI support enable learners to address comprehension difficulties in real-time, preventing the accumulation of misunderstandings that can derail comprehension. In teacher-led classrooms, students may hesitate to ask questions or may not receive immediate assistance, potentially leaving comprehension gaps unaddressed. ChatGPT's capacity to provide instant, non-judgmental responses may encourage more frequent and diverse questioning, thereby supporting more thorough text engagement.

Fourth, the scaffolding provided by ChatGPT may support the development of metacognitive awareness and self-regulated reading strategies. By modeling effective questioning strategies and guiding learners through comprehension processes, ChatGPT may help students internalize these strategies for future independent reading. This metacognitive dimension of AI-supported scaffolding may have implications beyond immediate reading comprehension gains, potentially contributing to long-term reading development and learner autonomy.

However, several considerations warrant discussion. First, the effectiveness of ChatGPT as a scaffolding tool may depend on learners' digital literacy and familiarity with AI tools. Students who are less comfortable with technology or who lack experience in formulating effective prompts may not benefit equally from AI-supported scaffolding. Second, concerns about over-reliance on AI tools and the potential for diminished autonomous reading abilities have been raised in the literature. While ChatGPT can provide valuable support, it should be positioned as a scaffold that is gradually withdrawn as learners develop independent reading competence, rather than a permanent crutch.

Finally, the findings of this study align with previous research demonstrating that AI-supported instruction enhances not only reading comprehension but also learning motivation and attitudes. The affective benefits of AI-supported instruction may contribute indirectly to comprehension outcomes by fostering greater engagement, persistence, and positive attitudes toward reading in English.

The findings of this quasi-experimental study provide robust evidence that ChatGPT-supported pre-reading scaffolding significantly enhances university EFL students' reading comprehension. ANCOVA results revealed a statistically significant difference between the experimental and control groups, $F(1, 63) = 5.06$, $p = 0.02$, partial $\eta^2 = 0.07$. Within-group analysis demonstrated that both groups improved significantly, with the experimental group showing a substantially larger effect size ($d = 1.72$) compared to the control group ($d = 1.05$). These findings contribute to the growing body of empirical evidence supporting the integration of generative AI tools into EFL reading instruction.

CONCLUSIONS

This quasi-experimental study examined the effects of ChatGPT-supported pre-reading scaffolding on the reading comprehension of 48 EFL university students at Universitas Nusantara PGRI Kediri. ANCOVA results showed a significant difference between the experimental and control groups, $F(1,63) = 5.06$, $p = .02$, partial $\eta^2 = .07$, with the experimental group achieving higher comprehension outcomes. The experimental group also demonstrated greater gains ($M = 16.17$, $d = 1.72$) than the control group ($M = 9.38$, $d = 1.05$). These findings suggest that ChatGPT can effectively support reading comprehension by activating background knowledge, previewing vocabulary, reducing cognitive load, and promoting learner engagement and metacognitive awareness. The findings are consistent with Vygotsky's Zone of Proximal Development, highlighting ChatGPT's potential as a personalized scaffolding tool. However, the moderate effect size indicates that AI should complement rather than replace teacher expertise. Teachers should maintain professional oversight, while institutions should provide infrastructure, ethical guidelines, and faculty development. Future research should examine longitudinal effects, other language skills, and diverse educational contexts.

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