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Exploring the Relationships between Learning Motivation and Chinese Reading Achievement in a ChatGPT-assisted Learning Environment

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Abstract

This study investigated the effects of a ChatGPT-assisted learning environment on Thai junior high school students' Chinese reading achievement and learning motivation, and the relationship between motivational factors and reading performance. Sixty-four Grade 8 students enrolled in an HSK Level 3 Chinese course were randomly assigned by class to either a Traditional Teaching Group (TTG) or a ChatGPT-Assisted Group (CAG). During the instructional period, both groups studied identical reading content using different instructional approaches. Data were collected using Chinese reading pre- and post-tests and a learning motivation questionnaire measuring intrinsic motivation, self-determined motivation, self-efficacy motivation, and grade motivation. The results showed that students in the CAG achieved significantly higher Chinese reading scores than those in the TTG. Significant differences were also found in self-determined motivation, self-efficacy motivation, and grade motivation, favoring the ChatGPT-assisted environment, while intrinsic motivation did not differ significantly between groups. Further analysis revealed that self-determined motivation was the only motivational dimension significantly associated with reading achievement. These findings suggest that ChatGPT-assisted learning can enhance Chinese reading performance and support key motivational factors, particularly learner autonomy. The study highlights the importance of integrating AI tools in ways that promote self-determined learning to maximize their educational effectiveness.

Keywords: ChatGPT, Chinese Reading, Learning Motivation, AI-assisted Learning

■ Introduction

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Chinese reading remains one of the most challenging areas for Thai junior high school students learning Chinese as a foreign language. The complexity of the Chinese logographic writing system, coupled with the lack of phonetic and spacing cues, imposes a heavy cognitive load on students accustomed to alphabetic scripts such as Thai. Traditional teacher-centered instruction and rote memorization often fail to develop students' higher-order reading skills, leading to low motivation, limited autonomy, and poor reading comprehension (Zhang & Chayanuvat, 2024; Everson, 2009). Consequently, it has become essential to explore innovative, technology-enhanced pedagogies that make Chinese reading more engaging and effective for students in Thailand.

Recent advancements in artificial intelligence (AI) have opened new opportunities for supporting language learning. Among these technologies, ChatGPT, a large language model developed by OpenAI, has shown remarkable potential in facilitating interactive, personalized, and self-paced learning experiences. ChatGPT can generate adaptive reading materials, provide instant explanations of vocabulary and grammar, and engage students in authentic communication scenarios, all of which can promote both motivation and achievement in second language learning (El Hassan & Alsawah, 2025; Bai & Chan, 2024; Godwin-Jones, 2024). Previous experimental findings have confirmed that ChatGPT-assisted instruction can significantly improve Chinese reading achievement and enhance students' motivation compared to traditional teaching approaches.

However, despite this growing body of evidence, two important gaps remain in literature. First, while prior studies have established that ChatGPT-assisted environments benefit language learners in general, little is known about which specific motivational dimensions — such as intrinsic motivation, self-efficacy, or instrumental orientation — most strongly predict reading performance within such environments. Understanding these fine-grained motivational mechanisms is essential for designing more targeted and effective AI-assisted instruction. Second, most of the existing research has been conducted in university or adult learning contexts; empirical evidence from secondary school learners, particularly in Southeast Asian settings where both the target language (Chinese) and the instructional technology (ChatGPT) represent significant novelty, remains sparse.

Therefore, this study aims to investigate the relationships between students' learning motivation and Chinese reading achievement in a ChatGPT-assisted learning context among Thai junior high school students. By analyzing correlations among motivational dimensions and reading outcomes, this research identifies which motivational factors serve as significant predictors of reading performance. In doing so, the study makes two distinct contributions to the field: it extends theoretical understanding of the motivational mechanisms that operate within AI-assisted Chinese language learning environments, and it provides empirical evidence from a secondary school context in Thailand — a population that has been largely underrepresented in the existing literature. The findings carry practical implications for educators and curriculum designers seeking to leverage AI tools in ways that are psychologically grounded and contextually responsive.

■ Research Questions

Building on previous findings that ChatGPT-assisted learning improves students' Chinese reading performance, this study aims to further explore the effect of different learning environments on learning achievement and the relationships between learning motivation and learning achievement. The following research questions guide this study:

RQ1: Is there a significant difference in Chinese reading achievement between students learning in a traditional learning environment and those learning in a ChatGPT-assisted learning environment?

RQ2: Are there significant differences in students' learning motivation between traditional learning environments and ChatGPT-assisted learning environments?

RQ3: What is the relationship between students' learning motivation and their Chinese reading achievement in a ChatGPT-assisted learning environment?

■ Significance and Purposes

- 1) To examine the differences in Chinese reading achievement between students learning in a traditional learning environment and those learning in a ChatGPT-assisted learning environment.
- 2) To examine the differences in students' learning motivation between traditional learning environments and ChatGPT-assisted learning environments.
- 3) To investigate the relationship between students' learning motivation and their Chinese reading achievement in a ChatGPT-assisted learning environment.

■ Literature Reviews

This section reviews the relevant literature on learning motivation, Chinese reading achievement, and AI-assisted learning environments. It aims to synthesize previous studies and establish the theoretical foundation for examining the relationships among the variables in the present research.

Motivation and Its Role in Language Achievement

Motivation serves as a foundational mechanism for sustaining engagement and enabling effective self-regulated learning processes in language acquisition. Self-regulated learning (SRL), widely described in educational psychology, highlights the central role of motivation across phases such as forethought, performance, and self-reflection (Zimmerman, 2000). Within this framework, motivated students exhibit stronger strategic behavior, greater persistence, and a greater willingness to tackle challenging task characteristics, which are essential for mastering complex language skills.

Self-efficacy functions as one of the strongest motivational determinants of achievement. As explained in social cognitive theory, self-efficacy influences task choice, effort, and resilience. Extensive

empirical research shows that students with greater confidence in their learning abilities tend to use more effective strategies and achieve better academic outcomes. Studies examining motivation in technology-enhanced environments similarly identify self-efficacy as a central predictor of improvements in reading and language performance (Paris & Paris, 2001; Azevedo, 2009).

Motivational constructs also expand beyond self-efficacy to include intrinsic interest, goal orientation, and task value. Research on technology-supported and online learning environments reveals that intrinsic interest promotes deeper engagement, especially when students interact with multimedia or digitally mediated tasks (Chen, Chung, & Wu, 2013). Grade-oriented motivation and task value additionally influence strategy use, often regulating the depth of processing in reading comprehension or writing performance (Butterfuss et al., 2022; Roscoe et al., 2019).

In modern AI-assisted learning settings, motivation becomes even more dynamic as digital tools create opportunities for personalized scaffolding. Intelligent tutoring systems, metacognitive support mechanisms, and adaptive learning environments enhance motivation by providing immediate feedback and supporting students' autonomy and competence. Two core psychological needs are highlighted in motivational theory. Studies have shown that digital tools that incorporate metacognitive prompts or adaptive-strategy feedback promote sustained engagement and heightened motivation in language-related tasks (Chen, 2024). Students interacting with AI-based feedback systems also demonstrate stronger self-regulation, which further mediates learning performance (Shyr & Chen, 2018; Hsieh et al., 2012).

In language learning, motivation influences essential processes such as vocabulary acquisition, text interpretation, and strategy selection. Research on EFL learning using AI-enhanced systems highlights that students with greater motivational readiness demonstrate more effective uptake of feedback, stronger engagement with reading tasks, and improved overall performance (Chu et al., 2022). Motivation, therefore, functions not only as a psychological construct but as a practical learning resource that determines students' ability to benefit from AI-enhanced Chinese reading tasks.

Overall, literature consistently reinforces the importance of motivation, particularly intrinsic motivation, self-determined motivation, and self-efficacy, in predicting reading outcomes and promoting deeper engagement in language learning contexts, including AI-supported environments.

Promoting Motivation in AI-Assisted Learning

Motivation jointly shapes students' engagement and achievement in AI-supported learning environments. Research in digital learning consistently shows that motivated students are more likely to perceive digital tools positively and use them effectively, while positive experiences with technology strengthen motivational constructs such as self-efficacy, interest, and task value (Kuhail et al., 2022; Yin et al., 2021).

In AI-enhanced language learning, this reciprocal relationship becomes particularly impactful. Students with higher self-efficacy tend to explore more AI functions, employ more advanced strategies, and persist in reading tasks even when encountering difficulty. At the same time, AI systems that deliver timely

feedback, contextual explanations, or personalized tasks reinforce students' competence and autonomy, leading to heightened motivation and more consistent engagement.

Integrative findings across studies suggest that AI serves as a cognitive and metacognitive scaffold, supporting the entire SRL cycle. AI-enabled intelligent tutoring systems facilitate planning and goal setting, while automated prompts and feedback mechanisms enhance monitoring and reflection, enabling the use of deeper strategies in reading and language tasks (Chen, 2024; Chen & Tsao, 2021). When students accept these tools and perceive them as useful, the motivational impact becomes more pronounced.

Existing research also highlights that AI-supported learning environments strengthen the interaction between motivation and acceptance. Elevated perceived usefulness often enhances self-efficacy and perceived competence, particularly when students receive feedback that supports comprehension or corrects misconceptions in real-time. Conversely, higher motivation leads to greater openness to experimenting with AI tools, which, in turn, indirectly strengthens acceptance and promotes long-term use (Lai & Gu, 2011; Liang et al., 2021).

Despite increasing attention to AI-assisted language learning, empirical studies integrating motivational dimension variables remain limited. Most previous research focuses on either motivation independently, leaving unanswered questions about how these variables interact or which specific dimensions contribute most strongly to reading achievement (Wei, 2023; Huang & Mizumoto, 2024). This gap underscores the need for a comprehensive analysis that examines motivations, including intrinsic motivation, self-efficacy, and self-determination.

Integrating findings from empirical AI-language-learning research provides a compelling foundation for examining how motivation and acceptance jointly influence Chinese reading achievement in ChatGPT-assisted learning environments. Such an integrative analysis supports a deeper understanding of how students engage with AI, how they evolve their learning strategies, and how psychological factors collectively shape language-learning outcomes (Zhai & Nezakatgoo, 2025).

Enhancing Chinese Reading Performance with AI-Assisted

AI-assisted technologies have become an important means of enhancing students' reading engagement and comprehension in Chinese language education. Research in AI-supported reading environments shows that interactive and adaptive systems can improve learners' motivation, reading quantity, and comprehension outcomes compared with traditional instruction. For example, primary school students who engaged in human-AI robot interaction demonstrated higher reading engagement and stronger language development than peers using paper-based materials, suggesting that AI-supported interaction can positively influence reading performance by increasing motivation and providing more practice opportunities (Yang & Wang, 2023). Similarly, studies on chatbot-supported dialogic reading indicate that AI-guided questioning and feedback can significantly enhance young children's story comprehension and vocabulary acquisition, with effects comparable to human-facilitated dialogic reading. These findings

suggest that AI can effectively scaffold comprehension processes when designed around interactive principles.

Personalization is another central mechanism through which AI promotes Chinese reading performance. Research on AI-assisted instructional systems in primary Chinese classrooms indicates that adaptive recommendation functions, real-time analytics, and individualized feedback help address learners' specific weaknesses in vocabulary, inference, and higher-order comprehension skills. Empirical classroom studies report improvements in both reading achievement and learning motivation when AI tools are integrated into reading instruction, particularly when systems provide targeted exercises aligned with students' proficiency levels (Liu et al., 2025). This aligns with broader evidence in digital learning research showing that adaptive systems enhance self-efficacy and task value by providing achievable challenges and immediate feedback, thereby supporting sustained engagement and improved academic outcomes (Wei, 2023; Zhai & Nezakatgoo, 2025).

The effectiveness of AI-assisted reading is also supported by advances in natural language processing technologies tailored to the characteristics of the Chinese language. The development of large-scale Chinese machine reading comprehension datasets, such as DRCD (Shao et al., 2018), has enabled more accurate automated assessment and question generation in intelligent tutoring systems. In addition, pretrained language models such as ChineseBERT (Sun et al., 2021), which integrate glyph and pinyin information, enhance machines' semantic understanding of Chinese characters and contextual meaning. These technological foundations increase the reliability and sophistication of AI-driven reading tools, allowing systems to deliver more precise comprehension support and feedback.

However, research also emphasizes that AI functions most effectively as a complementary instructional tool rather than a replacement for teachers. Studies highlight the importance of pedagogical alignment, teacher facilitation, and meaningful interaction to maximize the benefits of AI-assisted reading. For example, classroom-based research on AI-supported Chinese reading instruction indicates that learning gains are strongest when AI tools are integrated into structured pedagogical designs rather than used as standalone technologies (Yang & Wang, 2023). Similarly, studies on AI-assisted dialogic reading demonstrate that the effectiveness of chatbot systems depends on guided questioning strategies that scaffold active meaning-making processes, reinforcing the importance of instructional design and interaction quality. Broader research on AI in education also underscores that technological novelty alone does not guarantee improved performance; instead, alignment with learning objectives and teacher mediation is essential for sustaining engagement and achievement (Lo et al., 2024; Fang, 2025). Therefore, successful implementation requires integrating AI tools into structured reading strategies, fostering dialogic interaction, and ensuring that students actively process textual meaning rather than passively consuming digital content.

Research indicates that AI-assisted learning environments can provide advantages over traditional instruction in supporting Chinese reading achievement. While traditional classrooms offer structured guidance and teacher-led explanations, they often provide limited opportunities for individualized support. In contrast, AI-integrated environments, particularly those using tools such as ChatGPT, allow learners to receive immediate feedback and tailored assistance.

Adaptive responses and real-time clarification help students address specific difficulties in vocabulary, inference, and higher-order comprehension skills (Allehyani et al., 2025; Alsaedi, 2024). Empirical studies on AI-supported Chinese reading instruction report improvements in both reading performance and engagement when such tools are incorporated into well-designed pedagogical frameworks (Song & Song, 2023). These findings suggest that the instructional environment is an important factor influencing reading outcomes.

In terms of learning motivation, research suggests that AI-assisted settings may foster stronger motivation than traditional classrooms. The interactive and responsive features of AI tools can enhance students' perceptions of competence and autonomy, which are central to sustaining intrinsic motivation (Huang & Mizumoto, 2024). Students working in AI-supported contexts often report higher self-efficacy and greater perceived task value, as well as more sustained engagement in reading activities (Dinh, 2025; Huang et al., 2025). By comparison, traditional instruction, which typically relies on uniform teaching methods and delayed feedback, may provide fewer opportunities to address individual learning needs, thereby limiting motivational growth.

The relationship between motivation and Chinese reading achievement in AI-assisted environments has also been highlighted in prior research. Students with higher levels of self-efficacy and intrinsic interest tend to make more effective use of AI tools, apply appropriate reading strategies, and achieve stronger comprehension outcomes (Wei et al., 2025). At the same time, timely and personalized feedback from AI systems can strengthen learners' confidence and sustain their interest in reading tasks (Alhammad, 2024). Motivation, therefore, functions as an important factor that shapes how students interact with ChatGPT-assisted instruction and how effectively they benefit from it.

■ Research Methodology

This study employed a quasi-experimental research design combined with correlational analysis. A pre-test–post-test nonequivalent group design was implemented to examine the instructional effects of a ChatGPT-assisted learning environment compared with traditional instruction. In addition, correlational and two-way ANOVA analyses were conducted to investigate the relationships between different motivational dimensions and Chinese reading achievement within and across instructional conditions.

Participants

A total of sixty-four Grade 8 students from a public secondary school in Chiang Mai, Thailand, participated in this study. All participants were enrolled in a Chinese language course aligned with the HSK Level 3 curriculum. The reading materials used throughout the intervention were selected from the HSK3 syllabus and focused on common communicative themes, such as daily routines, school life, social relationships, traditional Chinese food and festivals, as well as travel and communication contexts.

The participants were drawn from two intact classes at the same grade level. To assign instructional conditions, a random class assignment procedure was used, in which one class was designated as the Traditional Teaching Group (TTG) and the other as the ChatGPT-Assisted Group (CAG). Each group consisted of 32 students. Assigning intact classes rather than individual students helped maintain the natural classroom setting while reducing potential disruption to regular teaching practices.

Students in the TTG received conventional classroom instruction led by the teacher, primarily using printed reading texts supported by PowerPoint presentations. In contrast, students in the CAG engaged in Chinese reading activities with the assistance of ChatGPT, which supported vocabulary clarification, sentence-level analysis, and the practice of reading strategies through guided interaction. During these sessions, the teacher assumed a facilitative role, providing guidance and monitoring students' use of the AI tool.

To control instructional consistency, both groups were taught by the same teacher, covered identical lesson content, followed the same instructional schedule, and completed the same assessments. The integration of ChatGPT in the CAG constituted the sole instructional variation between the two groups. An overview of the participants' sociodemographic characteristics is presented in Table 1.

Table 1

Participants' sociodemographic characteristics

Name	Option	Frequency	Percentage (%)
Gender	Male	30	46.88
	Female	34	53.13
Age	13	23	35.94
	14	41	64.06
Nationality	Thailand	62	96.88
	Myanmar	2	3.12

Measuring Tools

Chinese Reading Achievement Tests

To measure students' Chinese reading achievement, a set of pre-test and post-test instruments was designed and implemented. The pre-test was administered before the instructional intervention to assess students' initial reading proficiency, whereas the post-test was conducted upon completion of the intervention to evaluate learning progress. The test items were developed by the researcher and reviewed by subject-matter experts to ensure content validity.

Each test comprised 20 multiple-choice items targeting key aspects of Chinese reading comprehension, including comprehension of short

passages, contextual understanding of vocabulary, inferential reasoning, and the organization of sentences into meaningful sequences. Test reliability was examined using the Kuder–Richardson Formula 20 (KR-20), yielding coefficients of 0.81 for the pre-test and 0.82 for the post-test, which indicate a satisfactory level of internal consistency.

Learning Motivation Questionnaire

Students' learning motivation was assessed using a questionnaire adapted from the Science Motivation Questionnaire developed by Glynn et al. (2011). The instrument was modified to suit the context of Chinese reading and was designed to measure four motivational dimensions: intrinsic motivation (IM), self-determined motivation (SDM), self-efficacy motivation (SEM), and grade motivation (GM).

To ensure clarity and accessibility for the participants, the questionnaire was translated into Thai. Responses were collected using a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The final version consisted of 20 items, with each dimension reflecting a specific motivational aspect: interest and enjoyment in Chinese reading (IM), learners' autonomy and willingness to engage in reading tasks (SDM), confidence in one's ability to comprehend Chinese texts (SEM), and motivation driven by academic performance and grades (GM). The questionnaire's overall reliability was acceptable, with Cronbach's alpha coefficient of 0.70.

Experimental Procedure

An overview of the research procedure is illustrated in Figure 1. Initially, students completed a pre-test before being divided into two instructional groups: the ChatGPT-Assisted Group (CAG) and the Traditional Instruction Group (TIG). Each group received different instructional methods, and the study concluded with a post-test and a motivation survey to evaluate learning outcomes and motivation.

In addition, the study was carried out in three sequential stages: the pre-intervention assessment, the instructional stage, and the post-intervention assessment.

1) Pre-Intervention Assessment

At the beginning of the study, students in both the Traditional Teaching Group (TTG) and the ChatGPT-Assisted Group (CAG) completed a Chinese reading comprehension pre-test. This assessment determined students' baseline reading proficiency prior to exposure to the instructional treatment.

2) Instructional Stage

The instructional stage lasted four weeks, during which both groups studied identical reading topics but were taught through different instructional approaches. TTG received conventional teacher-led instruction, relying primarily on printed reading materials supplemented by PowerPoint presentations. Classroom activities focused on text explanation, vocabulary instruction, and comprehension exercises directed by the teacher. The details of the instructional stage are shown in Figure 2.

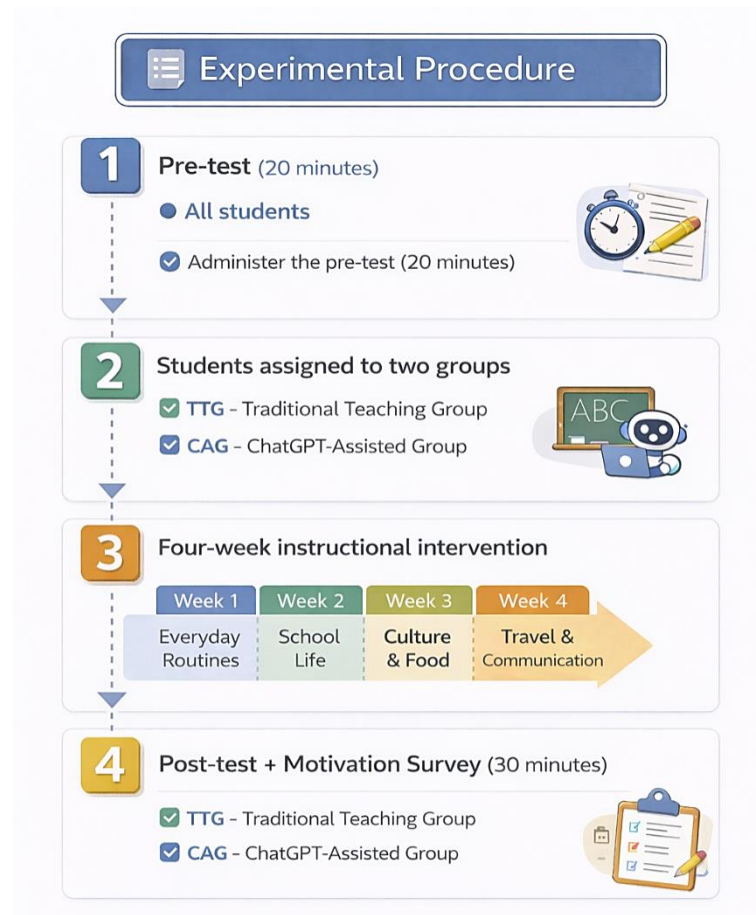


Figure 1. Experimental Procedure

In contrast, the CAG participated in an AI-supported learning environment that integrated ChatGPT as a learning aid. The study employed the GPT-5 version of ChatGPT through its standard web-based interface, which was freely accessible to all participants. Within this setting, the teacher adopted a facilitative role by demonstrating effective prompt construction at the beginning of the intervention and by providing ongoing guidance throughout the learning sessions.

During classroom activities, students interacted with ChatGPT to support their reading processes, including vocabulary clarification, grammatical analysis, and the application of reading strategies. The teacher actively monitored student-AI interactions, assisted learners in refining prompts, and encouraged critical evaluation of AI-generated responses to ensure accuracy and meaningful learning. For example, students used prompts such as “Explain the word 喧闹 (noisy) in the context of a festival” to explore vocabulary meaning, or “Analyze the grammar of the sentence 我喜欢过春节 (I like celebrating Chinese New Year)” to deepen sentence-level understanding. These interactions were embedded within lesson-specific tasks. In the final instructional week, focusing on Travel and Communication, students engaged in role-play activities by asking ChatGPT to simulate real-life communication scenarios, such as seeking directions from a local resident in Beijing, thereby applying newly acquired vocabulary and sentence patterns in an interactive context.



Figure 2. Four-Week Instructional Design for TTG and CAG

To ensure consistency and pedagogical structure, students were provided with a set of semi-structured prompt templates during the first week of the intervention. These templates guided students to formulate questions related to vocabulary clarification, grammatical analysis, and inferential comprehension (e.g., “Explain the meaning of ___ in this sentence,” “Identify the grammatical structure of ___,” or “What can be inferred from paragraph 2?”). After initial modeling and guided practice, students were gradually encouraged to modify and generate their own prompts following this framework. This scaffolded approach aimed to balance instructional structure with learner autonomy, ensuring that ChatGPT interaction supported targeted reading strategies rather than unfocused exploration.

3) Post-Intervention Assessment

Following the completion of the instructional stage, all participants completed the post-test to measure changes in Chinese reading achievement. In addition, students completed the Learning Motivation Questionnaire to assess their motivational perceptions after the intervention. The overall research procedure, the instructional content, and activities for each week.

■ Results

This study examines differences in Chinese reading achievement among students across different learning environments. Furthermore, examine the relationship between students' learning motivation and their Chinese reading achievement in a ChatGPT-assisted learning environment. The experimental results are analyzed as follows.

Results of Students' Learning Achievement

To examine the effect of instructional approach on students' Chinese reading performance, a one-way ANCOVA was conducted. In this analysis, the post-test score was defined as the dependent variable, representing students' learning achievement after the instructional intervention. The learning environment was treated as an independent variable, with two conditions: the Traditional Teaching Group (TTG, $n = 32$) and the ChatGPT-Assisted Group (CAG, $n = 32$). The two groups were comparable in age and grade level, as they were drawn from the same school and academic cohort. However, because intact classes were used, the study adopted a quasi-experimental design. The pre-test score was included as a covariate to account for students' prior reading ability.

An independent samples t-test was first conducted to examine baseline equivalence. The results revealed a statistically significant difference in pre-test scores between the two groups ($t = 2.194$, $p = 0.032$), indicating that the groups did not begin the study with equivalent prior reading proficiency. This baseline difference suggests that students' initial reading ability may have influenced subsequent post-test performance. Without statistical adjustment, any observed post-test difference could partially reflect pre-existing ability rather than the instructional effect.

Given this initial inequality, a one-way ANCOVA was employed to control the influence of pre-test scores. ANCOVA was considered appropriate because it statistically adjusts post-test scores by removing variance associated with prior reading ability, thereby providing a more accurate estimate of the treatment effect. By including the pre-test score as a covariate, the analysis reduces bias caused by baseline differences and strengthens the internal validity of the findings.

After adjusting for the covariate, the ANCOVA results showed a statistically significant effect of the learning environment on students' post-test performance, $F_{(1, 63)} = 6.169$, $p = 0.016$, $\eta^2 = 0.092$. The effect size indicates that approximately 9.2% of the variance in post-test scores was attributable to differences in the instructional environment.

As shown in Table 2, students in the ChatGPT-Assisted Group (CAG) achieved a higher post-test mean score ($M = 13.16$, $SD = 4.13$) than those in the Traditional Teaching Group (TTG) ($M = 10.31$, $SD = 4.55$). The mean square value associated with the group effect was 118.422. This pattern indicates that students who participated in the ChatGPT-assisted learning environment demonstrated stronger reading comprehension than those receiving traditional instruction.

Overall, the results suggest that integrating ChatGPT into classroom learning may enhance students' reading achievement. By statistically controlling for initial differences in reading proficiency, the findings provide more robust evidence that the observed improvement is associated with the instructional approach rather than pre-existing ability.

Table 2

Results of students' learning achievement between different learning environments

Group	N	M	SD	MS	$F_{(1,63)}$	η^2
CAG	32	13.16	4.13	118.422	6.169*	0.092
TTG	32	10.31	4.55			

* $p < 0.05$

Results of Students' Learning Motivation

The second set of results examined students' learning motivation across different instructional settings. Learning motivation was analyzed through four dimensions: intrinsic motivation (IM), self-determined motivation (SDM), self-efficacy motivation (SEM), and grade motivation (GM). To determine whether motivational differences existed between the two instructional conditions, a one-way MANOVA was conducted. In this analysis, the instructional approach was the independent variable, and the four motivation dimensions (IM, SDM, SEM, and GM) were the dependent variables. The statistical outcomes of this analysis are reported in Table 3.

Table 3

Results of students' learning motivation between different learning environments

Dimension	Group	N	M	SD	MS	$F_{(1,63)}$	η^2
IM	CAG	32	3.17	0.46	0.731	3.783	0.058
	TTG	32	2.95	0.42			
SDM	CAG	32	3.29	0.61	1.357	4.080*	0.062
	TTG	32	3.00	0.54			
SEM	CAG	32	3.50	0.52	4.384	12.260*	0.165
	TTG	32	2.98	0.67			
GM	CAG	32	3.32	0.45	1.063	4.577*	0.069
	TTG	32	3.06	0.51			

* $p < 0.05$

The results indicate that the instructional approach (independent variable) had a statistically significant effect on self-determined motivation (dependent variable), $F_{(1,63)} = 4.080$, $p = 0.048$, $\eta^2 = 0.062$.

The instructional approach also significantly influenced self-efficacy motivation (dependent variable), $F_{(1,63)} = 12.260$, $p < 0.001$, $\eta^2 = 0.165$, and grade motivation (dependent variable), $F_{(1,63)} = 4.577$, $p = 0.036$, $\eta^2 = 0.069$. However, the instructional approach (independent variable) did not significantly affect intrinsic motivation (dependent variable), $F_{(1,63)} = 3.783$, $p = 0.056$, $\eta^2 = 0.058$.

Results of the Relationship between Motivation and Achievement

Tables 4 and 5 revealed differential effects of motivational dimensions on Chinese reading achievement. Group and motivation level (high level is an average motivation score of 4 or higher, and low level is lower, according to the Likert scale) are used as independent variables, while the post-test score is the dependent variable. For intrinsic motivation (IM), a significant main effect of Group was found ($p = 0.030$), indicating that students in the ChatGPT-Assisted Group (CAG) achieved significantly higher reading scores than those in the Traditional Teaching Group (TTG), regardless of motivation level. Descriptive statistics further show that CAG students obtained consistently higher mean scores than TTG students at both high and low IM levels. However, neither the main effect of IM level ($p = 0.990$) nor the interaction effect ($p = 0.663$) was statistically significant, suggesting that intrinsic motivation itself did not significantly influence reading achievement. For self-determined motivation (SDM), both the main effect of Group ($p = 0.005$) and the main effect of SDM level ($p = 0.013$) were statistically significant. Students with higher levels of SDM achieved better reading performance than those with lower levels. This pattern was particularly evident in the TTG, where students with high SDM ($M = 11.57$) substantially outperformed those with low SDM ($M = 7.11$), indicating a meaningful achievement gap associated with SDM level. The interaction effect was not significant ($p = 0.219$), suggesting that although SDM positively influenced achievement, it did not alter the relative advantage between CAG and TTG. Among all motivational dimensions examined, SDM was the only variable that demonstrated a significant independent relationship with learning achievement. In contrast, self-efficacy motivation (SEM) showed no significant main effects of Group ($p = 0.282$) or SEM level ($p = 0.389$), and no significant interaction effect ($p = 0.136$). Similarly, for grade motivation (GM), although a significant main effect of Group was found ($p = 0.021$), neither the main effect of GM level ($p = 0.751$) nor the interaction effect ($p = 0.627$) was statistically significant. Descriptive results indicate minimal differences in GM levels between high and low groups within each group, suggesting that grade-oriented motivation did not meaningfully predict reading performance.

Overall, the findings demonstrate that the instructional group consistently influenced reading achievement, as CAG students achieved higher mean scores across all motivational dimensions. However, among the four motivational variables, only self-determined motivation showed a statistically significant and meaningful relationship with learning achievement.

Table 4

Descriptive data on students' motivation and learning achievement

Motivation	Group	Motivation Level	N	Mean $\pm$ SD
IM	CAG	High	24	13.29 $\pm$ 3.96
		Low	8	12.75 $\pm$ 4.86
	TTG	High	19	10.11 $\pm$ 4.50
		Low	13	10.62 $\pm$ 4.81
SDM	CAG	High	24	13.54 $\pm$ 3.97
		Low	8	12.00 $\pm$ 4.66
	TTG	High	23	11.57 $\pm$ 4.45
		Low	9	7.11 $\pm$ 3.14
SEM	CAG	High	28	13.57 $\pm$ 3.90
		Low	4	10.25 $\pm$ 5.12
	TTG	High	19	9.95 $\pm$ 4.38
		Low	13	10.85 $\pm$ 4.93
GM	CAG	High	26	13.12 $\pm$ 3.98
		Low	6	13.33 $\pm$ 5.13
	TTG	High	20	10.70 $\pm$ 4.35
		Low	12	9.68 $\pm$ 5.00

*p < 0.05

Table 5

Results of two-way ANOVA between students' motivation and learning achievement

Motivation	Source	$F_{(1,63)}$	Sig.
IM	Group	4.913	0.030*
	IM Level	0.001	0.990
	Group x IM Level	0.192	0.663
SDM	Group	8.599	0.005*
	SDM Level	6.528	0.013*
	Group x SDM Level	1.540	0.219
SEM	Group	1.176	0.282
	SEM Level	0.753	0.389
	Group x SEM Level	2.285	0.136
GM	Group	5.639	0.021*
	GM Level	0.101	0.751
	Group x GM Level	0.239	0.627

*p < 0.05

■ Discussion

This study explored the impact of a ChatGPT-assisted learning environment on Thai junior high school students' Chinese reading achievement and learning motivation, and the relationship between motivational dimensions and reading performance. By comparing a ChatGPT-Assisted Group (CAG) with a Traditional Teaching Group (TTG), the findings contribute to a more nuanced understanding of how artificial intelligence supports language learning outcomes and learner motivation in a secondary school context.

The results indicated that students in the CAG achieved significantly higher post-test reading scores than those in the TTG, providing empirical support for RQ1. This finding aligns with a growing body of research suggesting that AI-assisted learning tools can enhance reading comprehension by offering immediate, adaptive, and individualized support (Godwin-Jones, 2024; El Hassan & Alsawah, 2025). In the context of Chinese as a foreign language, such support is particularly valuable given the linguistic complexity of Chinese texts, including character recognition, syntactic patterns, and the construction of contextual meaning.

From a pedagogical perspective, ChatGPT served as cognitive scaffolding, supporting learners during the reading process. By providing explanations of vocabulary usage and sentence structure on demand, ChatGPT likely reduced learners' cognitive load, enabling them to focus on higher-order comprehension skills such as inference making and textual integration. This finding is consistent with previous studies that emphasize the role of scaffolding and strategy instruction in improving reading outcomes in second-language learning environments (Chen & Tsao, 2021).

Moreover, ChatGPT's interactive nature may have contributed to sustained engagement during reading activities. Unlike traditional instruction, which often follows a fixed pace, the AI-assisted environment allowed students to revisit explanations and ask follow-up questions as needed (Chen, 2024). This flexibility may have supported deeper processing of reading materials and contributed to the observed improvement in reading achievement.

However, the observed gains in reading achievement should be interpreted with caution, as several alternative explanations merit consideration. First, the improvement may partly reflect a novelty effect, whereby students in the CAG performed better not solely because of ChatGPT's pedagogical affordances, but because the introduction of a novel technological tool heightened their attention, curiosity, and overall engagement during the intervention period (Jeno et al., 2019). This heightened engagement, driven by the unfamiliarity of the tool rather than its instructional design, may have temporarily boosted performance without necessarily reflecting durable learning gains. Future studies employing longer intervention periods or delayed post-tests would help determine whether the observed improvements persist beyond the initial novelty of AI integration.

Second, the role of teacher guidance during ChatGPT uses warrants closer examination. In the present study, teachers supported students in navigating the AI tool, framing questions, and interpreting responses. This mediated form of AI interaction may have been an important, yet underacknowledged,

driver of achievement gains. If teachers actively scaffolded how students engaged with ChatGPT, for instance by modeling effective prompting strategies or redirecting off-task interactions, the improvement observed in the CAG may reflect the quality of teacher facilitation as much as the capabilities of the AI tool itself. This interpretation aligns with sociocultural perspectives on learning, which emphasize that technological tools achieve their pedagogical potential most fully when embedded within supportive human interaction (Tai & Chen, 2024). Disentangling the contribution of teacher guidance from AI-specific effects remains an important direction for future research.

Third, students' prior familiarity with digital learning technologies may have moderated the impact of ChatGPT use. Thai junior high school students who were already accustomed to digital platforms and text-based interaction may have adapted more readily to the AI-assisted environment, thereby gaining more from its affordances than students with limited digital literacy. Conversely, students less familiar with such tools may have experienced initial friction that partially offset the benefits of AI assistance. The present study did not systematically assess students' prior digital experience, which represents a limitation. Future investigations should consider including measures of digital literacy as a covariate to better isolate the effects of AI-assisted instruction on reading outcomes.

In response to RQ2, the MANOVA results revealed significant differences between the CAG and TTG in self-determined motivation (SDM), self-efficacy motivation (SEM), and grade motivation (GM), while intrinsic motivation (IM) did not differ significantly between groups. These findings suggest that the ChatGPT-assisted learning environment influenced specific motivational dimensions rather than motivation as a uniform construct.

The significant increase in self-determined motivation among students in the CAG highlights the autonomy-supportive nature of AI-assisted learning. ChatGPT enabled learners to initiate questions, select learning strategies, and control the pace of interaction, all of which are core elements of autonomy in self-determination theory (Deci & Ryan, 2020). This autonomy may have encouraged students to take greater ownership of their learning, resulting in higher levels of voluntary engagement with reading tasks.

The higher level of self-efficacy motivation observed in the CAG further indicates that AI-assisted feedback played an important role in shaping students' confidence. Immediate explanations and confirmations from ChatGPT may have reduced uncertainty and anxiety associated with reading Chinese texts, thereby reinforcing learners' beliefs in their reading ability. This finding supports Bandura's assertion that mastery experiences and timely feedback are central to the development of self-efficacy (Bandura, 1991). Nevertheless, an alternative interpretation should be acknowledged: the boost in self-efficacy may have been partially driven by the relative ease with which students could obtain answers from ChatGPT, rather than through genuine mastery of the reading content. If students perceived ChatGPT as a readily available shortcut rather than as a tool for deepening understanding, their increased confidence may not accurately reflect actual competence gains. This possibility highlights the importance of designing AI-assisted tasks that require students to demonstrate, rather than merely retrieve, their comprehension.

Grade motivation was also significantly higher among students in the ChatGPT-assisted environment. This suggests that students perceived ChatGPT as a useful tool for improving academic performance and

achieving better assessment outcomes. In exam-oriented educational contexts, such as secondary education in Thailand, performance-related motivation remains an important factor influencing student engagement. The presence of AI support may have strengthened students' perception that effort invested in reading activities would translate into tangible academic benefits (Butterfuss et al., 2022). It is worth noting, however, that heightened grade motivation may also reflect students' strategic orientation toward using AI as a performance aid, raising questions about whether such motivation supports deep learning or primarily encourages outcome-focused, surface-level engagement.

In contrast, intrinsic motivation did not differ significantly between the two groups. This result suggests that short-term instructional interventions may have limited influence on students' inherent interest in reading Chinese. A four-week instructional period may be sufficient to enhance situational engagement, perceived competence, or performance-oriented motivation; however, it is often insufficient to shift deep-seated intrinsic interests that develop gradually through sustained exposure, personal relevance, and identity formation in language learning (Ryan & Deci, 2020). Intrinsic motivation is typically shaped by long-term experiences, personal goals, and broader cultural attitudes toward language study. Therefore, while ChatGPT may have enhanced students' engagement and confidence, it may not have been sufficient to fundamentally alter their intrinsic interest within the limited intervention period (Bai & Chan, 2024). This null finding may also reflect a ceiling or floor effect, whereby students' baseline intrinsic motivation was either already relatively high or firmly established prior to the intervention, leaving limited room for measurable short-term change regardless of instructional approach.

Regarding RQ3, the findings revealed that self-determined motivation was the only motivational dimension significantly associated with Chinese reading achievement. This result underscores the central role of learner autonomy in AI-assisted learning environments. Students who demonstrated a higher willingness to engage independently and regulate their learning achieved better reading outcomes, regardless of their levels of intrinsic interest, self-efficacy, or grade-oriented motivation (Deci & Ryan, 2020; Zimmerman, 2002).

This finding suggests that AI tools such as ChatGPT are most effective when learners actively and strategically engage with them. While self-efficacy and grade motivation may encourage participation, they do not necessarily guarantee effective use of AI resources. Self-determined motivation, on the other hand, reflects learners' readiness to take initiative, ask meaningful questions, and persist in problem-solving, all of which are critical for successful AI-supported learning (Deci & Ryan, 2020).

The lack of a significant relationship between intrinsic motivation and reading achievement further highlights the importance of distinguishing between motivational dimensions. Enjoyment and interest alone may not directly translate into improved performance unless accompanied by autonomous learning behaviors (Yin et al., 2021). Similarly, self-efficacy and grade motivation may support engagement but require self-determined action to influence learning outcomes. These findings contribute to the literature by clarifying the mechanisms underlying motivation in AI-assisted language learning contexts. Taken together, the motivational findings point toward a practical implication: instructional designs that leverage AI tools

should prioritize fostering learner autonomy through open-ended tasks, reflective prompting, and student-directed inquiry, rather than relying on AI primarily as an answer-delivery mechanism. Without intentional support for self-determined engagement, the motivational and achievement benefits of AI-assisted learning may remain constrained.

■ Conclusion

This study examined the effects of a ChatGPT-assisted learning environment on Chinese reading achievement and learning motivation among Thai junior high school students. The results demonstrated that students who learned with ChatGPT support achieved significantly higher reading performance than those who received traditional instruction. These findings confirm the effectiveness of AI-assisted instruction in supporting Chinese reading comprehension at the secondary school level.

In addition, the ChatGPT-assisted learning environment positively influenced several motivational dimensions, including self-determined motivation, self-efficacy motivation, and grade motivation. However, intrinsic motivation remained unchanged, suggesting that short-term AI integration may have a limited impact on learners' inherent interest in reading Chinese. Importantly, among the motivational factors examined, self-determined motivation emerged as the only dimension significantly associated with reading achievement.

These findings highlight the importance of learner autonomy in AI-supported language learning. ChatGPT serves not merely as a source of information but as a learning scaffold that empowers students to regulate their learning, seek clarification, and apply reading strategies independently. For educators, the results suggest that the pedagogical value of AI tools lies not only in their technical capabilities but also in how they are integrated to support autonomous learning behaviors.

Despite its contributions, this study has several limitations. The sample size was relatively small and drawn from a single school, which may limit the generalizability of the findings. In addition, the intervention period was relatively short, which may have constrained changes in intrinsic motivation. Future research could involve larger samples, longer intervention periods, and mixed-method approaches to further explore students' learning experiences and motivational development in AI-assisted language learning environments.

■ Limitations and Recommendations

This study had several limitations, including the short 4-week intervention period, which restricts the understanding of ChatGPT's long-term impact on Chinese reading development and intrinsic motivation cultivation; the limited sample size of 64 students from a single junior high school in Thailand, which affects the generalizability of the findings to other educational contexts and age groups; the focus on reading achievement alone, without assessing other key Chinese language skills such as listening, speaking, and

writing; and the lack of investigation into teachers' perspectives regarding the integration of AI tools into Chinese language instruction, which could provide valuable insights for practical implementation.

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