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Enhancing Japanese EFL Students' Grammar Accuracy and Writing Fluency Using ChatGPT: A Mixed-Method Study

Rosbe Colina [1] , ***Dominic Bryan San Jose*** [2*] , ***Mike Lawrence Ratunil*** [3]

[1] *Osaka City Board of Education, Osaka 530-8201, Japan*

[2] *Recoletos de Bacolod Graduate School, University of Negros Occidental-Recoletos, Bacolod 6100, Philippines*

[3] *Ritsumeikan Uji Junior and Senior High School, Uji 611-0031, Japan*

ABSTRACT

This mixed-methods study investigated whether or not ChatGPT worked as a writing aid to increase the grammar accuracy and writing fluency of Japanese EFL students. Thirty Japanese senior high school students took part in a six-week intervention that included ChatGPT in process-based writing assignments. Three research questions were examined in the study: (1) How much does ChatGPT help learners become more accurate with grammar? (2) What impact does ChatGPT have on writing fluency? (3) What role does ChatGPT play in the development of students' writing? Pre- and post-tests evaluated using analytical rubrics yielded quantitative data. Grammar accuracy ($t(29) = 8.62$, $p < 0.001$, $d = 1.11$) and writing fluency ($t(29) = 6.46$, $p < 0.001$, $d = 0.84$) both significantly improved, according to paired-samples t-tests. Three main themes emerged from qualitative data from learner journals, semi-structured interviews, and classroom observations: ChatGPT as a grammar mentor, fluency development via iterative rewriting, and growing concerns about overreliance. Students reported better coherence and flow in written texts, increased awareness of frequent grammatical errors, and increased confidence in editing sentences. Results show that when ChatGPT is used as a scaffolded, process-oriented tool rather than as a replacement for independent writing, it can support both linguistic accuracy and fluency. Students' worries about dependence, however, emphasize the necessity of clear instruction in digital literacy. The study offers pedagogical implications for integrating AI responsibly in Japanese and wider Asian EFL contexts and adds empirical evidence to the

*CORRESPONDING AUTHOR:

Dominic Bryan San Jose, Recoletos de Bacolod Graduate School, University of Negros Occidental-Recoletos, Bacolod 6100, Philippines; Email: dominicsanjose@gmail.com

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expanding body of research on AI-assisted EFL writing.

Keywords: ChatGPT; EFL Writing; Grammar Accuracy; Writing Fluency; Japanese Learners; Mixed-Methods Research; AI-Assisted Language Learning

1. Introduction

Global education, particularly with language learning, has been rapidly and profoundly transformed by artificial intelligence or AI. One of the most important and widespread tools that has been adopted is ChatGPT, an AI-powered language model developed by OpenAI, and is now used globally. ChatGPT has made quite a name for itself in terms of its ability to help language learners produce writing that is not only communicative but also quite coherent and grammatically accurate. AI writing assistants like ChatGPT have become so integrated into classrooms worldwide that they now provide real-time feedback to learners and serve as virtual writing partners (Amoush & Alhosban, 2025[1]; Xiao et al., 2025[2]).

In the Asian context, where English proficiency is closely linked with academic and professional success, the call for effective English language instruction has intensified. Countries such as South Korea (Kim, 2025[3]), China (Luo & Hsiao-Chin, 2023[4]), and Vietnam (Quyet et al., 2024[5]) have begun to adopt AI-powered learning tools and use them in conjunction with traditional classroom practices. These tools are viewed not just as innovative signals of a tech-forward classroom, but also as potential equalizers, giving learners at all proficiency levels the chance to receive the kind of individualized support and scaffolding that leads to language learning. Still, more empirical research is needed to better understand the kind of learning outcomes these tools are producing.

Japan's English education, notably at the secondary and university levels, has undergone significant reforms in the last few decades and now places a much greater emphasis on communicative competence, especially in the areas of speaking and writing (Fujio, 2024[6]). Despite these changes, the most recent National Assessment of English Language Proficiency in Japan found that Japanese students remain far from fluent in English (Hiramoto, 2023[7]). This has often been attributed to a lack of practice in real-life situations, but it could also very well be related to continued over-reliance on certain digital tools that have yet to achieve a level of sophistication necessary to yield significant returns in terms of language learning (Weinmann et al., 2021[8]).

While genuine communicative practice opportunities are scarce in numerous Japanese public school environments, tools like ChatGPT now enable the simulation of real-time, situational English usage through interactive role-play and conversational scaffolding. Nonetheless, the current study concentrates exclusively on ChatGPT's function in written production rather than spoken interaction, and consequently does not explore these conversational abilities comprehensively. It is also important to consider that individuals who took part in this study were students at private eikaiwa (English conversation schools), which are more like extra tutoring schools than regular public schools. Students who enroll in these programs generally opt for supplementary English studies and exhibit higher levels of motivation and engagement compared to the general cohort of Japanese secondary students. This contextual differentiation is crucial for assessing the application of the findings to different educational settings.

Nagoya City, which has a mixed population of students attending public and private education, sees English writing skills among high school students as quite poor. Despite this, there are many qualified educators and ample opportunities for students to practice their writing. The barriers to developing stronger writing skills often seem to fall under the two umbrellas of (1) insufficient individualized support and (2) insufficient time to write in the classroom and to revise outside of it. Meanwhile, ample opportunities to write exist. And as for utilizing the latest writing tools like ChatGPT, empirical studies are imperative to establish their benefits in the EFL classrooms.

Recent academic research has increasingly emphasized the capacity of large language models (LLMs) and AI writing assistants to facilitate the writing development of EFL learners. Research conducted by Fu and Li[9] and Zhang and

Huang[10] demonstrates that AI-generated feedback can improve grammatical accuracy by providing immediate corrective input and metalinguistic explanations. Likewise, Rassaei and Ravand[11] and Seo[12] indicated that iterative engagement with AI tools can enhance fluency by allowing learners to refine sentence structure, enhance lexical selection, and bolster cohesion. Investigations in broader Asian contexts reveal analogous results. For instance, Xiao et al.[2] and Sharshova et al.[13] discovered that prolonged interaction with ChatGPT enhanced students' mastery of discourse-level features and fostered greater confidence in extended writing. These studies highlight the educational significance of AI-assisted writing while also emphasizing the necessity to investigate the functionality of such tools within particular cultural and instructional frameworks.

Even with this expanding corpus of research, there are still a number of significant gaps, especially in the field of Japanese EFL. First, empirical research specifically examining ChatGPT's impact on Japanese learners is still scarce, particularly at the senior high school level, despite the fact that international studies have looked at AI-driven writing support. Second, few mixed-methods studies have examined how ChatGPT concurrently influences both aspects of writing performance, despite the fact that writing fluency and grammar accuracy are major issues for Japanese learners. Current research predominantly evaluates accuracy or fluency in isolation, resulting in a deficiency in comprehending how enhancements in one dimension may facilitate or influence the other. Lastly, new research has started to look at students' worries about relying too much on AI tools, but there is not much research on how students' views of AI dependency change while they are writing, especially in cultures like Japan, where precise language and teacher-centered feedback are important.

To fill in these gaps, this study looks into how ChatGPT can help Japanese EFL students with their writing, focusing on both language development and how the students feel about it. The study is directed by the subsequent research questions: (1) How much does ChatGPT help learners become more accurate with grammar? (2) What impact does ChatGPT have on writing fluency? (3) How do students see and use ChatGPT while they are writing, and what worries or benefits come up for them?

2. Literature Review

2.1. AI-Assisted Writing in Global EFL Contexts

The quick growth of big language models (LLMs) and AI writing assistants has opened up new ways to teach writing in a second language (L2). Studies have consistently shown that AI tools can give instant feedback, change what a learner says, and help them write more accurately and fluently. Fu and Li[9] discovered that AI-driven corrective feedback considerably diminished grammatical errors among Chinese university EFL learners by providing explicit explanations that facilitated metalinguistic comprehension. Zhang and Huang[10] similarly indicated that iterative engagement with ChatGPT facilitated learners in enhancing sentence-level accuracy and coherence via AI-generated recommendations for idea restructuring.

Recent studies have also emphasized enhancements in fluency, especially concerning lexical selection, sentence coherence, and discourse cohesion. Rassaei and Ravand[11] showed that students who used ChatGPT wrote sentences that were more complex and had more varied syntax when they were revising. Seo[12] also found that AI-assisted rewriting tasks made students do higher-order revisions, which led to smoother transitions and more cohesive paragraphs. These results show that ChatGPT can do more than just fix grammar mistakes. It can also help writers improve their writing in many different ways.

2.2. AI Tools in EFL Writing across Asia

Studies across Asia have demonstrated significant learner engagement and favorable writing outcomes resulting from the integration of AI tools. In China, Xiao et al.[2] showed that writing with the help of ChatGPT made sentences more complex and helped students organize longer pieces of writing, especially when they worked through multiple drafts. Sharshova et al.[13] studied AI-assisted writing among Kazakhstani EFL students in Central Asia. They found that using ChatGPT for scaffolding made students feel more confident, less anxious about writing, and better able to come up with ideas.

These regional studies underscore that AI can significantly enhance traditional classroom instruction by offering

personalized assistance that transcends the limitations of teacher feedback. However, researchers have also warned against uncritically accepting. Certain learners exhibited indications of emergent dependency, significantly relying on AI-generated phrasing instead of striving for independent formulation (Seo, 2024[12]; Zhang & Huang, 2024[10]). This tension between support and overreliance highlights the necessity for culturally contextualized research that explores not only linguistic advancements but also the cognitive and behavioral effects of AI on learners' writing processes.

2.3. EFL Writing in Japan: Accuracy, Fluency, and Feedback

The Japanese EFL context poses distinct challenges concerning writing development. Many studies have found that Japanese learners put more emphasis on grammatical correctness than fluency (Egitim, 2022[14]; Lu & Sato, 2025[15]; Kasai et al., 2022[16]; Muroya, 2022[17]). This is because English education is focused on passing tests and Japanese culture values accuracy (for example, following rules strictly and not making mistakes). Traditional teaching has often emphasized writing tasks that are controlled, which means there are fewer chances for expressive writing or revision based on the writing process.

Additionally, studies on writing instruction in Japan reveal ongoing challenges with verb tense consistency, article usage, subject-verb agreement, and sentence-level complexity, precisely the domains where AI tools have demonstrated potential. Japanese learners often feel anxious when writing long texts in English, which leads to shorter and less cohesive pieces of writing. Previous interventions, including teacher-led conferencing, peer feedback, and automated writing evaluation systems (AWEs), have demonstrated partial efficacy; however, these methods are constrained by time limitations, variable feedback quality, and insufficient linguistic adaptability.

There is still a dearth of empirical research on ChatGPT in Japanese EFL writing, despite Japan's quick adoption of educational technologies. There is a significant knowledge gap regarding the pedagogical value of ChatGPT in this particular cultural and instructional context because the few new studies mainly concentrate on general attitudes toward AI tools rather than actual measurable writing outcomes.

2.4. Theoretical Perspectives: SLA, Feedback, and Scaffolding

ChatGPT's application in EFL writing can be contextualized within various fundamental second language acquisition (SLA) frameworks. From a sociocultural standpoint, Vygotsky's notion of the Zone of Proximal Development (ZPD) (Vygotsky & Cole, 2018[18]) posits that learners advance when facilitated by scaffolding that connects their existing competencies with their aspirational performance. ChatGPT, when used interactively, gives learners scaffolded input by reformulating, explaining, and prompting them to help them learn new language structures.

Interactionist theories (Abbuhl, 2022[19]) affirm AI-mediated writing, as significant negotiation of form, with a peer, teacher, or AI tool, promotes the recognition and subsequent reorganization of linguistic knowledge. ChatGPT's capacity to provide instantaneous feedback corresponds with the tenets of corrective feedback, notably metalinguistic and explicit correction, both of which have demonstrated efficacy in enhancing learner accuracy (Fu & Li, 2022[9]; Zhang & Huang, 2024[10]).

Moreover, theories of writing development stress revision based on process, drafting in stages, and getting feedback. AI tools seem to make these processes better by letting students make changes more often and with less risk. These theoretical viewpoints collectively suggest that ChatGPT possesses the capacity to facilitate both grammatical advancement and the organization of higher-order discourse, crucial areas of emphasis for Japanese EFL learners.

2.5. Identified Research Gaps

Although research from Asia and other countries shows promise for AI-assisted writing, there are a number of gaps in the literature that this study aims to fill. First, there is not much empirical research in Japan that looks at how ChatGPT directly affects quantifiable writing results. Second, there is a lack of mixed-methods studies that simultaneously investigate grammar accuracy, writing fluency, and learner perceptions within a single design. Third, there is an inadequate analysis of the risks associated with AI dependency, particularly for students used to teacher-centered feedback and accuracy-focused instruction. Lastly, there are unclear mechanisms that explain how iterative AI interaction affects

discourse-level fluency and sentence-level accuracy. To create pedagogically sound models of AI integration that help, not replace, students' writing development in Japanese and other Asian EFL settings, it is important to fill in these gaps.

3. Materials and Method

3.1. Research Design

A convergent parallel mixed-methods design is used in this study, where quantitative and qualitative data are gathered, examined concurrently, and then combined for interpretation (Creswell & Poth, 2016[20]). This method improves the validity and thoroughness of the results by enabling both extensive measurement of writing outcomes and an in-depth understanding of student experiences.

3.2. Respondents and Participants

The respondents and participants in the study were Japanese senior high school learners of English as a foreign language (EFL) taking classes in three eikaiwa (English conversation schools) in Nagoya City, Japan, in the school year 2024–2025. For the quantitative part, there were initially 46 respondents, aged 15 to 18 identified through convenience sampling, and who expressed willingness to participate in the study, but only 30 respondents completed the required data for sampling. For the qualitative part, the inclusion criteria for the participants were: (a) they were enrolled in the English speaking and writing courses in one of the eikaiwas, (b) they were senior high school students, (c) they consented to participate, and (d) they had no previous experience with AI writing tools such as ChatGPT. From these, 14 participants volunteered for qualitative interviews until we reached thematic saturation (Buckley, 2022[21]).

3.3. Instruments

In the quantitative part, the pre- and post-writing tests were assessed using a validated rubric that evaluates the grammar accuracy and fluency of the students' writing. We used a five-category analytic rubric to check for grammar accuracy (see **Appendix A**) by looking at: verb tense consistency, subject–verb agreement, article and determiner usage, sentence structure and word order, and overall grammatical correctness. We gave each category a score from 1 to 5, with 1 being "major recurring errors" and 5 being "near-native control." Expanded scoring descriptors were added to make it clearer what the different levels of performance were. Then, to measure writing fluency, we used three indicators: sentence complexity (use of subordination and different structures), cohesion of ideas (logical flow, transitions, and discourse markers), and timed word count (150 words in 15 min). Each indicator was rated on a 5-point scale, with detailed descriptors for each level to ensure consistent interpretation (see **Appendix B**). Two expert raters evaluated pre-test and post-test writing samples using grammar accuracy and writing fluency rubrics to ensure consistent scoring. The inter-rater reliability, calculated with Cohen's kappa ($\kappa = 0.87$), indicated high agreement between raters, confirming the reliable application of rubric criteria. In the qualitative part, semi-structured interviews explored the students' perceptions of ChatGPT, how they used it, perceived advantages or disadvantages, and effects on their writing strategies. Sample questions include: "How did you use ChatGPT when revising your essays?" "What benefits or limitations did you experience?" "Did using ChatGPT change how you think about writing in English?"

3.4. Data Collection Procedure

The quantitative phase had a clear sequence of activities that included a pre-test, a four-week writing intervention with ChatGPT, and a post-test (see **Figure 1** for the data collection timeline). Pre-Test Administration was conducted in week 1, where students completed a 250- to 300-word essay on a general academic topic (e.g., "The Advantages and Disadvantages of Online Learning") under timed conditions, 30 to 40 minutes. This writing sample served as the baseline measurement for grammar and fluency. Then, in week 2, a ChatGPT orientation workshop was done. Students were taught in a structured way how to use ChatGPT as a writing assistant ethically and effectively. The rules stressed (a) writing drafts independently before asking AI for help, (b) asking for explanations instead of full rewrites, and (c) not copying and pasting text that AI wrote directly. There was a signed agreement for responsible use. From weeks 3 to 6, the intervention period, students completed four writing tasks (one per week), each was done in stages. Stage 1 was draft writing, in which

the students wrote an initial draft without using ChatGPT. Stage 2 was revision with ChatGPT, where students revised their drafts using ChatGPT for suggestions, corrections, and rephrasing. Both versions were submitted and stored for analysis. Post-Test Administration was conducted in week 7, where students completed a new 250- to 300-word writing task under similar conditions as the pre-test. The post-test was given one week after the intervention to make sure that the students' scores showed what they had learned during the writing cycle and not "practice effects" right away. This time frame is in line with EFL studies that use short-term interventions, where post-tests are usually given one to two weeks later to see if there are any near-transfer gains. The enhancements noted in cohesion, sentence complexity, and timed word count signify transient learning advancements, while long-term retention necessitates further exploration. The post-test evaluated improvement in grammar accuracy and writing fluency.

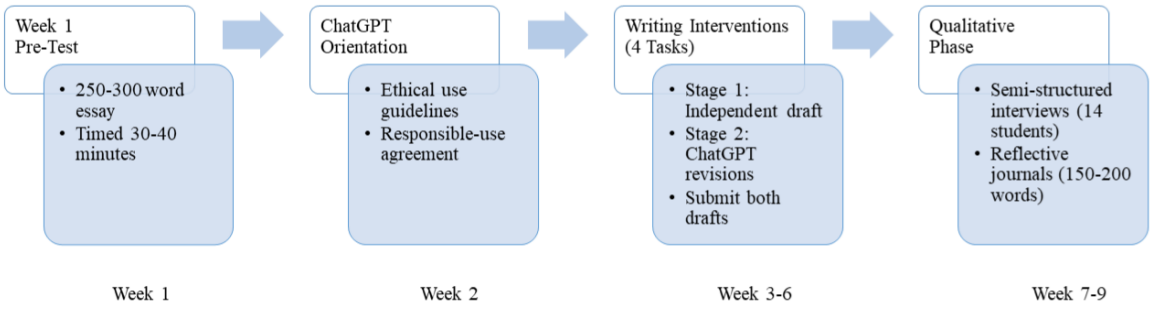

Figure 1. Data Collection Timeline.

For qualitative data collection, which aimed to understand students' experiences, strategies, and perceptions when using ChatGPT in their writing process, a step-by-step procedure was also followed. In the participant selection, after the intervention, 14 students were purposefully selected for diversity in gender, writing improvement level (high, medium, low), and engagement with ChatGPT. Selection aimed for maximum variation sampling to capture a wide range of experiences. Semi-Structured interviews were conducted in weeks 7 to 9. Each interview lasted 30 to 45 min and was conducted in a quiet room. As a supplementary data source, students were invited to write a short reflective journal (150 to 200 words) about their experience using ChatGPT. All interviews were audio-recorded (with permission), transcribed verbatim, and translated (if necessary) for coding.

3.5. Data Analysis

For the quantitative data analysis, scoring was completed on the samples of writing (pre- and post-tests) that were evaluated using an analytic rubric with criteria for grammar accuracy and fluency. Statistical tests assessed significant differences in grammar and fluency between pre- and post-tests with paired-sample *t*-tests (or Wilcoxon signed-rank tests if non-normal distribution). The effect sizes (Cohen's d) were calculated to determine if there was an improvement in grammar and fluency, and if so, how much of an improvement. In the analysis of the qualitative data, the framework used for thematic analysis was Braun and Clarke's Reflexive Approach (Byrne, 2022 [22]). This framework does not merely code for frequency; it emphasizes researcher reflexivity, depth of interpretation, and semantic-latent theme integration. Step-by-step procedure included familiarization where the researchers read and re-read the transcripts, and took analytic notes on initial impressions. Reflection on how personal assumptions may influence interpretation (reflexivity). It was followed by initial coding, where we used semantic (explicit) and latent (underlying) codes. Sample codes included "AI as grammar corrector," "fear of over-reliance," "writing confidence," and "identity as a writer." The next step was generating themes where we grouped codes into meaningful patterns (themes). Example patterns are: "ChatGPT as an empowering tool"; "tensions between automation and authenticity"; "shifting roles of the EFL student writer." In the next step, reviewing themes, we checked themes against the full dataset for consistency and distinctiveness. We conducted a peer debriefing to ensure theme coherence. Lastly, defining and naming themes in which we clearly defined themes with supporting utter-

ances. We emphasized how themes relate to student writing, learning, and tool use. After that, we produced the report by weaving themes into a narrative. We connected student voices with the research questions and quantitative results.

3.6. Data Trustworthiness

The researchers adhered to the four criteria that Lincoln and Guba established for guaranteeing qualitative data trustworthiness: credibility, transferability, dependability, and confirmability (Thomson & Crowther, 2022[23]). We ensured credibility by conducting member checks in which participants verified the summaries of their interviews and by triangulating our data from interviews, journal reflections, and writing samples. Following a thick description of participants and context, transferability was established by allowing readers to determine applicability. The dependability of coding decisions and analytic memos was maintained with an audit trail. Finally, we ensured confirmability by documenting our biases and interpretations in reflexivity logs.

3.7. Ethical Considerations

Ethical approval was obtained from the administrators of the participating eikaiwa centers, and all students provided informed consent after being briefed on the study's purpose, procedures, potential risks, and their right to withdraw at any time. To protect participants' privacy, no personal identifying information was collected, and all data were anonymized using coded identifiers. In keeping with responsible AI-use guidelines, students were also instructed not to enter sensitive or personal information into ChatGPT. All digital materials, including writing samples, interview recordings, transcripts, and scoring files, were stored in encrypted, password-protected folders accessible only to the research team and backed up on a secure institutional drive to ensure data confidentiality and integrity.

4. Results

4.1. Quantitative Findings

4.1.1. Improvement in Grammar Accuracy

A paired-samples *t*-test analyzed variations in grammatical accuracy from pre-test to post-test (see **Table 1**). The results showed a big improvement, with scores going up from a pre-test mean of 14.2 (SD = 2.8) to a post-test mean of 17.8 (SD = 2.5), $t(29) = 8.62$, $p < 0.001$, $d = 1.11$. This significant effect shows that the ChatGPT-supported intervention led to big improvements in grammar. The analysis of errors showed big drops in mistakes with verb tense, articles, and subject-verb agreement. The sentences written by students also had better structural accuracy, with fewer fragments and phrases that were out of order. These findings indicate that the incorporation of ChatGPT offered significant assistance in enhancing grammatical accuracy in EFL writing.

Table 1. Summary of Statistical Results for Grammar Accuracy (Pre-test vs. Post-test).

Statistical Indicator	Pre-Test	Post-Test	Result/Notes
Mean Score	14.2	17.8	Increase of +3.6 points.
Standard Deviation (SD)	2.8	2.5	Slight reduction in score variability.
Respondents (n)	30 (paired)	30 (paired)	Same participants completed both tests.
Paired-Samples *t*-test	–	–	$t(29) = 8.62$, $p < 0.001$
Effect Size (Cohen's d)	–	–	1.11 (Large effect)
Significance Level	–	–	Statistically significant improvement.
Primary Error Types Assessed	–	–	Sentence construction, verb tense, S–V agreement, article usage.
Observed Outcome	–	–	Fewer grammatical errors; improved tense consistency; improved accuracy across targeted error categories.
Interpretation	–	–	Results indicate a large, educationally meaningful improvement in grammar accuracy attributable to ChatGPT-assisted writing.

4.1.2. Improvement in Writing Fluency

Writing fluency also showed significant gains following the intervention (see **Table 2**). Mean scores increased from 12.6 (SD = 3.1) at pre-test to 15.9 (SD = 2.7) at post-test, $t(29) = 6.46$, $p < 0.001$, $d = 0.84$. Within the allotted time, students produced longer texts and showed a greater variety of sentence structures, including a greater use of subordination. Compositions showed smoother transitions and stronger over-

all cohesion, with more frequent use of discourse markers such as however, in addition, and as a result. These enhancements imply that ChatGPT promoted higher-order organization and flow in students' writing in addition to productivity.

Table 2. Summary of Statistical Results for Writing Fluency (Pre-test vs. Post-test).

Statistical Indicator	Pre-Test	Post-Test	Result/Notes
Mean Score	12.6	15.9	Increase of +3.3 points.
Standard Deviation (SD)	3.1	2.7	Slight decrease in score variability.
Respondents (n)	30 (paired)	30 (paired)	Same participants completed both tests.
Paired-Samples *t*-test	–	–	$t(29) = 6.46$, $p < 0.001$
Effect Size (Cohen's d)	–	–	0.84 (Moderate-to-large effect)
Significance Level	–	–	Statistically significant improvement.
Primary Fluency Indicators	–	–	Sentence complexity, idea cohesion, timed word count.
Observed Outcome	–	–	More complex sentences, higher lexical variety, smoother transitions, improved cohesion, higher word count.
Interpretation	–	–	Results indicate a substantial and educationally meaningful improvement in writing fluency attributable to ChatGPT-assisted writing.

4.2. Qualitative Findings

4.2.1. ChatGPT as a Grammar Mentor

In interviews and journal reflections, students conveyed a consistent image of ChatGPT as an omnipresent, ever-available, and ever-patient grammar tutor. Participant 3 described it this way: "*It helps me fix my grammar and also explains why. I started to notice my patterns of mistakes.*" Likewise, Participant 7 told us, "*When it told me the rule, I remembered it the next time I wrote.*"

The participants underscored how timely the feedback was. Participant 12 stated in their journal, "*Having a teacher right beside me, all the time, but with no shy feeling to ask, is what it is like*." It is clear that participants enjoyed the feeling of having a teacher at their side. Feedback as "kind," "neutral," and "non-judgmental" was mentioned in multiple entries. It was obvious that multiple participants liked not just the feedback but also the manner in which it was offered.

Observation notes indicated that learners who read ChatGPT's explanations before editing often paused for several seconds, re-reading the highlighted sentences and suggested changes. Participant 9 reflected in their journal, "*I read the reason first, then I change my sentence. I feel I can do it by myself more now.*"

Comparisons of the drafts show a significant reduction in persistent errors in verb tense, article use, and subject-verb agreement across the writing tasks. Participant 2 said, "*I used to write 'he go' many times, but now I think about adding the '-s' before I send it to ChatGPT*."

In general, the participants viewed ChatGPT as providing grammatical guidance outside of class hours, allowing them to self-correct before turning in their work, rather than as a substitute for the teacher.

4.2.2. Fluency through Iteration

Participants often described ChatGPT as an assistant that helped them create a more coherent product. When the collaborative tool was used, the number of writing errors decreased substantially. One participant shared, "*When I collaborated with ChatGPT, my ideas became clearer. It showed me how to connect arguments better."* Another participant said, "*It helps with word choice. I just can't seem to find the right words sometimes. My writing sounds more natural after a collab with ChatGPT*."

Several students expressed that they took part in an iterative process and gave the following as their reason: writing an initial draft, consulting ChatGPT for suggestions, and refining their work Participant 11 stated, "*I write first, then see the suggestions. I combine my sentences, add transitions, and then it feels more complete*." Observation notes recorded instances of students reviewing AI-generated transitions such as "however," "in addition," and "as a result," before applying them to their own paragraphs.

Preliminary comparisons revealed enhancements in cohesion and the complexity of sentences. One participant stated in their journal: "*In the beginning, I wrote sentences that were very... (let's say) simple. Now I join them with 'which' or 'because' to make them simpler but longer. Also, sometimes I write sentences that are almost questions. Like, 'Can you understand this? I barely can*!' "

This process is often described by students as helping them to build confidence in their ability to express ideas. Par-

ticipant 1 summarized in their interview, "*It's like practicing a conversation, but in writing. Every time I rewrite, I feel more sure about my sentences*."

Students said in interviews that it felt empowering to be able to revise not just once but many times, especially given how hard it is to get human feedback in a timely way. The loop of drafting, getting AI suggestions, and then revising seems to have been a much more effective way for these students to learn new expressions and discourse markers, which is probably why their fluency scores went up.

4.2.3. Balancing Trust and Dependency

Although students appreciated the help they received from ChatGPT, a number of them expressed worry about depending on the AI tool too much. For instance, Participant 10 stated, "*I was afraid I was not thinking by myself anymore. I needed to remind myself to write first, then ask help.*" Another participant, who reflected in their journal, said, "*If I use it too much, I feel that I am not myself and my own ideas are weaker.*" This sentiment was echoed in varying forms by several other participants. They all seemed to arrive at the idea that if they let ChatGPT do too much of the heavy lifting, it was going to affect their own creative processes and critical thinking.

A few learners said they made conscious attempts to restrict their use in order to avoid becoming too dependent. One participant said, "*I give condition to myself. I only check after I finish my writing. If I check too early, I stop thinking on my own.*" Observation notes confirmed that some students opted to turn in drafts with intentional gaps, only later going to ChatGPT for specific corrections.

There were also mixed feelings about trusting all of ChatGPT's suggestions. Participant 9 commented, "*Sometimes it changes my sentence and words too much, so I don't accept everything.*" Participant 2 noted, "*I check if the change really fits my meaning before I use it*."

Self-monitoring strategies were revealed in the journal entries. For instance, participants compared ChatGPT's version with their original draft. One participant kept a personal list of the grammar points she tends to forget. Said participant, who also compared versions with ChatGPT: "*I still want to keep my own style. I use it like a helper not a boss.*"

Both interviews and classroom observations showed a clear balancing act. Participants valued the tool but were also guarding their independence. This theme suggests that while ChatGPT can be a powerful enhancer, its use should be scaffolded in a way that promotes active learning and critical engagement. Guided strategies like the "write first, refine later" approach were cited by students as helpful in achieving a balance between using ChatGPT to enhance and using it too much, resulting in some sort of dependency.

4.3. Integration of Quantitative and Qualitative Results

This study's quantitative results demonstrated that the integration of ChatGPT into Japanese EFL students' writing practice led to improvements that were both clear and statistically significant. Grammar accuracy scores increased from a pre-test mean of 14.2 (SD = 2.8) to a post-test mean of 17.8 (SD = 2.5), and writing fluency scores improved from a pre-test mean of 12.6 (SD = 3.1) to a post-test mean of 15.9 (SD = 2.7). Both of these increases represented effect sizes that were substantial by the standards of educational research.

Strong support for the improvement of grammar accuracy came from Theme 1: ChatGPT as a Grammar Mentor. Student interviews showed that they not only received immediate corrections but also quite valued the explanations that came with those corrections. These explanations helped students recognize and understand the kinds of errors they tended to make over and over again, errors in verb tense, article use, and sentence structure. This kind of metalinguistic work seemed to play a big role in the reduction of errors we saw in writing samples and the observation data we gathered.

In the same way, the quantitative gain in writing fluency closely matched Theme 2: Fluency Through Iteration. The students articulated that drafting with ChatGPT's suggestions led to more cohesive and logically structured texts. Pre- and post-intervention writing samples confirmed this. They showed not just that drafts had greater sentence complexity and smoother transitions, but also that there was a more deliberate thematic progression.

The integration of results also highlights an important divergence between quantitative and qualitative outcomes. While the statistical results painted a uniformly positive picture, Theme 3: Balancing Trust and Dependency revealed concerns about the potential overreliance on AI assistance. Some students are admitted to concurrent consulting with ChatGPT and doing the independent drafting stage of their work, which is a risk to keeping the state-of-the-art creative

and critical thinking skills they need.

This was not reflected in the quantitative scores, which measure product quality rather than process quality or learner autonomy. Writing samples from heavily dependent users occasionally exhibited less originality and a more formulaic style, suggesting that uncritical reliance on ChatGPT could have subtle long-term drawbacks despite short-term gains.

The mixed-methods approach holds greater value because it enables not only quantitative but also qualitative insight to be gained, so that we do not miss any potential issues with dependency that could otherwise lead us to an overly optimistic assessment of ChatGPT's impact. This study does not avoid such difficult conversations but instead integrates them with more straightforward findings to give a balanced account of ChatGPT's place in our increasingly AI-augmented pedagogical world. And what is that balanced account? In this study, ChatGPT has been shown to enhance the grammar accuracy and fluency of student writings, provided that uses of the AI are appropriately scaffolded to ensure that those students in question are still engaged in what we might refer to as "cognitively essential" writing. **Table 3** below presents the joint display of the findings.

Table 3. Joint Display of Quantitative and Qualitative Findings.

Quantitative	Qualitative	Integrated Interpretation
Grammar Accuracy (t = 8.62, d = 1.11)	Theme 1: ChatGPT as a Grammar Mentor	Significant improvements in grammar accuracy are consistent with students' claims that ChatGPT acted as a constant grammar tutor. Metalinguistic awareness was reinforced by AI explanations, which correlated with higher rubric scores.
Writing Fluency (t = 6.46, d = 0.84)	Theme 2: Fluency Through Iteration	Quantitative fluency improvements reflect students' beliefs that using ChatGPT to write drafts over and over improved sentence flow, word variety, and cohesion. Text samples confirmed that the discourse was denser and more cohesive.
Overall Impact: Significant improvements in grammar and fluency across all participants.	Theme 3: Balancing Trust and Dependency	Positive learner experiences enhance writing accuracy and fluency. Qualitative findings elucidate the reasons behind the gains and underscore areas necessitating pedagogical support (AI literacy, autonomy).

5. Discussion

This study provides a layered understanding of the role of ChatGPT as a writing assistant for Japanese EFL students by integrating findings from quantitative and qualitative research. The study revealed statistically significant gains in grammar accuracy and writing fluency. The qualitative findings further explained why these improvements occurred by illustrating learners' experiences and perceptions during the intervention. Together, the results align with a growing body of research that positions AI language models as effective scaffolding tools for second language acquisition (Zhang & Huang, 2024 [10]; Sharshova et al., 2025 [13]).

The results directly addressed the study's three research questions. In RQ1 (grammar accuracy), the paired-samples t-test revealed a significant improvement in grammar accuracy, and qualitative reports indicated that students thought ChatGPT was a reliable grammar guide. In RQ2 (writing fluency), fluency scores also increased significantly, and interview data illustrated how iterative drafting with ChatGPT improved cohesion, transitions, and expression. In RQ3 (student perceptions), qualitative results provided insights not apparent in the quantitative results, revealing both appreciation for AI-supported learning and worries about overreliance. When combined, these convergent findings offer a comprehensive picture of how ChatGPT affects the development of EFL writing.

5.1. ChatGPT as a Grammar Mentor in Global and Asian EFL Contexts

Numerous studies have demonstrated globally that immediate, targeted feedback is one of the most effective ways to improve grammatical accuracy (Fu & Li, 2022 [9]; Sadeghi & Esmaeeli, 2024 [24]). ChatGPT's ability to not only correct errors but also explain underlying rules resonates with the principles of metalinguistic feedback.

Research has found metalinguistic feedback to promote long-term retention of grammatical structures (Schenck, 2020 [25]; Jang, 2020 [26]; Rassaei & Ravand, 2024 [11]). This finding mirrors work in Asian EFL contexts, where corrective feedback has been shown to be particularly effective.

Grammar accuracy showed a large effect size (d = 1.11), indicating that ChatGPT functioned as a meaningful gram-

mar mentor that supported deeper cognitive engagement. Interview data reinforced this. Students reported that they were more aware of recurring error patterns and were self-monitoring (to varying degrees of success) before consulting the tool. ChatGPT was described as functioning in a role closest to a personal language coach, a figure who offers individualized feedback in a way that is often constrained by traditional classrooms.

5.2. Fluency through Iteration: Insights from Japanese EFL Learners

In the Japanese EFL context, writing fluency is often hindered by limited exposure to extended written discourse and a pedagogical emphasis on correctness over expression (Long & Watanabe, 2023 [27]; Hibino & Matruglio, 2024 [28]). This study suggests that drafting iteratively with ChatGPT can boost writing fluency for Japanese EFL students. This finding is an important first step in understanding AI's influence on student writing, especially since fluency is essential for writing both effectively and extensively.

Interpretation of qualitative findings supports this. Students provided descriptions to illustrate how ChatGPT had improved the text cohesion, logical sequencing, and thematic unity of their writing. This aligns with research conducted in other Asian contexts, such as South Korea and China. There, tools similar to ChatGPT have been found to enhance discourse-level competence by enabling repeated cycles of writing and revision (Seo, 2024 [12]; Li et al., 2023 [29]). In Nagoya City, where EFL programs often operate with limited time for writing instruction, such iterative support could bridge the gap between classroom constraints and students' need for extended writing practice.

5.3. The Risk of Overreliance and the Need for Digital Literacy

Although the quantitative data indicated no adverse consequences, the qualitative results advise against adopting AI too uncritically. The "Balancing Trust and Dependency" theme reflects a common concern in AI-supported education: students may use AI to avoid engaging in the deeper thinking required for meaningful learning.

In Japan, where educational achievement is often judged by the kind of high-stakes standardized tests that measure how much students can regurgitate under timed conditions, there's a risk that we will not see the kinds of significant AI-assisted learning gains that we might hope for because students may view the technology as a shortcut, not unlike the very types of tools that their parents used in the 1980s and 1990s to get through academic problems.

The tension in the data resonates with findings from both Western and Asian studies (Herman & Lara-Steidel, 2025 [30]; Francis et al., 2025 [31]; Zhang et al., 2024 [32]) that advocate for integrating AI within the kind of pedagogical framework that they also found to be lacking in the K–12 context.

For the EFL context in Nagoya, these studies suggest a different path than the one currently road-mapped by MEXT. We argue for a more explicit and localized integration of AI within a curriculum framework that better prepares educators and their students.

5.4. Implications for Theory and Practice

In theory, these findings are consistent with sociocultural perspectives of SLA, especially Vygotskian (Surtees & Duff, 2022 [33]). According to Vygotsky (Vygotsky & Cole, 2018 [18]), the ZPD is the space where a novice and a more able partner can jointly solve a problem. In this work, we consider ChatGPT as the more able partner. Working within the ZPD, ChatGPT provides scaffolded feedback that helps students remain engaged in the writing process and progress toward more advanced performance. From an interactionist perspective (Abbuhl, 2022 [19]), where interaction and the negotiation of meaning between input and output are key, one could argue that also here, via feedback, a type of interaction is taking place.

Based on these findings, several classroom practices are recommended. Teachers can first implement a structured "write–revise–reflect" model where students draft on their own, use ChatGPT to refine their work, and then write a brief reflection on the changes they made. Second, lesson plans can incorporate guided prompts, such as "Help me improve cohesion between these paragraphs," that teach students how to ask AI for useful feedback. Third, educators can use AI-literacy scaffolds to teach students to critically assess ChatGPT's recommendations rather than blindly accepting them. Lastly, while balancing the advantages of AI-assisted revision, regular "AI-free writing sessions" can

preserve students' capacity for independent writing.

The practical implications of the results suggest that ChatGPT could be added to the arsenal of tools available to Japanese EFL teachers and students. The system can be used to provide not just language, but also cultural, personal, and contextual information that allegedly leads to more eloquent and accurate expression of thoughts in writing. It is hoped that instructional use of ChatGPT could, with limited downside and a great upside, be incorporated into the limited-resource classrooms generally found in Japan.

To sum up, the findings from this study highlight ChatGPT's possibilities as a grammar- and fluency-enhancing tool in Japanese EFL writing contexts. Its capacity to offer personalized, iterative suggestions helps address two persistent challenges in EFL instruction: limited individualized support and insufficient opportunities for sustained writing practice. However, it is easy to fall into the trap of thinking that such a tool could just replace the unhelpful teacher. Pedagogical planning could help prevent this pitfall and keep ChatGPT in the realm of useful stuff that is actually enhancing the EFL writing experience. The findings in this study have implications not only for Japan but also for broader Asian and global contexts where EFL learners navigate similar challenges in writing development.

6. Conclusions

This study shows that ChatGPT can help Japanese EFL students write better and more fluently when they use it as a writing assistant. Quantitative improvements were significant, and qualitative reports illustrated how students utilized ChatGPT's guidance to comprehend mistakes, enhance their ideas, and bolster their confidence in writing. These findings indicate that AI-mediated feedback can enhance the educational impact of the classroom by delivering immediate, personalized, and non-judgmental assistance that is frequently challenging for educators to offer consistently.

The study also shows how important it is to think critically about AI. ChatGPT made students less anxious and more willing to try out more complicated structures, but some students were hesitant to rely too much on AI-generated suggestions. This advises teachers to use ChatGPT as a scaffold, not as a replacement for thinking, and to create writing tasks that allow students to have control, think about language, and solve problems on their own. The worth of ChatGPT is not solely contingent upon the technology itself, but rather on the responsible manner in which learners and educators incorporate it into the writing process.

There are a few limitations that should be noted. The study's sample size was limited and sourced from three eikaiwa centers, potentially constraining the generalizability of the findings to other regions or educational levels. The intervention lasted only seven weeks, which makes it hard to draw conclusions about long-term retention and growth. Writing assignments were restricted to brief academic essays, neglecting other genres. Subsequent research should incorporate longitudinal designs, encompass larger and more diverse samples, and investigate ChatGPT's impact across various writing genres, multimodal tasks, and proficiency levels. Comparative studies in Asian EFL contexts would elucidate the cultural and institutional factors influencing AI-assisted writing.

Even with these limitations, this study shows that ChatGPT can help with language development and boost learners' confidence when used carefully. Its effects are not inherently liberating or detrimental; instead, they are contingent upon the intentions, strategies, and critical awareness of the individuals who collaboratively engage in learning with AI. For Japanese EFL learners, the benefits they derive from ChatGPT ultimately depend on their level of engagement with the tool and the effectiveness of educators in facilitating its use within pedagogically sound frameworks.

Author Contributions

Conceptualization, methodology, software, validation, formal analysis, investigation, resources, data curation, writing, original draft preparation, writing, review and editing, R.C., D.B.S.J., and M.L.R.; visualization, supervision, project administration, D.B.S.J. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

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Informed Consent Statement

Informed consent was obtained from all respondents/participants involved in the study.

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Conflicts of Interest

The authors declare no conflict of interest. The authors used AI purely for sentence refinement. The authors take full responsibility for the manuscript's core content.

Appendix A. Grammar Accuracy Rubric

Table A1. Grammar Accuracy Rubric.

Category	1–Major Errors	2–Frequent Errors	3–Occasional Errors	4–Minor Errors	5–Near-Native Control
Verb Tense Consistency	Tenses incorrect or inconsistent throughout; meaning frequently unclear.	Frequent errors; inconsistent control; frequent shifts affecting clarity.	Some errors but basic tense control present; occasional shifts.	Mostly consistent; errors are minor and do not impede meaning.	Accurate and consistent control of tense; natural and appropriate use.
Subject–Verb Agreement	Persistent, systematic errors; agreement rarely correct.	Frequent errors with singular/plural forms; inconsistent control.	General control with noticeable but non-disruptive errors.	Mostly accurate; occasional slips but meaning clear.	Fully accurate agreement in all contexts.
Article & Determiner Usage	Articles/determiners rarely used or incorrect; strong interference from L1.	Frequent misuse or omission; hinders clarity.	Some errors but emerging awareness of correct forms.	Mostly accurate use with minor omissions.	Appropriate, natural use of articles/determiners; near-native accuracy.
Sentence Structure & Word Order	Frequent fragments/run-ons; word order errors obscure meaning.	Noticeable structural issues; awkward or incorrect ordering.	Generally correct structures with occasional awkward or incorrect order.	Strong control with only minor structural issues.	Clear, well-formed sentences with natural English word order.
Overall Grammatical Correctness	Grammar severely limits comprehensibility.	Frequent grammatical issues that disrupt meaning.	Adequate grammar with some distracting errors.	Strong grammatical performance; errors minor.	Highly accurate grammar with almost no errors.

Appendix B. Writing Fluency Rubric

Table A2. Writing Fluency Rubric

Indicator	1–Very Limited Fluency	2–Limited Fluency	3–Moderate Fluency	4–Good Fluency	5–Excellent Fluency
Sentence Complexity	Simple sentences only; no subordination; repetitive structures.	Mostly simple sentences; occasional attempts at complex forms with errors.	Mix of simple and some complex structures; errors do not impede meaning.	Frequent use of complex sentences; good variety; mostly accurate.	Wide range of structures; sophisticated and accurate use of subordination.
Idea Cohesion	Ideas disconnected; no transitions; unclear flow.	Limited cohesion; transitions rarely used; weak paragraph logic.	Adequate flow with some transitions; minor lapses in coherence.	Logical and coherent progression; appropriate transitions.	Highly cohesive text; seamless transitions; strong rhetorical control.
Timed Word Count (15 mins)	Under 60 words; significant difficulty generating content.	60–100 words; slow output with long pauses.	100–130 words; steady pace; some hesitations.	130–150 words; confident and efficient writing.	150+ words; fluent, continuous output with minimal hesitation.

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