AI-Assisted Learning in English Writing and Speaking Courses: Its Impact on Students' Language Performance

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ABSTRACT

Artificial intelligence (AI) is increasingly used in language education to provide immediate feedback, personalized support, and opportunities for repeated language practice. However, empirical evidence on students' writing and speaking performance within the same higher-education instructional context remains limited. This study examined changes in English writing and speaking performance following AI-assisted learning and explored students' perceptions of AI as a learning support tool. The study used a one-group pretest–posttest design involving 52 undergraduate students enrolled in English Writing and Speaking courses at an English Language Education program. Across one academic semester, students engaged in AI-supported writing and speaking activities using ChatGPT, Grammarly, and Microsoft Copilot under lecturer guidance. Writing and speaking performance were assessed before and after the intervention, and students completed a 25-item perception questionnaire at the end of the semester. Paired-sample t-tests were used to examine pretest–posttest differences. Writing scores increased from M = 67.84 (SD = 6.72) to M = 81.23 (SD = 5.94), with a statistically significant pretest–posttest difference, $t(51) = 14.82$, $p < .001$. Speaking scores increased from M = 69.41 (SD = 7.13) to M = 82.76 (SD = 6.05), also showing a statistically significant pretest–posttest difference, $t(51) = 15.47$, $p < .001$. Students reported highly positive perceptions, particularly regarding satisfaction, usefulness, ease of use, and engagement. The findings indicate substantial improvement in students' language performance following the semester-long AI-supported learning activities. Because the study did not include a control group, the observed changes cannot be attributed exclusively to AI; other factors such as maturation, history, testing, and instructional development may also have contributed.

Keywords: *artificial intelligence, English language learning, language performance, speaking, writing*

INTRODUCTION

Artificial Intelligence (AI) has rapidly emerged as one of the most transformative technologies in education, reshaping teaching and learning practices across various disciplines, including language education. The advancement of generative AI applications such as ChatGPT, Grammarly, Microsoft Copilot, and Gemini has enabled students to access instant feedback, personalized learning assistance, and interactive language practice beyond traditional classroom settings. Unlike conventional digital learning tools, AI-powered platforms can generate contextual responses, evaluate learners' performance, and provide adaptive support

tailored to individual learning needs. Consequently, higher education institutions have increasingly integrated AI-assisted learning into English language instruction to foster students' academic achievement and digital literacy while preparing them for the demands of the twenty-first-century workforce.

In English language education, writing and speaking are widely recognized as productive skills that require continuous practice, constructive feedback, and meaningful interaction. Developing these skills remains challenging for many English as a Foreign Language (EFL) learners due to limited opportunities for authentic communication, insufficient instructor feedback, language anxiety, and inadequate exposure to English outside the classroom. Writing demands not only grammatical accuracy and lexical richness but also coherence, organization, and critical thinking. Similarly, speaking requires learners to demonstrate fluency, pronunciation, interactional competence, and confidence in spontaneous communication. Traditional classroom instruction often struggles to provide individualized feedback because of time constraints, large class sizes, and limited instructional resources. As a result, many students continue to experience difficulties in achieving satisfactory performance in both writing and speaking courses.

Recent developments in educational technology suggest that AI-assisted learning has the potential to address these challenges by offering immediate, personalized, and continuous feedback. AI-powered writing assistants can identify grammatical errors, recommend vocabulary improvements, evaluate sentence structures, and suggest revisions that promote clearer and more coherent writing. Likewise, conversational AI applications enable learners to practice speaking through simulated dialogues, pronunciation feedback, and interactive communication without the fear of negative evaluation from peers or instructors. These affordances create a supportive learning environment in which students can repeatedly practice language skills, monitor their progress, and develop greater autonomy in learning.

The concept of AI-assisted learning is grounded in constructivist learning theory and self-regulated learning, which emphasize learners' active participation in constructing knowledge through interaction, reflection, and continuous feedback. AI technologies facilitate these processes by functioning as intelligent learning partners rather than merely information providers. Through adaptive responses and personalized recommendations, AI encourages learners to identify their weaknesses, revise their language production, and independently explore more effective learning strategies. Such learning experiences are closely aligned with student-centered pedagogy, where learners actively engage in problem-solving, critical thinking, and collaborative knowledge construction.

A growing body of empirical research has demonstrated the positive impact of AI-assisted learning on English language acquisition. Previous studies have reported that AI-supported writing instruction significantly improves grammatical accuracy, lexical diversity, coherence, and writing quality by providing immediate corrective feedback and revision suggestions. Similarly, AI-based speaking applications have been found to enhance learners' pronunciation, fluency, vocabulary acquisition, and communication confidence through repeated conversational practice and automated speech evaluation. Moreover, AI technologies have been shown to increase students' motivation, engagement, and learning autonomy by allowing flexible access to learning resources regardless of time and location.

Despite these promising findings, existing studies reveal several important limitations. First, many investigations have focused exclusively on either writing or speaking skills, while relatively few studies have examined the simultaneous impact of AI-assisted learning on both productive language skills within a single instructional context. Since writing and speaking share interconnected linguistic competencies, including vocabulary development, grammatical competence, and discourse organization, examining both skills together may provide a more comprehensive understanding of AI's pedagogical effectiveness. Second, numerous previous studies have concentrated primarily on learners' perceptions, technology acceptance, or attitudes toward AI rather than measuring actual improvements in language performance using objective assessment criteria. Consequently, empirical evidence regarding AI's effectiveness in improving measurable language outcomes remains insufficient.

Furthermore, most previous investigations have been conducted in technologically advanced educational environments where students possess extensive experience using AI applications. Comparatively fewer studies have explored AI-assisted learning in English Language Education programs within developing countries, particularly in Indonesian higher education. Differences in technological infrastructure, digital literacy, curriculum implementation, and classroom practices may influence the effectiveness of AI integration. Therefore, contextual evidence from Indonesian universities is essential for understanding how AI can be effectively implemented to improve students' language performance while supporting institutional digital transformation initiatives.

Another issue concerns the changing role of English language teachers in AI-supported classrooms. Rather than replacing educators, AI should be viewed as a complementary instructional tool that enhances teaching effectiveness. Teachers continue to play critical roles in designing meaningful learning activities, facilitating interaction, promoting critical thinking, and ensuring that AI is used ethically and responsibly. Students must also develop AI literacy to evaluate AI-generated responses critically, recognize potential inaccuracies, and use AI as a learning partner instead of relying on it for automatic content generation. Consequently, integrating AI into language education requires balanced pedagogical strategies that combine technological innovation with effective instructional practices.

Another important consideration is research design. A one-group pretest–posttest design can document change within the same participants, but it does not include a control group and therefore cannot rule out alternative explanations for pretest–posttest differences. Potential threats include history, maturation, testing effects, instrumentation, and regression toward the mean. Consequently, changes observed after an AI-supported learning period should be interpreted as improvement following the intervention rather than definitive evidence of a causal AI effect.

The findings of this study are expected to contribute theoretically to the growing literature on artificial intelligence in language education by extending current understanding of AI-assisted learning in English as a Foreign Language contexts. Practically, the results may serve as valuable references for English lecturers, curriculum developers, higher education institutions, and policymakers in designing AI-integrated language learning environments that foster students' communicative competence and independent learning. Furthermore, the study supports the broader agenda of educational digital transformation by demonstrating how AI can

be responsibly integrated into higher education to improve learning quality and students' academic performance.

Based on the research background and identified gaps, this study aims to investigate the effectiveness of AI-assisted learning in improving undergraduate students' English writing and speaking performance and to examine students' perceptions of using AI as a learning support tool in English language courses. Accordingly, this study seeks to answer the following research questions:

(1) Does AI-assisted learning significantly improve students' English writing performance?

(2) Does AI-assisted learning significantly improve students' English speaking performance? And

(3) How do students perceive the implementation of AI-assisted learning in English Writing and Speaking courses?

METHOD

Research Design

This study employed a quantitative research approach using a quasi-experimental pretest–posttest design to investigate the impact of AI-assisted learning on students' English writing and speaking performance. The quasi-experimental design was selected because it enabled the researchers to examine the effectiveness of the instructional intervention in an authentic educational setting without randomly assigning participants to different groups. Students' language performance was measured before and after the implementation of AI-assisted learning activities, allowing comparisons of their achievement over the intervention period.

The instructional focus was AI-assisted learning in English Writing and Speaking courses. The AI applications used were ChatGPT for idea generation, language practice, and interactive communication; Grammarly for writing feedback and grammar correction; and Microsoft Copilot for language support and content development. The applications were integrated into classroom activities under lecturer supervision so that students were expected to evaluate AI suggestions and revise or produce language independently.

Participants or Data Sources

The participants consisted of 52 undergraduate students enrolled in the English Language Education Study Program at MNC University during the 2025/2026 academic year. They were registered in the English Writing and Speaking courses and were selected using purposive sampling because they had comparable English proficiency levels and had not previously participated in AI-assisted language learning programs.

The participants ranged in age from 18 to 21 years and represented both male and female students. Prior to the study, all participants received an orientation session regarding the ethical use of artificial intelligence in academic learning, including responsible prompting, verification of AI-generated responses, and academic integrity. Participation in the research was voluntary, and informed consent was obtained from all participants before data collection commenced.

AI-Supported Learning Intervention

The intervention lasted approximately one academic semester (14 weeks). During Week 1, students completed the writing and speaking pretests and a preliminary questionnaire concerning prior AI experience. AI-supported activities began in Week 2 and were integrated into regular Writing and Speaking course activities through the remainder of the semester. The manuscript records weekly classroom activities; therefore, the intervention is described as

semester-long with recurring weekly AI-supported practice rather than as a separate short-term treatment.

Table 1
Integration of AI Tools in Writing and Speaking Courses

Course	AI tool(s)	Main activities	Lecturer guidance
Writing	ChatGPT; Grammarly; Microsoft Copilot	Brainstorming and developing ideas; organizing essays; identifying grammatical problems; revising vocabulary and sentence structure; improving coherence; reviewing and revising drafts.	Lecturer demonstrated responsible prompting, required students to evaluate AI suggestions, and emphasized independent revision rather than copying generated text.
Speaking	ChatGPT / conversational AI; Microsoft Copilot where applicable	Interactive dialogue; repeated speaking practice; pronunciation practice; vocabulary use; spontaneous communication; reflection on AI feedback.	Lecturer monitored activities, combined AI feedback with lecturer feedback, and emphasized critical evaluation and responsible AI use.

Because the source manuscript does not record a separate number of minutes per week for each AI application, no unsupported frequency or minute-based dosage has been added here. The intervention is therefore reported using the documented semester duration and recurring weekly classroom implementation.

Instruments

Three instruments were used in the study. First, an English writing performance test was administered as a pretest and posttest using argumentative writing tasks of comparable difficulty. Writing performance was evaluated using an analytic rubric adapted from the IELTS Writing Band Descriptors, covering Task Achievement, Coherence and Cohesion, Lexical Resource, and Grammatical Range and Accuracy.

Second, an English speaking performance test was administered before and after the intervention using structured speaking tasks resembling IELTS Speaking activities. Speaking performance was assessed in terms of Fluency and Coherence, Lexical Resource, Grammatical Range and Accuracy, and Pronunciation. Two experienced English lecturers independently rated the speaking performances using the same scoring rubric.

Third, students completed a 25-item Likert-scale questionnaire covering perceived usefulness, perceived ease of use, learning autonomy, learning engagement, and overall satisfaction. The questionnaire was adapted from previous research on educational technology acceptance and AI-assisted language learning. Prior to data collection, the instruments were reviewed for content validity by experts, while the internal consistency of the questionnaire was examined using Cronbach's alpha. Inter-rater reliability was also examined for the performance assessments.

Data Collection Procedures

The research was conducted over one academic semester, consisting of approximately fourteen weeks of instruction. During the first week, students completed the writing and speaking pretests to determine their initial English proficiency. They also completed a

preliminary questionnaire regarding their previous experiences with artificial intelligence in language learning.

Beginning in the second week, AI-assisted learning activities were integrated into both writing and speaking courses. In writing classes, students used AI applications to brainstorm ideas, organize essays, identify grammatical errors, revise vocabulary choices, and improve coherence. The lecturer guided students in evaluating AI-generated suggestions critically and encouraged them to revise their work independently rather than copying AI-generated content.

In speaking classes, students interacted with conversational AI platforms to practice pronunciation, fluency, vocabulary use, and spontaneous communication. AI-generated feedback was combined with lecturer feedback to help students improve their communicative competence. Weekly classroom activities emphasized collaborative learning, reflective practice, and responsible AI utilization.

At the end of the intervention, students completed the writing and speaking posttests using assessment tasks equivalent in difficulty to the pretests. They subsequently completed the perception questionnaire to evaluate their learning experiences throughout the semester.

Data Analysis Techniques

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 29. Prior to hypothesis testing, descriptive statistics, including means, standard deviations, minimum scores, and maximum scores, were calculated to summarize students' writing and speaking performance before and after the intervention.

The normality of the data distribution was examined using the Shapiro–Wilk test. Since the data met the assumptions of normal distribution, paired-sample *t*-tests were conducted to determine whether statistically significant differences existed between pretest and posttest scores for both writing and speaking performance. Statistical significance was established at the 0.05 level.

To determine the magnitude of the instructional effect, Cohen's *d* effect size was calculated. The interpretation followed Cohen's (1988) guidelines, where effect sizes of 0.20, 0.50, and 0.80 represented small, medium, and large effects, respectively. Responses from the student perception questionnaire were analyzed using descriptive statistics, including frequencies, percentages, means, and standard deviations, to identify students' overall perceptions toward AI-assisted learning. The quantitative findings from language performance assessments and perception data were then integrated to provide a comprehensive evaluation of the effectiveness of AI-assisted learning in English Writing and Speaking courses.

RESULTS

This section presents the findings obtained from the quantitative analysis of students' English writing and speaking performance before and after the implementation of AI-assisted learning. In addition, students' perceptions toward the use of artificial intelligence in English language learning are reported. The findings are organized according to the research objectives and presented using descriptive and inferential statistics.

Improvement in Students' Writing Performance

Students' writing achievement was measured through pretest and posttest assessments using an analytic writing rubric adapted from the IELTS Writing Band Descriptors. Table 1 summarizes the descriptive statistics of students' writing scores before and after the intervention.

Table 2

Descriptive Statistics of Students' Writing Performance

Test	N	Mean	SD	Minimum	Maximum
Pretest	52	67.84	6.72	55	81
Posttest	52	81.23	5.94	69	92

The descriptive statistics indicate a substantial improvement in students' writing performance following the implementation of AI-assisted learning. The mean writing score increased from 67.84 in the pretest to 81.23 in the posttest, representing an average gain of 13.39 points. Moreover, the reduction in standard deviation suggests that students' writing performance became more consistent after the intervention. A paired-sample *t*-test was conducted to examine whether the observed improvement was statistically significant.

Table 3

Paired Sample t-test for Writing Performance

Variable	Mean Difference	t	df	Sig. (2-tailed)
Writing Pretest–Posttest	13.39	14.82	51	< .001

The paired-sample *t*-test revealed a statistically significant improvement in students' writing performance ($t = 14.82$, $p < .001$). These findings indicate that AI-assisted learning contributed positively to the development of students' writing skills. To determine the practical significance of the intervention, Cohen's *d* effect size was calculated.

Table 4

Effect Size for Writing Performance

Variable	Cohen's d	Interpretation
Writing Performance	1.28	Large Effect

The calculated effect size demonstrates that AI-assisted learning had a strong educational impact on students' writing achievement.

Improvement in Students' Speaking Performance

Students' speaking performance was evaluated using an analytic speaking rubric consisting of fluency, pronunciation, vocabulary, and grammatical accuracy. Table 4 presents the descriptive statistics.

Table 5

Descriptive Statistics of Students' Speaking Performance

Test	N	Mean	SD	Minimum	Maximum
Pretest	52	69.41	7.13	56	83
Posttest	52	82.76	6.05	71	94

The findings demonstrate a noticeable increase in students' speaking performance after participating in AI-assisted learning activities. The average speaking score improved by 13.35 points, while score variation decreased slightly, indicating more uniform achievement among participants.

A paired-sample *t*-test was performed to examine statistical significance.

Table 6
Paired Sample t-test for Speaking Performance

Variable	Mean Difference	t	df	Sig. (2-tailed)
Speaking Pretest–Posttest	13.35	15.47	51	< .001

The analysis revealed a statistically significant improvement in students' speaking performance ($t = 15.47$, $p < .001$), suggesting that AI-assisted learning effectively enhanced learners' oral communication skills.
The effect size analysis further confirmed the strength of the instructional intervention.

Table 7
Effect Size for Speaking Performance

Variable	Cohen's d	Interpretation
Speaking Performance	1.36	Large Effect

The effect size indicates that AI-assisted learning produced a large educational effect on students' speaking performance.

Students' Perceptions toward AI-Assisted Learning

At the end of the intervention, students completed a questionnaire examining their perceptions of AI-assisted learning. The questionnaire consisted of five dimensions: perceived usefulness, perceived ease of use, learning autonomy, engagement, and overall satisfaction.

Table 8
Students' Perceptions of AI-Assisted Learning

Dimension	Mean	SD	Interpretation
Perceived Usefulness	4.53	0.42	Very High
Ease of Use	4.48	0.45	Very High
Learning Autonomy	4.44	0.47	High
Learning Engagement	4.51	0.39	Very High
Overall Satisfaction	4.56	0.36	Very High

The questionnaire results indicate overwhelmingly positive perceptions toward AI-assisted learning. Students rated overall satisfaction as the highest dimension (M = 4.56), followed by perceived usefulness (M = 4.53) and learning engagement (M = 4.51). These findings suggest that students considered AI an effective learning partner that supported independent practice, provided immediate feedback, and increased confidence in learning English.

Overall, the quantitative findings consistently demonstrate that AI-assisted learning significantly improved both English writing and speaking performance. Students achieved higher posttest scores than pretest scores in both productive language skills, with statistically significant differences and large effect sizes. Furthermore, students expressed highly positive perceptions regarding the usefulness, accessibility, and effectiveness of AI applications in supporting their English learning. Collectively, these findings provide empirical evidence that integrating AI into English Writing and Speaking courses can substantially enhance language performance while promoting learner autonomy and engagement.

DISCUSSION

The present study found substantial pretest–posttest improvement in both writing and speaking performance after a semester in which AI-supported activities were embedded in

English Writing and Speaking courses. Writing scores increased by 13.39 points and speaking scores by 13.35 points, with statistically significant paired-sample differences. Because the study used a one-group design without a control group, these findings should be interpreted as improvement observed following AI-supported learning rather than definitive evidence of a causal AI effect. One-group pretest–posttest designs remain vulnerable to alternative explanations such as history, maturation, testing, and instrumentation.

The improvement in writing is consistent with literature describing AI-supported writing as useful for brainstorming, drafting, editing, and revision. AI feedback can draw learners' attention to grammatical problems, lexical choices, sentence construction, and organization, while allowing repeated revision (Park & Kim, 2024; Warschauer & Xu, 2023; Nazari & Ebersbach, 2024). In the present study, students used AI tools during several stages of the writing process and were guided by the lecturer to evaluate suggestions rather than copy AI-generated text. This combination of automated feedback and human guidance may have supported repeated engagement with writing problems.

The speaking results are also consistent with recent research on AI-mediated speaking practice. Fathi et al. (2024), for example, reported positive changes in EFL speaking-related outcomes following AI-mediated interaction. In the present study, conversational practice created additional opportunities for students to produce English, receive immediate responses, and repeat communicative tasks. Such repeated practice may have contributed to the observed improvement in fluency, pronunciation, vocabulary use, and grammatical performance. Nevertheless, the current design does not allow the improvement to be isolated from ordinary semester-long language development or other classroom experiences.

Students' perceptions were strongly positive across the five questionnaire dimensions. The highest mean was observed for overall satisfaction, followed by perceived usefulness and engagement. These results are consistent with the broader literature suggesting that AI can provide accessible and interactive learning support, while also highlighting the importance of ease of use and perceived usefulness in technology adoption (Adiguzel et al., 2023; Kohnke et al., 2023). The results should, however, be interpreted as descriptive evidence of students' perceptions rather than proof that positive attitudes caused performance improvement.

The findings can also be interpreted in relation to learner autonomy and self-regulated learning. AI-supported activities can provide learners with opportunities to monitor language production, obtain feedback, revise outputs, and practice beyond immediate teacher interaction. These processes are compatible with learner autonomy (Ranalli, 2022). However, autonomy should not be equated with unsupervised AI use. Lecturer mediation remains important because AI-generated responses may be inaccurate, overly generic, or inappropriate for the learning objective (Alam, 2023; UNESCO, 2023).

From a pedagogical perspective, the results support a complementary model in which AI expands opportunities for practice while teachers retain responsibility for task design, feedback, assessment, ethical guidance, and critical evaluation. The intervention described in this study did not position AI as an autonomous instructor. Instead, students used AI within lecturer-guided classroom activities. This distinction is important because the educational value of AI depends not only on the technology but also on how activities are designed and how learners are taught to evaluate AI output.

The study has several limitations. First, the participants came from a single university and were selected purposively, limiting generalizability. Second, the one-group pretest–posttest design did not include a control group, so history, maturation, testing effects, instrumentation, regression toward the mean, and ordinary instructional development cannot be ruled out as alternative explanations for the observed gains. Third, the intervention involved several AI applications rather than one standardized platform, making it difficult to identify the

contribution of any individual tool. Fourth, the current manuscript does not report the numerical results of expert validation, questionnaire Cronbach's alpha, or inter-rater reliability; these should be added from the original records before publication. Fifth, the study relied mainly on quantitative outcomes and end-of-semester perceptions, so it did not capture detailed learner experiences or changes in AI-use behavior over time.

Future research should use randomized or controlled comparison designs where feasible, include multiple institutions and larger samples, and report intervention dosage more precisely. Studies could also compare specific AI platforms, examine how different patterns of AI use relate to learning outcomes, and combine performance data with interviews, classroom observations, prompts/logs, or learning analytics. Such designs would provide stronger evidence about when and how AI-supported learning contributes to language development.

CONCLUSION

This study investigated the impact of AI-assisted learning on undergraduate students' English writing and speaking performance in higher education. By integrating artificial intelligence applications into Writing and Speaking courses, the research examined whether AI could enhance students' productive language skills while promoting positive learning experiences. The findings demonstrated that AI-assisted learning significantly improved students' performance in both writing and speaking, as evidenced by the statistically significant differences between the pretest and posttest scores. The large effect sizes further indicate that the instructional intervention had substantial educational value. In addition, students expressed highly positive perceptions of AI-assisted learning, recognizing its usefulness in providing immediate feedback, supporting independent practice, increasing learning engagement, and facilitating continuous language development.

The findings contribute to the growing body of knowledge on artificial intelligence in English language education by providing empirical evidence that AI can effectively function as a pedagogical support tool rather than merely a technological innovation. The study reinforces the view that AI-assisted learning promotes learner autonomy, encourages self-regulated learning, and creates more personalized learning experiences that complement teacher-guided instruction. From a practical perspective, the results suggest that English language educators should consider integrating AI applications into writing and speaking instruction to enrich learning activities, provide timely formative feedback, and foster students' digital literacy alongside language proficiency.

Despite these promising outcomes, several limitations should be acknowledged. The study involved participants from a single higher education institution, limiting the generalizability of the findings to other educational contexts. Furthermore, the intervention was conducted over one academic semester and primarily employed quantitative methods, which may not fully capture the complexity of students' learning experiences or the long-term effects of AI-assisted learning. Future studies are therefore encouraged to involve participants from multiple institutions, employ longitudinal or mixed-methods research designs, compare different AI platforms, and investigate additional variables such as learning motivation, critical thinking, digital literacy, and academic integrity. Such investigations would provide a more comprehensive understanding of how artificial intelligence can be integrated responsibly and effectively into English language education.

Overall, this study concludes that AI-assisted learning has considerable potential to transform English Writing and Speaking instruction by improving students' language performance, increasing learning engagement, and supporting learner autonomy. When implemented ethically and accompanied by appropriate pedagogical guidance, artificial intelligence can serve as an effective instructional partner that enriches language learning and

prepares students with the linguistic and digital competencies required in the rapidly evolving educational landscape of the twenty-first century.

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