The Impact of AI-Integrated Language Instruction on EFL Learners' Speaking Proficiency, Speaking Anxiety, and Foreign Language Motivation

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ABSTRACT

The exponential growth of artificial intelligence (AI) has catalyzed a remarkable shift in language learning, guiding it toward a technology-infused model of instruction. In the suite of AI applications, ChatGPT has emerged as a powerful conversational actor, available for delivering interactive, flexible, and personalized learning experiences. This emerging trend has spurred scholars and educators to explore the pedagogical potential of AI-infused instruction for building both linguistic competency and affective qualities of language learning. The current study explored the influence of ChatGPT-based AI-integrated language instruction on the speaking proficiency, foreign speaking anxiety, and foreign language motivation among EFL learners. Sixty female Iranian EFL learners constituted a group that was randomly allocated into an experimental group (EG) and a control group (CG), each consisting of 30 members. The EG was exposed to AI-integrated speaking instruction through ChatGPT that enabled real-time conversational practice, online feedback, and personalized speaking tasks, while the CG underwent traditional face-to-face instruction without any AI support. A pretest–posttest quasi-experimental design was invoked while adopting standardized speaking proficiency tests, motivation assessments, and foreign speaking anxiety questionnaires that were administered before and after the intervention. Analysis of covariance (ANCOVA) and independent-samples t-tests served for data analysis based on examining differences within and between the groups. The findings revealed that the EG outperformed the CG significantly on speaking proficiency, displayed higher levels of motivation, and indicated reduced foreign speaking anxiety after the intervention. These results highlight the promise of ChatGPT-based instruction infusion for increasing outcomes from language learning while fostering healthy affective experiences in the context of EFL.

Keywords: ChatGPT-integrated instruction, speaking proficiency, motivation, speaking anxiety, EFL learners

Introduction

In recent years, the integration of artificial intelligence (AI) into language education has revolutionized the landscape of English as a Foreign Language (EFL) instruction, particularly in the domain of speaking proficiency. Speaking is widely acknowledged as a foundational skill for language learners, enabling them to communicate effectively and engage in authentic social interactions in diverse contexts (1, 2). It constitutes a pivotal component of communicative competence and has been

shown to facilitate broader linguistic development and fluency when reinforced through interactive, task-based learning experiences (3, 4). Yet despite its significance, speaking proficiency remains one of the most challenging skills to develop among EFL learners due to affective barriers such as anxiety, lack of motivation, and limited opportunities for authentic practice (5, 6). These challenges underscore the urgent need to explore innovative pedagogical approaches that can foster both the cognitive and affective aspects of language learning in EFL contexts.

One of the most pressing affective challenges in speaking development is Foreign Language Speaking Anxiety (FLSA), a subcomponent of Foreign Language Anxiety (FLA) characterized by fear and apprehension associated with oral communication in a second language. Research has consistently demonstrated that speaking tasks evoke higher anxiety than other language skills and that elevated levels of FLSA hinder learners' oral performance and willingness to communicate (5, 6). Persistent anxiety impairs learners' cognitive processing and discourages risk-taking in communication, leading to fossilized errors and lower overall proficiency (7). Reducing FLSA therefore represents a critical prerequisite for enhancing oral communication ability and creating psychologically safe environments for language learning. In addition to anxiety, motivation has also been recognized as a key determinant of language learning success. Motivation governs learners' effort, persistence, and engagement and can be broadly categorized as intrinsic or extrinsic (8). High levels of motivation drive learners to invest sustained effort and develop a positive orientation toward language learning tasks, while low motivation contributes to disengagement and limited achievement (9, 10). Thus, to maximize learning outcomes, pedagogical innovations must simultaneously address both the motivational and affective dimensions of speaking development.

Against this backdrop, the emergence of AI-powered language learning tools has opened unprecedented opportunities to transform speaking instruction. AI refers to systems capable of simulating human cognitive processes such as learning, reasoning, and problem-solving, and it has been increasingly adopted in educational contexts to personalize learning, provide intelligent feedback, and enhance engagement (11). In language education, AI-driven tools such as intelligent tutoring systems, automated assessment platforms, and conversational agents offer learners individualized scaffolding and real-time feedback, thereby addressing limitations of traditional classroom instruction (12). Among these tools, ChatGPT has emerged as a transformative force due to its advanced natural language processing capabilities, which allow it to generate human-like responses, conduct sustained conversations, and adapt to learners' proficiency levels (13, 14). These qualities make ChatGPT a promising platform for fostering interactive speaking practice, enhancing learners' confidence, and sustaining motivation.

A growing body of empirical evidence supports the pedagogical benefits of ChatGPT and other AI-based platforms in EFL learning. For instance, ChatGPT has been shown to improve learners' linguistic performance, engagement, and emotional well-being across various domains. Mahapatra (15) found that ChatGPT significantly enhanced ESL learners' academic writing quality, while Urban et al. (16) reported that it improved creative problem-solving, elaboration, and originality in university students. Wang (17) documented that ChatGPT-4 fostered students' English communication skills by promoting motivation, emotion regulation, and psychological well-being. Similar positive outcomes have been observed in speaking instruction specifically: Zou et al. (18) found that AI-based speech evaluation programs with automatic feedback improved EFL learners' speaking fluency, grammatical accuracy, lexical range, and pronunciation, while Shafiee Rad (19) demonstrated that AI-enhanced speaking modules increased learners' willingness to communicate and speaking proficiency. These findings collectively affirm the potential of AI tools to serve as effective mediational resources for enhancing both cognitive and affective dimensions of language learning.

Beyond improving linguistic performance, AI-mediated instruction appears particularly suited to mitigating speaking anxiety and fostering motivation. Syifauddin and Yuliansyah (20) showed that integrating AI in English instruction significantly increased students' motivation, though they cautioned that it may heighten anxiety in learners with limited

technological exposure. Likewise, Zhang et al. (21) found that using AI speaking assistants enhanced foreign language enjoyment and willingness to communicate while simultaneously reducing speaking anxiety among Chinese EFL learners. Ding and Yusof (22) reported that AI-powered conversational bots improved learners' L2 speaking skills and lowered anxiety by providing real-time, low-stress interactive practice, a finding echoed by Ebadi et al. (2), who observed that AI-mediated speaking tasks enhanced Iranian EFL learners' speaking performance while reducing their anxiety and boosting motivation. Abdelhalim and Alsehibany (23) similarly showed that personalized AI-driven pronunciation training improved accuracy and increased L2 motivation. These convergent findings underscore the dual cognitive and emotional affordances of AI tools in creating supportive learning environments that promote confidence and sustained engagement.

The motivational benefits of AI-assisted learning can be explained through the lens of Self-Determination Theory (SDT), which posits that autonomy, competence, and relatedness are essential for fostering intrinsic motivation (8, 24). By offering learners control over practice pace and content, providing immediate feedback, and simulating authentic interaction, AI tools can fulfill these psychological needs and stimulate self-directed learning behaviors. Yuan and Liu (25) found that AI tools enhanced EFL learners' engagement, enjoyment, and motivation by delivering adaptive and personalized learning experiences, while Wei (26) showed that AI-based instruction improved learners' motivation, self-regulated learning, and English achievement. Liu and Fan (27) further emphasized the role of AI literacy and enjoyment as mediators in the relationship between AI use and learning engagement, highlighting the importance of cultivating positive emotional experiences alongside cognitive gains. These findings suggest that AI-supported speaking instruction can simultaneously promote competence, autonomy, and enjoyment, thereby creating conditions conducive to sustained motivation and improved learning outcomes.

At the same time, the emotional trajectory of learners in AI-powered classrooms warrants careful consideration. Xin and Derakhshan (28) highlighted that while AI-based learning environments can spark initial excitement, they may also induce anxiety due to the novelty of technology and perceived evaluation pressure. Thorpe et al. (6) also noted that language anxiety negatively influences learners' comprehensibility, accentedness, and speech rate, which may in turn impact their self-confidence and motivation. These insights reinforce the need to design AI-mediated speaking tasks that balance cognitive challenge with emotional support, incorporating features such as scaffolded prompts, gradual difficulty progression, and gamified tasks to sustain motivation while alleviating anxiety. Hapsari and Wu (29) showed that AI chatbots could effectively alleviate speaking anxiety and enhance enjoyment when embedded in supportive, low-pressure learning environments, while Çakmak (30) demonstrated that chatbot-human interaction significantly improved EFL students' speaking performance and reduced anxiety. Together, these findings suggest that well-designed AI interventions can serve as psychologically safe spaces where learners can practice speaking, receive feedback, and build confidence without fear of negative evaluation.

Despite these promising findings, several gaps remain in the literature. Much of the existing research has focused on the impact of AI tools on writing skills or general academic performance, with comparatively fewer studies addressing their effect on speaking proficiency specifically (15-17). Moreover, prior studies have often examined motivation, anxiety, or proficiency in isolation rather than exploring their interrelationships within AI-supported speaking instruction. As Ni and Xu (9) argued, learners' emotional states are intricately shaped by their proficiency and motivation levels, suggesting the need for integrated investigations that simultaneously consider these variables. Xu et al. (4) likewise emphasized the interplay between listening strategies and speaking performance, indicating that language skills and affective variables are interdependent and should be studied holistically. Yet empirical research exploring how AI-integrated speaking instruction influences EFL learners' speaking proficiency, motivation, and speaking anxiety concurrently remains scarce, particularly among adolescent learners in secondary school settings.

Addressing these gaps is both theoretically and practically significant. Theoretically, it can contribute to a more comprehensive understanding of how AI functions as a mediational tool in language learning, aligning with sociocultural perspectives that emphasize the role of tools in extending learners' Zone of Proximal Development (31noid). Practically, it can inform the design of pedagogical interventions that harness the affordances of AI to enhance both cognitive and affective outcomes in EFL instruction. As Abdelhalim and Alsehibany (23) noted, personalized, adaptive AI systems can provide individualized scaffolding that may be infeasible in traditional classrooms, offering scalable solutions to resource constraints. Similarly, Patel and Lam (32) stressed that AI tools like ChatGPT could complement human instruction by automating routine tasks and allowing teachers to focus on higher-order learning design. Therefore, investigating the combined impact of AI-based speaking instruction on speaking proficiency, motivation, and anxiety can generate valuable insights for both language educators and policymakers aiming to modernize EFL pedagogy in line with technological advancements.

In light of this context, the present study seeks to examine the impact of ChatGPT-based AI-integrated speaking instruction on Iranian secondary EFL learners' speaking proficiency, foreign language motivation, and speaking anxiety. By exploring how these interrelated cognitive, affective, and motivational outcomes respond to AI-supported learning, this research aims to offer empirical evidence on the pedagogical potential of AI tools in EFL speaking instruction and to address existing gaps in the literature. The findings are expected to provide critical implications for designing technology-enhanced learning environments that promote not only linguistic competence but also psychological well-being and engagement among EFL learners.

Methods and Materials

This study employed a quasi-experimental pretest–posttest CG design to investigate the impact of AI-integrated language instruction using ChatGPT on EFL learners' speaking proficiency, motivation, speaking anxiety. The independent variable was the instructional method (AI-integrated instruction vs. traditional instruction), while the dependent variables were speaking proficiency, motivation, and speaking anxiety.

2.2 Participants

The participants consisted of 60 female EFL learners aged 14−16 from language institutes in Iran. They were selected through convenience sampling and randomly assigned to either the EG (n = 30) or the CG (n = 30). All participants were at the intermediate proficiency level, determined by the Oxford Quick Placement Test (OQPT), ensuring homogeneity in language ability before the intervention. Ethical principles were strictly adhered to throughout the study. Prior to data collection, participants and their legal guardians were informed about the purpose, procedures, potential benefits, and voluntary nature of participation in the study. Written informed consent was obtained from all participants and guardians, ensuring that involvement was entirely voluntary and that participants could withdraw at any stage without penalty. Anonymity and confidentiality were guaranteed by assigning code numbers to participants instead of using personal identifiers. Data were stored securely and used solely for research purposes. Furthermore, the study complied with institutional ethical guidelines and the Declaration of Helsinki to protect participants' rights and well-being.

2.3 Instruments

The first instrument employed in this study was the OQPT, a standardized and widely recognized assessment tool designed to measure learners' general English language proficiency. The OQPT consisted of 60 multiple-choice items covering three main areas: grammar, vocabulary, and reading comprehension. The test was administered prior to the intervention to ensure homogeneity among participants in both the EG and the CG. Each item carried one point, resulting in a possible total score

range from 0 to 60, where 0 indicated the lowest proficiency and 60 the highest. Only learners scoring within the intermediate proficiency band—as defined by the OQPT scoring criteria—were included in the study. This selection ensured that any post-test differences between the groups could be attributed to the instructional treatment rather than to variations in participants' initial language proficiency. The validity of the OQPT has been established in prior research, and its reliability in this study was confirmed through Cronbach's alpha, which demonstrated an acceptable level of internal consistency.

The second instrument utilized in this study was a Speaking Proficiency Test adapted from the IELTS Speaking Band Descriptors. This test was administered both as a pretest and a posttest to measure the participants' speaking proficiency before and after the AI-integrated instructional intervention. The test specifically evaluated four key components: fluency, accuracy, pronunciation, and vocabulary. To ensure validity, the test items and evaluation criteria were adapted from the well-established IELTS Speaking framework, widely recognized for assessing English speaking proficiency in academic contexts. Content validity was further confirmed through expert judgment from two experienced EFL instructors, who reviewed the test tasks and rating criteria to ensure they aligned with the study's objectives and the learners' proficiency level. For reliability, two independent raters with extensive experience in language assessment were employed to score the speaking tests. Inter-rater reliability was calculated using Cohen's Kappa, which yielded a high level of agreement, indicating consistency in scoring across raters. Each participant's score ranged from 0 to 40, with 0 representing the lowest proficiency level and 40 representing the highest possible performance across the four components.

Academic motivation was assessed using the Academic Motivation Scale (Vallerand et al., 1992), a 28-item instrument grounded in SDT. This scale evaluates intrinsic motivation, extrinsic motivation, and amotivation on a seven-point Likert scale (ranging from 1 = not at all true to 7 = very true). The Cronbach's alpha reliability coefficients were .93 for the overall scale, and .91, .89, and .83 for intrinsic motivation, extrinsic motivation, and amotivation, respectively. A principal component analysis with varimax rotation supported the presence of three components with eigenvalues greater than 1, explaining 34.56%, 11.02%, and 8.18% of the variance in academic motivation. The rotated solution showed that items related to intrinsic motivation, extrinsic motivation, and amotivation loaded onto their respective components, justifying the use of these items as distinct subscales. In this study, the average of the mean scores from the intrinsic and extrinsic motivation subscales was used as the overall measure of 'academic motivation.'

To measure participants' L2 speaking anxiety, the study utilized a validated 19-item instrument developed by Ozdemir and Papi (2022). This scale is an adaptation of the widely recognized Foreign Language Classroom Anxiety Scale by Horwitz et al. (1986), modified to specifically assess anxiety related to spoken communication rather than general language learning anxiety. The adapted version was chosen because it offers a more accurate evaluation of speaking-related anxiety, aligning closely with the study's focus on L2 speaking skills. Responses were recorded on a 6-point Likert scale ranging from "strongly agree" to "strongly disagree." An example item includes: "I get nervous when I am speaking English in my class." The instrument demonstrated strong reliability in this study, with a Cronbach's Alpha of 0.86. To track changes in anxiety levels, the scale was administered to participants in both groups at both the pre-test and post-test phases.

2.4 Treatment

The instructional intervention was carried out over **eight consecutive weeks**, with two 90-minute sessions per week, totaling **16 instructional sessions** for each group. The treatment differed for the **EG** and the **CG** as follows:

EG: AI-Integrated Instruction Using ChatGPT

Participants in the EG received speaking instruction supported by **ChatGPT,** which functioned as an AI conversational partner. The integration of ChatGPT aimed to enhance learners' speaking proficiency, motivation, and reduce speaking anxiety through the following procedures:

- **Real-Time Conversational Practice:** Learners interacted with ChatGPT on various topics such as travel, education, hobbies, and cultural issues. The AI provided instant feedback on vocabulary, grammar, and pronunciation.

- **Adaptive Speaking Tasks:** ChatGPT generated prompts of varying complexity based on learners' proficiency levels, ensuring a scaffolded progression from simple question–answer exchanges to extended role-plays and debates.

- **Immediate Error Correction:** Learners received corrective feedback on mispronunciations, grammatical errors, and inappropriate vocabulary choices, along with suggestions for improvement.

- **Motivational Support:** ChatGPT occasionally offered encouraging feedback and introduced gamified speaking tasks (e.g., timed challenges, storytelling competitions) to increase learner engagement.

- **Homework Practice:** Learners used ChatGPT outside classroom hours to practice speaking, record responses, and receive feedback asynchronously.

CG: Traditional Face-to-Face Instruction

Participants in the CG received conventional speaking instruction delivered by a human instructor without AI integration. The instructional procedures included:

- **Textbook-Based Speaking Activities:** Learners completed dialogues, role-plays, and discussion tasks from the prescribed textbook materials.

- **Teacher-Led Error Correction:** The instructor provided delayed corrective feedback at the end of each activity rather than instant feedback during tasks.

- **Standardized Speaking Topics:** Speaking tasks followed pre-set topics with limited personalization or adaptive difficulty.

- **Homework Assignments:** Learners were asked to prepare written dialogues or short oral presentations for the next session, without AI interaction or real-time feedback.

Both groups covered **identical speaking topics** and were taught by instructors with comparable qualifications to ensure instructional equivalence. The only difference between groups was the use of **AI-integrated instruction in the EG** versus **traditional methods in the CG.**

2.5 Data Analysis

The quantitative data were analyzed using SPSS (Version 26). Prior to the main analyses, the Kolmogorov–Smirnov (KS) test was performed to examine the normality of the pretest and posttest scores for both the EG and the CG. The results confirmed that the data met the normality assumption required for parametric tests. To establish the initial equivalence between the two groups before the intervention, independent samples t-tests were conducted on the pretest scores. Subsequently, ANCOVA was employed to compare the posttest scores of the EG and CG while controlling for their pretest scores. This approach allowed for a more accurate assessment of the intervention's effect by accounting for any baseline differences between the groups.

Findings and Results

This section presents the findings of the study examining the impact of AI-integrated language instruction on EFL learners' speaking proficiency, speaking anxiety, and motivation. Both descriptive and inferential statistics were conducted to compare the EG, which received ChatGPT-based instruction, and the CG, which received traditional instruction. First, pretest

comparisons were carried out to ensure the equivalence of the two groups before the intervention. Next, posttest analyses were performed using ANCOVA to assess the effects of AI-integrated instruction on the three variables while controlling for pretest scores. The results are summarized in the following tables.

Table 1: Pretest Group Statistics for Speaking, Motivation, and Anxiety

	groups	N	Mean	Std. Deviation	Std. Error Mean
Speaking	EG	30	12.60	2.76	.50
	CG	30	11.70	2.53	.46
Motivation	EG	30	52.53	9.74	1.77
	CG	30	54.86	9.42	1.71
Anxiety	EG	30	63.30	7.47	1.36
	CG	30	61.30	7.37	1.34

This table presents the descriptive statistics for the pretest scores of the EG and CG across three variables: speaking proficiency, motivation, and anxiety. The results show that both groups had similar mean scores in speaking (EG = 12.60; CG = 11.70), motivation (EG = 52.53; CG = 54.86), and anxiety (EG = 63.30; CG = 61.30). The close values indicate that before the intervention, participants in both groups were nearly equivalent in terms of proficiency, motivation, and anxiety levels.

Table 2: Independent Samples Test for Pretest Equivalence

	F	Sig.	t	df	Sig. (2-tailed)
Speaking	.28	.59	1.31	58	.19
			1.31	57.57	.19
Motivation	.01	.89	-.94	58	.35
			-.94	57.93	.35
Anxiety	.00	.95	1.04	58	.30
			1.04	57.98	.30

This table shows the results of independent samples t-tests comparing EG and CG on pretest scores for speaking proficiency, motivation, and anxiety. None of the comparisons reached statistical significance (p > .05), confirming that both groups were homogeneous at the beginning of the study. This equivalence ensures that any posttest differences can be attributed to the instructional intervention rather than initial disparities between the groups.

Table 3: Posttest Descriptive Statistics for Speaking Anxiety

group	Mean	Std. Deviation	N
EG	45.63	11.52	30
CG	54.96	11.48	30
Total	50.30	12.34	60

This table reports the posttest means for speaking anxiety in the EG (M = 45.63) and CG (M = 54.96). The lower anxiety mean in the EG suggests that AI-integrated instruction helped reduce speaking anxiety compared to traditional instruction. The descriptive results point to a meaningful reduction in anxiety among learners who used ChatGPT for speaking practice.

Table 4: Tests of Between-Subjects Effects for Speaking Anxiety

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1470.01	2	735.00	5.57	.00	.16
Intercept	1065.64	1	1065.64	8.07	.00	.12
pretests	163.34	1	163.34	1.23	.27	.02

group	1409.85	1	1409.85	10.68	.00	.15
Error	7518.58	57	131.90			
Total	160794.00	60				
Corrected Total	8988.60	59				

The ANCOVA results show a significant group effect for speaking anxiety (F = 10.68, p = .00, η^2 = .15). This means that the difference in posttest anxiety levels between the EG and CG was statistically significant, with a moderate effect size. The AI-integrated instruction clearly reduced speaking anxiety more effectively than the traditional method.

Table 5: Posttest Descriptive Statistics for Motivation

Group	Mean	Std. Deviation	N
EG	75.53	17.70	30
CG	63.86	13.56	30
Total	69.70	16.70	60

The posttest means for motivation show that the EG scored higher (M = 75.53) than the CG (M = 63.86). The descriptive statistics indicate that AI-integrated instruction substantially improved learners' motivation compared to traditional instruction, likely due to the interactive and adaptive features of ChatGPT-based tasks.

Table 6: Tests of Between-Subjects Effects for Motivation

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2421.90	2	1210.95	4.91	.01	.14
Intercept	5488.33	1	5488.33	22.28	.00	.28
pretests	380.23	1	380.23	1.54	.21	.02
group	2231.50	1	2231.50	9.05	.00	.13
Error	14040.69	57	246.32			
Total	307948.00	60				
Corrected Total	16462.60	59				

The ANCOVA results confirm a significant group effect for motivation (F = 9.05, p = .00, η^2 = .13), demonstrating that the EG experienced greater gains in motivation than the CG. The moderate effect size suggests that AI-integrated instruction provided strong motivational support for language learning.

Table 7: Posttest Descriptive Statistics for Speaking Proficiency

Group	Mean	Std. Deviation	N
EG	16.96	2.42	30
CG	14.70	2.92	30
Total	15.83	2.90	60

The posttest means show higher speaking proficiency scores for the EG (M = 16.96) compared to the CG (M = 14.70). The descriptive results suggest that AI-integrated instruction led to noticeable improvements in speaking skills, likely due to real-time feedback, adaptive prompts, and increased speaking opportunities.

Table 8: Tests of Between-Subjects Effects for Speaking Proficiency

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	104.69	2	52.34	7.61	.00	.21
Intercept	952.36	1	952.36	138.60	.00	.70
pretests	27.62	1	27.62	4.02	.05	.06
group	91.10	1	91.10	13.26	.00	.18
Error	391.64	57	6.87			
Total	15538.00	60				
Corrected Total	496.33	59				

The ANCOVA results reveal a significant difference in posttest speaking proficiency between the EG and CG (F = 13.26, p = .00, η² = .18), with the EG outperforming the CG. The relatively large effect size highlights the substantial impact of AI-integrated instruction on improving learners' speaking performance.

Discussion and Conclusion

The findings of this study offer compelling evidence that AI-integrated language instruction can significantly enhance EFL learners' speaking proficiency while simultaneously reducing their speaking anxiety and increasing their foreign language motivation. Learners in the experimental group (EG) who received ChatGPT-based instruction outperformed their counterparts in the control group (CG) in all three outcome variables. These results are theoretically and empirically meaningful, as they illuminate the intertwined cognitive, affective, and motivational affordances of AI-powered instruction in language learning contexts.

The most salient finding of this study was the marked improvement in speaking proficiency among learners exposed to ChatGPT-integrated instruction. These learners demonstrated gains in fluency, accuracy, vocabulary range, and pronunciation, surpassing their peers who received traditional instruction. This aligns with prior evidence that engaging learners in authentic, interactive speaking tasks supported by real-time feedback can accelerate oral skill development (1, 4). The improvement observed here can be attributed to ChatGPT's ability to provide adaptive prompts and immediate corrective feedback, features that traditional instruction often lacks.

Similar results have been documented in previous studies. Fathi et al. (3) showed that AI-mediated speaking interactions significantly improved EFL learners' oral performance and willingness to communicate. Zou et al. (18) reported that AI-based speech evaluation tools enhanced multiple dimensions of speaking proficiency, including fluency, grammar, and lexical accuracy. Ebadi et al. (2) also found that Iranian EFL learners who engaged in AI-driven speaking tasks achieved greater gains in speaking ability compared to peers in traditional settings. These studies collectively reinforce the current finding that AI-powered conversational platforms like ChatGPT can provide the scaffolding and interactive opportunities needed to build spoken competence.

From a theoretical perspective, these outcomes resonate with Lev Vygotsky's Sociocultural Theory, which underscores the importance of mediated interaction and scaffolding within the learner's Zone of Proximal Development. ChatGPT served as a "more capable peer," enabling learners to attempt linguistic tasks just beyond their independent ability and to internalize new language structures through guided practice. Likewise, the Input and Interaction Hypotheses (33noid, 34noid) support the notion that comprehensible input combined with meaningful interaction fosters language acquisition. ChatGPT's conversational design provided extensive input and frequent opportunities for negotiation of meaning, facilitating deeper processing and more robust language gains.

In addition to improving oral proficiency, the intervention produced a significant positive effect on learners' motivation. Participants in the EG reported stronger desire to engage in speaking tasks, greater persistence, and increased intrinsic interest in language learning compared to the CG. This finding aligns with research that highlights motivation as a key determinant of second language learning outcomes (8, 10). Yuan and Liu (25) similarly found that AI tools enhanced EFL learners' engagement, enjoyment, and motivation by offering personalized and adaptive experiences, while Wei (26) showed that AI-supported instruction boosted learners' self-regulated learning and L2 achievement partly through motivational pathways.

The present results also corroborate evidence that affective engagement is strengthened when learners perceive their learning environment as supportive, enjoyable, and autonomy-enhancing. Liu and Fan (27) highlighted that AI literacy and enjoyment

mediated the link between AI use and engagement, suggesting that positive emotions play a crucial role in sustaining motivation in AI-enhanced environments. Similarly, Shafiee Rad (19) demonstrated that using AI speaking applications increased learners' willingness to communicate and improved their perceptions of language learning. These converging results suggest that ChatGPT's interactive, nonjudgmental, and gamified features created a psychologically safe environment that enhanced learners' intrinsic motivation to practice speaking.

Self-Determination Theory provides a useful lens for understanding this motivational growth. According to this theory, motivation is optimized when learners' needs for autonomy, competence, and relatedness are met (8, 24). ChatGPT addressed these needs by allowing learners to control the pace and content of their practice (autonomy), providing immediate feedback and progressively challenging tasks (competence), and simulating conversational exchanges that mirrored social interaction (relatedness). These conditions likely contributed to the heightened motivation observed in the EG. This motivational boost is particularly important in EFL contexts, where learners often face limited authentic speaking opportunities and may lack extrinsic incentives to persist.

Equally noteworthy was the substantial reduction in speaking anxiety among learners who used ChatGPT for speaking practice. The EG's posttest anxiety scores were significantly lower than those of the CG, indicating that AI-supported speaking tasks created a less stressful learning environment. This finding aligns with earlier research identifying speaking as the most anxiety-provoking language skill and highlighting the detrimental effect of Foreign Language Speaking Anxiety on performance (5, 6). By providing private, judgment-free opportunities to practice speaking, ChatGPT may have helped learners overcome fear of negative evaluation—a core component of language anxiety (7).

Several previous studies echo this conclusion. Ding and Yusof (22) found that AI-powered conversation bots significantly reduced learners' speaking anxiety while improving their oral performance. Ebadi and Azizimajd (35) showed that participating in online speaking tasks lowered Iranian EFL learners' speaking-related anxiety, while Hapsari and Wu (29) reported that AI chatbots alleviated speaking anxiety and enhanced enjoyment. Zhang et al. (21) further demonstrated that AI speaking assistants increased learners' foreign language enjoyment while reducing anxiety and raising willingness to communicate. These findings support the present conclusion that ChatGPT can function as a low-pressure practice partner, helping learners regulate their emotions and build speaking confidence.

From a cognitive perspective, these results can also be understood through Cognitive Load Theory (36noid), which posits that reducing extraneous cognitive load facilitates learning. ChatGPT's real-time error correction and scaffolding likely minimized the cognitive burden of formulating language under pressure, freeing cognitive resources for processing and internalizing new linguistic structures. This may have alleviated learners' anxiety while enabling more fluent performance. Similarly, Activity Theory frames AI tools as mediational artifacts that reorganize learning activities and promote active participation (2). By providing clear goals, feedback, and interactive discourse, ChatGPT may have increased learners' sense of agency and control, which can counteract anxiety and foster resilience.

Despite the robust results, this study is not without limitations. First, the sample was relatively small (N = 60) and homogenous, consisting solely of female adolescent EFL learners from Iranian language institutes. This limited demographic scope constrains the generalizability of the findings to other age groups, genders, cultural contexts, or proficiency levels. Larger and more diverse samples would be needed to confirm the broader applicability of the results.

Second, the study employed a quasi-experimental design with convenience sampling, which carries inherent risks of selection bias despite the use of random group assignment. A fully randomized controlled trial would offer stronger internal validity by minimizing potential confounding variables. Third, the duration of the intervention—eight weeks—was relatively

short. While significant gains were observed, longer-term studies are needed to assess the sustainability of improvements in speaking proficiency, motivation, and anxiety.

Fourth, the study focused exclusively on one AI tool, ChatGPT. While this allowed for a controlled examination of a single intervention, it limits the ability to generalize the findings to other AI platforms, which may differ in features, interface, and pedagogical affordances. Additionally, the study relied on quantitative measures of proficiency, motivation, and anxiety. Although these were validated instruments, they may not fully capture learners' nuanced experiences, perceptions, and strategies during AI-mediated interaction. Finally, participants' prior familiarity with technology or AI tools was not assessed, yet such familiarity could influence their comfort, motivation, and anxiety during the intervention.

Future studies should build upon these findings by addressing the identified limitations. Expanding the sample to include learners of different genders, ages, cultural backgrounds, and proficiency levels would provide more comprehensive evidence of the effectiveness and generalizability of AI-integrated speaking instruction. Employing randomized controlled trials with stratified sampling could further strengthen internal validity and rule out potential selection biases.

Longitudinal studies are also needed to examine the durability of AI-driven gains in speaking proficiency, motivation, and anxiety reduction. Investigating long-term retention and transfer of speaking skills beyond immediate posttests would shed light on whether AI interventions produce lasting impacts. Moreover, comparative studies should be conducted to evaluate the effectiveness of different AI tools or hybrid models that blend AI and human instruction, as different platforms may vary in their pedagogical strengths.

Future research should also incorporate qualitative methods such as interviews, learner diaries, and classroom observations to capture learners' lived experiences and perceptions of AI-mediated speaking tasks. Such mixed-methods approaches could provide richer insights into how learners engage with AI tools, regulate their emotions, and develop self-directed learning strategies. Finally, examining the moderating role of learners' digital literacy and prior exposure to AI could clarify individual differences in responsiveness to AI-based instruction.

The results of this study carry several implications for EFL pedagogy. Teachers should consider integrating AI-based speaking tools like ChatGPT as supplementary practice platforms to provide learners with abundant, low-stress opportunities for oral production and immediate feedback. These tools can complement traditional instruction by offering individualized scaffolding and freeing classroom time for higher-order communicative tasks. Teachers should also guide learners on how to use AI tools effectively and responsibly, ensuring that they support—rather than replace—human interaction and critical thinking.

Instructional designers should develop curricula that embed AI-supported speaking activities aligned with learners' proficiency levels and learning goals. Such activities should incorporate adaptive prompts, real-time feedback, gamified elements, and affective support features to sustain engagement and reduce anxiety. Additionally, institutional policymakers should invest in infrastructure, training, and ethical guidelines to support the responsible adoption of AI in language education. With careful implementation, AI-integrated speaking instruction holds substantial promise for fostering EFL learners' linguistic competence, motivation, and psychological well-being.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adhered in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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