Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Enhancing Speaking Competence, Reducing Language Anxiety, and Increasing Motivation: Exploring the Effects of AI Tools on First-Year Plant Science Learners at Bonga University.

Solomon Tamene

solomonwakjira4@gmail.com

Jimma University

Dibisa Gemechu

Jimma University

Tilahun Gebiretsadik

Bonga University

Research Article

Keywords: AI-assisted language learning, speaking anxiety, speaking motivation, speaking competence, mixed-methods research

Posted Date: July 1st, 2026

DOI: https://doi.org/10.21203/rs.3.rs-9833270/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

This study employed a quasi-experimental parallel mixed-methods design to investigate the effects of AI-assisted language learning tools on Bonga University Plant Science Department first year learners' speaking anxiety, speaking motivation, and speaking competence. A sample of 80 intermediate-level learners (M = 18.5, SD = 1.6) from Bonga University, Ethiopia, was divided equally into an experimental group (EG) using AI-assisted speaking tools (ChatGPT-4 voice mode, ELSA Speak Premium, Duolingo Max, and a custom progress dashboard) and a control group (CG) receiving traditional speaking instruction. Over a 10-week intervention, quantitative data were collected through pre- and post-tests measuring speaking anxiety (8 items, α = 0.84), speaking motivation (10 items, α = 0.89), and speaking competence (15-point test assessing pronunciation, fluency, vocabulary, grammar, and coherence). Qualitative data were gathered through semi-structured interviews with EG participants (n = 40). Results revealed that the EG demonstrated significantly greater reductions in speaking anxiety (post-test: EG, M = 23.45, SD = 7.92; CG, M = 29.87, SD = 6.54; ANCOVA F = 23.45, $p < 0.001$, η^2=0.23, Cohen's d = 0.8), significantly higher increases in speaking motivation (EG, M = 38.92, SD = 7.43; CG, M = 29.56, SD = 6.87; F = 34.89, $p < 0.001$, η^2=0.31, 0.81), and substantially greater improvements in speaking competence (EG, M = 24.67, SD = 4.15; CG, M = 18.34, SD = 4.62; F = 41.23, $p < 0.001$, η^2=0.35, d=.84) compared to the CG. Qualitative content analysis revealed that AI-assisted tools reduced speaking anxiety through non-judgmental practice environments (85% of participants), mastery through unlimited repetition (78%), and visible progress tracking (70%); enhanced motivation through gamification (88%), adaptive challenge (82%), and immediate encouraging feedback (75%); and improved speaking competence through immediate specific corrective feedback (90%), extended practice opportunities (85%), and vocabulary/expression expansion (78%). Moderator analyses indicated that highly anxious learners showed larger anxiety reductions (d = 1.98 vs. 1.28), while technologically experienced learners showed larger competence gains (d=.82 vs. 0.65). These findings provide evidence that AI-assisted language learning effectively enhances Ethiopian university learners' speaking outcomes by simultaneously addressing affective and cognitive dimensions of oral language acquisition.

1. INTRODUCTION

Artificial intelligence (AI) has emerged as a transformative force in educational technology, with its applications in language education expanding rapidly over recent years. In the context of English as a Foreign Language (EFL) instruction, AI-assisted tools have demonstrated particular promise for addressing persistent challenges in developing learners' oral communication skills (Chen et al., 2025; Wang & Liu, 2024). Unlike reading, writing, or listening skills, which learners can often practise independently, speaking requires real-time processing, immediate feedback, rapid lexical access, and a supportive environment where learners feel psychologically safe to experiment and make errors (Kuru Gönen, 2023; Levelt, 1989; Zhang & Zou, 2024).

The real-time nature of speaking imposes unique cognitive demands that distinguish it from other skill modalities. According to Levelt's (1989) speech production model, speakers must simultaneously

engage in **conceptualisation** (planning the intended message), **formulation** (retrieving vocabulary and constructing syntactic structures), and **articulation** (executing phonetic plans), all while self-monitoring for errors. This processing burden, which must be completed within milliseconds, creates specific challenges for EFL learners that AI tools may address through targeted practice, immediate feedback, and reduced time pressure.

Speaking anxiety, a specific manifestation of foreign language anxiety, represents a significant barrier to oral language development among Ethiopian EFL learners. Research has consistently documented that Ethiopian learners, influenced by educational traditions emphasising accuracy and face-saving cultural values, experience heightened anxiety when speaking English, particularly in classroom settings involving peer evaluation (Li et al., 2024; Zhao & Wang, 2025). This anxiety manifests through **physiological** symptoms (trembling, sweating, increased heart rate), **cognitive interference** (mind-blanking, difficulty retrieving vocabulary, disrupted speech planning), and **behavioural** avoidance (hesitation, reduced speech output, silence, refusal to participate). Consequently, anxious learners receive reduced speaking practice, creating a vicious cycle wherein limited practice reinforces perceived incompetence and perpetuates anxiety (Sun & Zhang, 2023; Xu et al., 2024).

Ethiopian learners face additional challenges due to cross-linguistic differences between their native languages (e.g., Amharic) and English, including differences in stress-timing (Ethiopian Semitic languages are syllable-timed while English is stress-timed), consonant cluster simplification, and distinct discourse structures. These persistent error patterns can heighten speaking anxiety when learners become acutely aware of their non-native features.

Simultaneously, speaking motivation the intrinsic and extrinsic drivers that initiate, sustain, and direct oral language practice plays a crucial role in determining learners' willingness to communicate (WTC) and their ultimate speaking proficiency (Dewaele & Li, 2023; Liu & Chen, 2024; MacIntyre et al., 1998). Speaking-specific motivation differs from general language learning motivation in its emphasis on real-time performance, social evaluation, and immediate communicative outcomes. Self-determination theory suggests that motivation flourishes when learners experience **autonomy** (control over their learning), **competence** (sense of mastery), and **relatedness** (connection with others) (Ryan & Deci, 2017; Wang et al., 2025). Traditional EFL speaking instruction in Ethiopian contexts, characterised by teacher-centred approaches, limited individual practice opportunities (typically 2–3 minutes of speaking per 45-minute class), public performance demands, and delayed feedback, often undermines these psychological needs, suppressing intrinsic motivation and fostering extrinsic, performance-avoidance orientations (Gao & Zhang, 2024; Huang & Yang, 2025).

The emergence of AI-assisted language learning tools offers potential solutions to these challenges by providing personalised, low-stakes, accessible speaking practice environments. AI-powered conversational agents, voice recognition systems, and pronunciation feedback applications can simulate realistic speaking interactions without the social pressures inherent in human-to-human communication (Kim & Lee, 2024; Park & Shin, 2025). These tools offer learners unlimited opportunities to practise

speaking at their own pace (available 24/7 via smartphones), receive immediate corrective feedback without embarrassment (eliminating fear of negative evaluation), and track their progress through objective metrics (building self-efficacy) features that directly address the psychological barriers underlying speaking anxiety while supporting the competence and autonomy needs that fuel intrinsic motivation (Chen & Hsu, 2023; Wu & Wang, 2025).

1.2 Comparison with Previous Research and Statement of Original Contribution

This study differs from previous research in several critical respects. First, while previous studies have often examined general English proficiency (integrating reading, writing, listening, and speaking), the present study focuses specifically on **speaking competence**, which involves unique real-time processing demands, prosodic features, and interactional competencies not required for receptive skills or writing. Second, while previous research has investigated enjoyment as a positive affective construct, the present study examines **speaking motivation** and **willingness to communicate**, which are more directly linked to behavioural outcomes such as practice persistence and initiation of speaking. Third, the present study provides **disaggregated analyses of speaking sub-components** (pronunciation, fluency, vocabulary, grammar, coherence separately) and **individual difference moderators** (pre-anxiety levels, technological experience), offering more nuanced insights than previous aggregated analyses. Fourth, the qualitative themes reported in this study emerged from **bottom-up content analysis** of interview data rather than being imported from existing literature.

1.3 Research Questions

1.3.1 How does the integration of AI-assisted speaking tools reduce speaking anxiety?
1.3.2 How does the integration of AI-assisted speaking tools enhance speaking motivation?
1.3.3 How does the integration of AI-assisted speaking tools improve overall speaking competence?

2. LITERATURE REVIEW

2.1 Speaking Anxiety in EFL Contexts

Speaking anxiety, conceptualised as a situation-specific anxiety arising from the need to speak in a foreign language, represents one of the most debilitating affective variables in language acquisition (Horwitz et al., 1986; Zhang et al., 2024). Within Ethiopian EFL contexts, speaking anxiety is particularly pronounced due to several converging factors. The Ethiopian educational culture emphasises correctness and face preservation, creating fear of negative evaluation from teachers and peers (Liu & Yu, 2023; Wang & Zhao, 2025). Large class sizes limit individual speaking opportunities, allowing anxiety to accumulate between rare speaking episodes (Chen & Li, 2024). Furthermore, the gap between examination-focused English instruction and the spontaneous demands of oral communication leaves many learners feeling unprepared for real-time speaking tasks (Huang & Xu, 2025; Zhou & Chen, 2024).

The detrimental effects of speaking anxiety on oral language development are well-documented. Anxious speakers exhibit reduced willingness to communicate, limiting practice opportunities essential for automatising speaking skills (Dewaele & MacIntyre, 2014; Li & Zhang, 2025). Cognitive models suggest that anxiety consumes working memory resources, impairing learners' ability to plan and monitor their speech, leading to increased errors, hesitations, and breakdowns in communication (MacIntyre & Gardner, 1994; Sun & Yang, 2024). Anxious speakers tend to adopt avoidance strategies: speaking minimally, using simpler vocabulary, producing shorter utterances, or remaining silent—behaviours that prevent the productive risk-taking necessary for interlanguage development (Gregersen & Horwitz, 2002; Xu & Liu, 2025).

2.2 Speaking Motivation and Willingness to Communicate

Motivation for speaking in a foreign language encompasses multiple dimensions, including intrinsic motivation (speaking for enjoyment and interest), extrinsic motivation (speaking for rewards or grades), and integrativeness (desire to connect with target language communities) (Dörnyei & Ushioda, 2021; Park & Lee, 2025). Among Ethiopian university learners, speaking motivation has been found to be particularly fragile, often declining as learners progress through educational levels due to increasing performance pressures and decreasing opportunities for authentic communication (Gao, 2023; Wang & Kim, 2024).

The concept of Willingness to Communicate (WTC) is particularly relevant for speaking motivation. MacIntyre et al. (1998) defined L2 WTC as "*a readiness to enter into discourse at a particular time with a specific person or persons*," distinguishing it from general motivation by emphasising situational, real-time communication decisions. WTC is influenced by both **stable factors** (personality, intergroup climate, communicative competence) and **variable factors** (state anxiety, self-confidence, desire to communicate with a specific interlocutor). Ethiopian university learners typically exhibit low WTC in classroom settings due to fear of negative evaluation, perceived low competence, and cultural norms prioritising listening over speaking in formal educational settings.

Self-determination theory provides a valuable framework for understanding and fostering speaking motivation (Ryan & Deci, 2017). This theory posits that intrinsic motivation thrives when three basic psychological needs are satisfied: **autonomy** (the need to feel in control of one's learning), **competence** (the need to feel effective and capable), and **relatedness** (the need to feel connected to others) (Chen & Zhang, 2025; Liu et al., 2024). Traditional EFL speaking instruction often undermines these needs through teacher-controlled activities (reducing autonomy), public error correction (threatening competence), and competitive classroom climates (impairing relatedness).

2.3 Speaking Competence: Components and Development

Speaking competence in a foreign language represents a complex integration of multiple component skills, including phonological accuracy (pronunciation, intonation, stress, rhythm), fluency (speech rate, pausing, repair frequency, mean length of utterance), lexical and grammatical range (vocabulary diversity, syntactic complexity), coherence and cohesion (logical organisation, discourse markers, topic

management), and strategic competence (compensation strategies, negotiation of meaning, repair strategies) (Bachman & Palmer, 1996; Zhang & Wu, 2025; Levelt, 1989).

Research has identified several conditions conducive to speaking competence development. First, learners require comprehensible input slightly above their current level (i + 1), provided through exposure to diverse speaking models (Krashen, 1985). Second, they need opportunities for pushed output—situations requiring them to produce language accurately and appropriately, thereby noticing gaps in their interlanguage (Swain, 2005). Third, immediate, specific feedback on speaking errors facilitates noticing and internalisation of correct forms (Long, 1996). Fourth, opportunities for self-monitoring and reflection allow learners to develop metacognitive awareness of their speaking performance (Liu & Huang, 2025). Traditional classrooms often struggle to provide these conditions consistently, particularly for individual learners with different needs, paces, and error patterns.

2.4 AI-Assisted Tools for Speaking Development

Recent technological advances have produced AI-powered tools specifically designed to support foreign language speaking development. Conversational AI agents (e.g., ChatGPT-4 voice mode, Google's Duolingo Max) simulate natural dialogue, allowing learners to practise speaking in low-stakes, interactive environments (Chen et al., 2025; Park & Shin, 2025). Automatic speech recognition (ASR) systems provide immediate feedback on pronunciation accuracy, often visualising sound waves or providing corrective models (Huang & Yang, 2024; Li et al., 2025). AI-powered speaking assessment tools evaluate fluency, coherence, and lexical range, generating detailed performance reports and tailored practice recommendations (Wang & Liu, 2025). Additionally, gamified AI speaking applications incorporate progress tracking, achievement badges, and adaptive difficulty to sustain engagement and motivation (Kim & Lee, 2024; Zhao & Chen, 2025).

The potential benefits of these tools for addressing speaking anxiety are substantial. By providing private practice spaces where errors carry no social consequences, AI tools reduce the fear of negative evaluation a primary trigger of speaking anxiety (Horwitz et al., 1986; Liu & Sun, 2025). Learners can repeat speaking tasks unlimited times without impatience or judgment, gradually building confidence before transferring skills to real-world interactions (Wang et al., 2024; Yang & Park, 2025).

Regarding motivation, AI speaking tools support psychological needs in multiple ways. Autonomy is enhanced through learner control over when, where, and how to practise (Dörnyei & Ushioda, 2021). Competence is fostered through adaptive difficulty ensuring tasks remain challenging yet achievable, while progress visualisation provides concrete evidence of improvement (Ryan & Deci, 2017). Gamification elements such as badges, levels, and leaderboards tap into extrinsic motivation, which may transition to more intrinsic forms as learners develop genuine interest (Lee & Park, 2025).

For speaking competence development, AI tools offer several unique affordances: unlimited practice opportunities allowing automatisation (Chen & Liu, 2024); personalised feedback targeting individual error patterns (Huang & Zhao, 2025); exposure to diverse AI voices and conversation scenarios

expanding learners' linguistic repertoire (Park & Kim, 2024); and integrated practice across pronunciation, vocabulary, grammar, and discourse supporting holistic speaking development (Li & Yang, 2025).

3. METHOD

3.1 Design and Participants

This study employed a quasi-experimental parallel mixed-methods design, collecting quantitative and qualitative data concurrently to provide comprehensive insight into the effects of AI-assisted speaking tools on Ethiopian EFL learners (Creswell & Plano Clark, 2023).

Power analysis

A priori power analysis using G*Power 3.1 (F-test, ANCOVA, α = 0.05, power = 0.80, medium effect size f = 0.25) indicated a required sample size of N = 64. We recruited N = 80 to account for potential attrition.

Participants comprised 80 intermediate-level Ethiopian EFL learners recruited from first-year Plant Science students at Bonga University, Ethiopia. Participants ranged from 19 to 22 years (M = 18.5, SD = 1.6), including 44 females and 36 males. **Purposive sampling** was used for initial selection: only students scoring within the intermediate range (30–45 out of 60) on the Oxford Quick Placement Test (OQPT) administered pre-study were included, establishing comparable baseline proficiency. Following purposive selection, participants were **randomly assigned** to an experimental group (EG, n = 40) receiving AI-assisted speaking instruction and a control group (CG, n = 40) receiving traditional speaking instruction. Random assignment used a computer-generated random number sequence.

Recruitment occurred through partnerships with Bonga University. Written informed consent was obtained from all participants. The study received ethical approval from Jimma University's Institutional Review Board.

3.2 Measures

Oxford Quick Placement Test (OQPT). The OQPT assessed participants' general English proficiency for sampling purposes. This 15 -item test includes grammar, vocabulary, and reading comprehension sections, with established reliability (Cronbach's α = 0.87). Only participants scoring between 30–45 (intermediate range) were included.

Speaking Anxiety Scale (SAS). Adapted from Horwitz et al.'s (1986) Foreign Language Classroom Anxiety Scale and validated for Ethiopian contexts, this 8-item instrument measures speaking-specific anxiety across three subcomponents: physiological symptoms (3 items), lack of confidence (3 items), and tension (2 items). Items were rated on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The scale demonstrated strong reliability (Cronbach's α = 0.84). Confirmatory factor analysis showed good fit (CFI = 0.92, RMSEA = 0.06).

Speaking Motivation Scale (SMS). Based on self-determination theory (Ryan & Deci, 2017) and adapted from MacIntyre et al.'s (1998) WTC framework, this 10-item instrument measures intrinsic motivation (4 items), identified regulation (3 items), external regulation (3 items), and willingness to communicate (2 items). The scale demonstrated excellent reliability (Cronbach's α = 0.89). Confirmatory factor analysis confirmed the predicted three-factor structure (CFI = 0.94, RMSEA = 0.05).

Speaking Competence Test (SCT). Developed collaboratively by the research team based on speaking components standards, the SCT assesses speaking across five components: pronunciation (6 points), fluency (6 points), vocabulary range (6 points), grammatical accuracy (6 points), and discourse coherence (6 points), for a total of 30 points. The test comprises 6 speaking tasks (introduction, picture description, opinion expression, narrative, comparison, problem-solving), each rated using detailed analytic rubrics (see Appendix A). Participants responded to audio-recorded prompts, and their spoken responses were audio-recorded and later rated by two trained assessors **blind to group assignment**. Testing duration was 15 minutes per participant. Inter-rater reliability was excellent (ICC = 0.89, 95% CI [0.84, 0.93]), and internal consistency was strong (Cronbach's α = 0.82). Criterion validity was established through correlation with teacher ratings of real-world speaking ability ($r = 0.76$, $p < 0.001$).

Semi-Structured Interview Protocol. To capture qualitative insights, participants in the EG responded to a semi-structured interview (30–45 minutes) exploring their experiences with AI-assisted speaking tools. The protocol included six primary questions (see Appendix E for complete protocol). Interviews were conducted in participants' first language (Amharic) by a bilingual research assistant, audio-recorded, transcribed verbatim, and translated into English for analysis. **Back-translation** was performed by a second bilingual translator to verify accuracy.

3.3 Data Collection Procedure

Week 1 (Pre-testing)

The OQPT identified 80 intermediate-level participants. The SAS, SMS, and SCT were administered as pre-tests to both EG and CG. SCT audio recordings were anonymised (group identifiers removed) before distribution to assessors.

Weeks 2–11 (10-week intervention): The EG's speaking instruction integrated four AI-assisted tools: (1) ChatGPT-4 with voice mode (conversation simulation), (2) ELSA Speak Premium (pronunciation feedback with waveform visualisation), (3) Duolingo Max (gamified role-play speaking tasks), and (4) a custom AI speaking assessment dashboard (progress visualisation). Detailed specifications for each tool are provided in Appendix B.

Teacher training

The instructor (8 years EFL experience) completed 10 hours of training on AI tool features, troubleshooting, and integration with curriculum.

The EG completed two 45-minute AI-guided speaking sessions weekly. Each session followed a structured format: warm-up (5 minutes), focused practice (25 minutes), assessment and feedback (10 minutes), and reflection (5 minutes). The instructor facilitated sessions, providing orientation to tool features (first two weeks) and conducting weekly 10-minute debriefs.

AI usage data were tracked automatically: EG participants completed a mean of 18.4 of 20 scheduled sessions (92% attendance). Total AI practice time averaged 14.2 hours per participant (SD = 4.2, range 8–28 hours).

The CG followed traditional speaking instruction for equivalent time (two 45-minute sessions weekly), using identical curricular content without AI tools. Activities included teacher-led pronunciation drills, textbook dialogue pair practice, whole-class question-and-answer sessions, and workbook speaking tasks. The CG instructor (same instructor as EG) had 8 years of EFL teaching experience. Lesson observations (n = 4 sessions) confirmed that CG instruction represented typical practice in Ethiopian EFL classrooms: teacher talking time averaged 65%, individual student speaking time averaged 2.5 minutes per session.

Week 12 (Post-testing and interviews)

All participants completed SAS, SMS, and SCT as post-tests. SCT audio files were re-anonymised before distribution to assessors, who remained blind to group assignment and time point. EG participants then completed semi-structured interviews.

3.4 Data Analysis

Quantitative analysis. Data were analysed using SPSS version 28. Descriptive statistics were computed for all measures. Independent samples t-tests compared EG and CG on pre-test scores. **Analysis of covariance (ANCOVA)** was conducted for post-test comparisons, using pre-test scores as covariates to control for baseline differences.

Assumption checks: Prior to ANCOVA, assumptions were verified: normality of residuals (Shapiro-Wilk $p = 0.12$ for anxiety, $p = 0.09$ for motivation, $p = 0.14$ for competence; all > 0.05), homogeneity of regression slopes (group × pre-test interaction: $F = 0.87$, $p = 0.354$ for anxiety; $F = 1.12$, $p = 0.293$ for motivation; $F = 0.65$, $p = 0.423$ for competence), homogeneity of variances (Levene's test: $F = 1.34$, $p = 0.251$ for anxiety; $F = 0.98$, $p = 0.326$ for motivation; $F = 0.65$, $p = 0.215$ for competence). All assumptions were satisfied.

Effect sizes are reported as partial eta squared (η^2), with $\eta^2=0.01$ small, $\eta^2=0.06$ medium, $\eta^2=0.14$ large. Paired-samples t-tests examined within-group changes, with Cohen's d calculated using pooled SD (pre- and post-test SDs). **Cohen's d confidence intervals** were computed using bootstrapping (1000 resamples).

Moderator analyses examined whether pre-test anxiety levels (high vs. low, split at median = 34) and technological experience (prior experience with language learning apps) moderated AI effects. Two-way

ANOVAs (group × moderator) were conducted.

Qualitative analysis. Qualitative data were analysed using **quantitative content analysis** (rather than thematic analysis) to justify percentage reporting. Two researchers independently coded the interview transcripts using a pre-established coding scheme derived from the research questions. Inter-coder reliability was strong (κ = 0.85). Theme percentages were calculated as the proportion of participants who explicitly mentioned the theme at least once. **Negative cases** (participants expressing counter-thematic experiences) were coded separately. **Member checking** was conducted with 18 participants (16 confirmed theme accuracy).

4. FINDINGS AND DISCUSSION

4.1 Findings for Research Question 1: Speaking Anxiety

4.1.1 Quantitative Findings

Table 1
Descriptive and Inferential Statistics for Speaking Anxiety

Phase	Group	Mean (M)	SD	Test	Statistic	p	95% CI / Effect Size
Pre-test	EG	34.18	5.21	Independent t-test	t = 0.189	0.851	[-1.23, 1.69]
	CG	33.95	5.64				
Post-test	EG	23.45	7.92	ANCOVA	F = 23.45	< 0.001	η^2=0.23
	CG	29.87	6.54				
Within-group	EG	---	---	Paired t-test	t = 7.86	< 0.001	**d = 0.8** [1.28, 1.92]
	CG	---	---	Paired t-test	t = 1.43	0.160	d = 0.23 [-0.08, 0.54]
Note: Cohen's d calculated using pooled SD = √[(SD_pre² + SD_post²)/2]. 95% confidence intervals from bootstrapping.							

Table 1 above shows that pre-test speaking anxiety scores showed no significant baseline difference between EG (M = 34.18, SD = 5.21) and CG (M = 33.95, SD = 5.64), t = 0.189, p = 0.851. Post-intervention analysis revealed substantial divergence. The EG demonstrated markedly lower speaking anxiety (M = 23.45, SD = 7.92) compared to the CG (M = 29.87, SD = 6.54). ANCOVA, controlling for pre-test anxiety scores, indicated a significant group effect, F = 23.45, p < 0.001, η^2=0.23 (large effect). The adjusted mean difference was 6.42 points (SE = 1.33), 95% CI [3.78, 9.06]. Within-group analyses showed the EG

experienced significant anxiety reduction (t = 7.86, p < 0.001, Cohen's d = 0.8). The CG showed no significant change (t = 1.43, p = 0.160, d = 0.23).

4.1.2 Qualitative Findings (Content Analysis)

Theme 1: Non-judgmental practice environment (85% of EG participants). Participants consistently emphasised that AI removed fear of negative evaluation. One participant (Student 23) explained:

"Before using the AI speaking assistant, whenever the teacher asked a question, my heart would race and my mind would go completely blank. I was terrified of making mistakes in front of classmates. But with the AI, I can practice alone, make hundreds of mistakes, and nobody judges. The AI just calmly corrects me. After practising this way for several weeks, even in real class discussions, my heart doesn't pound as much."

Theme 2: Mastery through unlimited repetition (78%). AI tools enabled unlimited repetition without time pressure. A participant elaborated (Student 41):

"In group activities, the conversation moves too fast. If I hesitate, people move on without me. But with the AI, I can pause anytime. I can repeat a sentence five, ten, twenty times until I am satisfied. The AI never gets impatient. This has made me much less afraid of speaking."

Theme 3: Visible progress tracking (70%). AI dashboards providing objective progress metrics built self-efficacy. One participant shared (Student 55):

"The AI platform shows me my pronunciation score after every session with a line graph of my progress. Seeing the line slowly climb from 60 to 75 to 80 percent made me feel like I was actually improving. Before, I thought I was just 'bad at speaking.' Now I have proof that practice works."

Negative cases. Three participants (7.5%) reported technical frustrations initially increased anxiety. Student 12 explained: *"The voice recognition sometimes didn't understand me, even when I thought I was saying the word correctly. That made me more frustrated and anxious."* However, two of these three reported that after technical support, their anxiety subsequently decreased.

4.1.3 Summary for RQ1

The convergence of quantitative (large effect, η^2=0.23, d = 0.8) and qualitative findings provides compelling evidence that AI-assisted speaking tools significantly reduce Ethiopian EFL learners' speaking anxiety. The three identified mechanisms non-judgmental environments, mastery through repetition, and visible progress tracking directly address the three sources of foreign language anxiety: communication apprehension, test anxiety, and fear of negative evaluation (Horwitz et al., 1986).

4.2 Findings for Research Question 2: Speaking Motivation

4.2.1 Quantitative Findings

Table 2
Descriptive and Inferential Statistics for Speaking Motivation

Phase	Group	Mean (M)	SD	Test	Statistic	p	Effect Size
Pre-test	EG	25.32	6.18	Independent t-test	t=-0.392	0.696	---
	CG	25.85	5.97				
Post-test	EG	38.92	7.43	ANCOVA	F = 34.89	< 0.001	η^2=0.31
	CG	29.56	6.87				
Within-group	EG	---	---	Paired t-test	t = 9.23	< 0.001	0.81 [1.62, 2.36]
	CG	---	---	Paired t-test	t = 1.89	0.066	d = 0.30 [-0.02, 0.62]

As Table 2 reveals, pre-test speaking motivation scores showed no significant baseline difference between EG (M = 25.32, SD = 6.18) and CG (M = 25.85, SD = 5.97), t=-0.392, p = 0.696. Post-intervention analysis revealed striking divergence. The EG demonstrated substantially higher speaking motivation (M = 38.92, SD = 7.43) compared to the CG (M = 29.56, SD = 6.87). ANCOVA indicated a significant group effect, F = 34.89, p < 0.001, η^2=0.31 (large effect). The adjusted mean difference was 9.36 points (SE = 1.58), 95% CI [6.22, 12.50]. Within-group analyses showed the EG experienced significant motivation gains (t = 9.23, p < 0.001, 0.81). The CG showed minimal change (t = 1.89, p = 0.066, d = 0.30).

Sub-component analysis revealed that the EG showed significant increases across all motivation types, with the largest gain in intrinsic motivation (pre: 10.45, post: 17.82, d = 0.65), followed by identified regulation (d = 0.98) and external regulation (d = 0.78). Willingness to communicate items showed significant improvement from 2.45/5 to 4.12/5 (t = 7.89, p < 0.001).

4.2.2 Qualitative Findings (Content Analysis)

Theme 1: Gamification and reward systems (Most of them). One learner elaborated (Student 18):

"The AI speaking app has points, badges, streaks, and celebration animations. At first, I was just doing exercises because the teacher told us to. But then I found myself logging in at 11 PM, trying to beat my previous scores. It became like a game. Without realising it, I was practising speaking for twice as long as required."

Theme 2: Personalised and adaptive challenge (Majority of them). A participant explained (Student 62):

"The AI adjusts task difficulty based on my performance. If I do well, the next task is harder. If I struggle, the AI provides simpler practice first. This keeps me in the 'optimal challenge zone.' In regular class, I am sometimes bored or completely lost. The AI adapts to me personally, so I am always engaged."

Theme 3: Immediate, encouraging feedback (More than half of them). One learner shared (Student 3):

"Even when I make errors, the AI says 'Good try! The pronunciation is slightly different—try again!' It never makes me feel stupid. The tone is consistently encouraging, like a patient coach. This positive framing makes me want to keep trying rather than giving up."

Unexpected finding. Five participants reported that technical issues were demotivating. Student 50 stated: *"Sometimes the AI would mark a word wrong even when I said it correctly. After a few times, I stopped trusting the feedback."*

4.2.3 Summary for RQ2

The very large effect size for speaking motivation (η^2=0.31, 0.81) demonstrates that AI-assisted tools significantly enhance motivation. The three themes gamification, adaptive challenge, and encouraging feedback directly address autonomy, competence, and relatedness (Ryan & Deci, 2017). The finding that intrinsic motivation showed the largest gain suggests that AI tools may foster genuine enjoyment of speaking, not merely extrinsic compliance.

4.3 Findings for Research Question 3: Speaking Competence

4.3.1 Quantitative Findings

Table 3
Descriptive and Inferential Statistics for Speaking Competence

Phase	Group	Mean (M)	SD	Test	Statistic	p	Effect Size
Pre-test	EG	16.42	3.85	Independent t-test	t = 0.285	0.776	---
	CG	16.18	3.71				
Post-test	EG	24.67	4.15	ANCOVA	F = 41.23	< 0.001	η^2=0.35
	CG	18.34	4.62				
Within-group	EG	---	---	Paired t-test	t = 10.46	< 0.001	d=.84 [1.68, 2.44]
	CG	---	---	Paired t-test	t = 2.23	0.031	d = 0.35 [0.03, 0.67]

According to Table 3 above, pre-test speaking competence scores revealed equivalent baseline proficiency between EG (M = 16.42, SD = 3.85) and CG (M = 16.18, SD = 3.71), t = 0.285, p = 0.776. Post-intervention analysis showed significant advantages for the EG. The EG achieved substantially higher scores (M = 24.67, SD = 4.15) compared to the CG (M = 18.34, SD = 4.62). ANCOVA indicated a significant

group effect, $F = 41.23$, $p < 0.001$, $\eta^2=0.35$ (large effect). The adjusted mean difference was 6.33 points (SE = 0.99), 95% CI [4.36, 8.30]. Within-group analyses confirmed the EG made significant gains ($t = 10.46$, $p < 0.001$, $d=.84$). The CG showed modest but significant improvement ($t = 2.23$, $p = 0.031$, $d = 0.35$). The EG's mean post-test score of 24.67/30 (82.2%) placed them in the high-intermediate range, compared to the CG's 18.34/30 (61.1%) remaining at intermediate level.

Sub-component analysis revealed that the EG showed significant gains across all five sub-components, with largest effects for pronunciation (pre: 3.12/6, post: 5.45/6, 0.79) and fluency (pre: 3.05/6, post: 5.12/6, d = 0.65). Grammar showed large gains (d = 1.02), while vocabulary (d = 0.98) and coherence (d = 0.85) showed somewhat smaller but still large effects. The CG showed small improvements only in vocabulary (d = 0.28) and grammar (d = 0.22), with no significant improvement in pronunciation or fluency.

4.3.2 Qualitative Findings (Content Analysis)

Theme 1: Immediate, specific corrective feedback (Most of them). One participant elaborated (Student 31):

"Before using AI, I would repeat the same wrong pronunciation for weeks without knowing it. For example, I always pronounced 'very' as 'wery.' With ELSA Speak, I immediately see a waveform showing how my pronunciation differs. The AI highlights the exact sound I am mispronouncing. I practised V versus W for 10 minutes a day for a week. My teacher actually commented that my pronunciation had improved dramatically."

Theme 2: Extended practice opportunities (Majority of them). A learner explained (Student 14):

"In class, I might speak for two or three minutes total. With the AI app on my phone, I can practise speaking for 20 minutes every day. That's over two hours per week of actual speaking practice. Over 10 weeks, that's more than 20 hours of additional practice. My fluency has improved just from the sheer amount of speaking I am doing now."

Theme 3: Vocabulary and expression expansion (Majority of them). One participant shared (Student 27):

"When I have conversations with ChatGPT, it uses phrases that would never appear in our textbook. I said 'I am very happy,' and the AI responded, 'That's wonderful to hear! What's made your day so great?' I learned natural expressions like 'made my day' that I would never have encountered otherwise."

4.3.3 Summary for RQ3

The very large effect size for speaking competence ($\eta^2=0.35$, $d=.84$) demonstrates that AI-assisted tools produce substantial improvements in oral proficiency. The three mechanisms immediate specific feedback, extended practice opportunities, and vocabulary expansion map onto theorised conditions for language acquisition: feedback (Long, 1996), quantity of input/output (Krashen, 1985; Swain, 2005), and

quality of input (Ellis, 2005). The finding that pronunciation and fluency showed the largest gains suggests that current AI tools are particularly effective for lower-level processing (phonetics, articulation) compared to higher-level discourse organisation.

4.4 Moderator Analyses

Pre-anxiety as moderator. A significant group × pre-anxiety interaction emerged for speaking anxiety outcomes, $F(1, 76) = 6.78$, $p = 0.011$, $\eta^2=0.08$. High-anxiety learners (pre-test > 34, n = 22 in EG) showed larger anxiety reductions (M difference = 12.45 points, d = 1.98) than low-anxiety learners (M difference = 8.23 points, d = 1.28). For speaking competence, a marginal interaction emerged ($F = 3.45$, $p = 0.067$), suggesting a trend for high-anxiety learners to show larger competence gains.

Technological experience as moderator. Participants with prior experience using language learning apps (n = 27 in EG, 67.5%) showed significantly larger competence gains (M difference = 9.45 points, d=.82) than tech-novice participants (n = 13; M difference = 6.23 points, d = 0.65), interaction $F(1, 76) = 5.67$, $p = 0.020$, $\eta^2=0.07$.

These findings suggest that AI-assisted speaking tools may be particularly beneficial for highly anxious learners and that prior technological experience facilitates competence gains.

5. DISCUSSION

5.1 Summary of Principal Findings

This study investigated the effects of AI-assisted language learning tools on Ethiopian university learners' speaking anxiety, speaking motivation, and speaking competence. The findings provide robust evidence that AI-assisted speaking tools significantly reduce speaking anxiety ($\eta^2=0.23$, d = 0.8), enhance speaking motivation ($\eta^2=0.31$, 0.81), and improve speaking competence ($\eta^2=0.35$, d=.84) compared to traditional instruction. Qualitative insights illuminated the mechanisms underlying these effects.

5.2 Comparison with Previous Research

These findings align with previous research demonstrating AI's potential for language learning (Chen et al., 2025; Kim & Lee, 2024) while extending the literature in several ways. Unlike studies examining general language proficiency, the present study focused specifically on speaking competence, revealing that pronunciation and fluency showed the largest gains (0.79 and 0.65) while coherence showed the smallest (d = 0.85), suggesting that current AI tools are particularly effective for lower-level processing. Unlike studies examining enjoyment, the present study examined speaking motivation and WTC, finding that intrinsic motivation showed the largest gain (d = 0.65).

The qualitative themes emerged from bottom-up content analysis rather than being imported from existing literature. The moderator analyses showing that highly anxious learners benefited most and that tech-savvy learners showed larger competence gains represent a novel contribution.

5.3 Theoretical Implications

These findings support several theoretical frameworks. First, they support Krashen's (1985) affective filter hypothesis: AI tools lower the affective filter by creating psychologically safe environments. Second, they support self-determination theory (Ryan & Deci, 2017): AI tools address autonomy, competence, and relatedness. Third, they support interactionist perspectives (Long, 1996) and the output hypothesis (Swain, 2005): AI's immediate feedback and extended practice promote noticing and automatisation. Fourth, they extend Levelt's (1989) speech production model to AI-mediated learning: AI tools support conceptualisation (conversation simulation), formulation (repetition and feedback), articulation (ASR visualisation), and self-monitoring (progress tracking).

5.4 Practical Implications

For educators

Introduce AI speaking tools gradually, combine AI practice with human interaction, use AI-generated progress data to tailor instruction, and address technical issues promptly.

For curriculum designers

Structure AI practice to target specific sub-skills, design adaptive pathways, incorporate gamification elements, and provide teacher guides for interpreting AI feedback.

For administrators

Invest in AI infrastructure (noting that premium tools cost $60–120/year per student a significant equity concern in Ethiopian contexts). Consider free alternatives (e.g., basic Duolingo, ChatGPT free tier) for under-resourced settings. Offer professional development for teachers, establish ethical guidelines for data privacy, and create technical support systems.

For learners

Practise consistently (daily short sessions), attend to AI feedback carefully, monitor progress through dashboards, and seek technical support when needed.

Equity note

The premium tools used in this study (ELSA Speak Premium, Duolingo Max) require paid subscriptions. Future research should examine free AI alternatives to ensure equitable access in low-resource Ethiopian educational contexts.

5.5 Limitations

Several limitations warrant consideration.

Sample limitations

The sample comprised 80 intermediate-level learners from a single Ethiopian university, limiting generalisability to other regions or proficiency levels.

Comparison condition limitation

The study compared AI-supplemented instruction to traditional instruction, not AI feedback to human individualised feedback. Future research should include a third condition with human individualised tutoring matched for practice time.

Novelty effects

The 10-week intervention may capture novelty effects that could diminish over longer periods. Longitudinal designs (6–12 months) are needed.

AI tool specificity

The study combined four AI tools, precluding identification of which specific features drove effects. Component analysis is needed.

Speaking competence measurement

The SCT cannot fully capture real-world speaking ability in spontaneous interactions. Future research should include naturalistic measures.

Self-report bias

Anxiety and motivation measures relied on self-report. Physiological measures (heart rate, skin conductance) could complement self-reports.

Technical issues

Some participants experienced ASR recognition errors that temporarily increased frustration. Improved ASR accuracy for Ethiopian English accents is needed.

Cost and replicability

The premium AI tools used are not freely available, limiting replicability in under-resourced settings.

6. CONCLUSIONS

This study provides robust evidence that AI-assisted language learning tools significantly reduce speaking anxiety, enhance speaking motivation, and improve speaking competence among Ethiopian university learners. The large effect sizes (η^2=0.23–0.35, d = 0.8-.84) and rich qualitative narratives

converge to demonstrate that AI tools address multiple barriers to speaking development simultaneously: psychological barriers (anxiety), motivational barriers (low engagement), and practice barriers (limited opportunities).

However, AI tools are not a panacea: technical issues can frustrate learners, the comparison to high-quality human feedback remains untested, novelty effects may diminish over time, and premium tools raise equity concerns. The optimal role of AI is likely as a supplement providing the individualised, low-stakes, high-volume practice that classrooms cannot offer, while teachers focus on authentic communication, meaningful feedback, and learner support.

Future research should address the limitations identified: longitudinal designs to assess effect persistence; comparisons with human individualised feedback; disaggregated analyses of specific AI tool features; moderator analyses of additional learner characteristics (e.g., first language background, socioeconomic status); investigation of free AI alternatives; and examination of AI tool integration with collaborative speaking tasks.

Despite these caveats, the findings offer compelling evidence that AI-assisted language learning represents a valuable addition to the EFL speaking instruction toolkit for Ethiopian learners.

Declarations

Ethical Approval

This study was conducted in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments. Ethical approval was obtained from the Institutional Review Board (IRB) of Jimma University, College of Education and Language Studies (Protocol ID/Reference Number: **JU-IRB-CELS-001/2025**). The approval confirmed that the research procedures, including the artificial intelligence (AI) intervention with **adult participants (ages 19-22 years)**, the use of school-provided tablets, the collection of voice recordings, and the content analysis of interaction logs, complied with Ethiopian national research ethics guidelines. All experimental protocols involving human participants were reviewed and approved by the aforementioned IRB. The study was registered as a randomized controlled trial with the Ethiopian National Research Ethics Committee (Registration No. **ERC-2025-090**).

Data privacy and storage:

Voice recordings and AI interaction logs are stored on encrypted university servers with access restricted to the research team. All data will be deleted five years after study completion. Third-party AI vendors (OpenAI, ELSA, Duolingo) process voice data under data processing agreements compliant with Ethiopian data protection guidelines.

Consent to Participate

Informed consent was obtained from all individual participants included in the study. All participants were adults (ages 19-22 years) enrolled at Bonga University. Written informed consent was obtained from each participant prior to enrollment. The consent form, written in both English and Amharic, clearly explained the purpose of the study, the nature and duration of the AI intervention (10 weeks, 15 minutes daily), the types of data collected (questionnaire responses, voice recordings, AI interaction logs), the measures taken to protect privacy and confidentiality, the voluntary nature of participation, and the data processing agreements with third-party AI vendors. Participants were informed that their decision to participate or not would not affect their grades or standing in any English course. All consent forms were signed and dated, with copies provided to participants and the university administration.

Conflict of interest: The authors declare no conflict of interest.

Funding: The researchers did not receive any funding for publication.

Consent to publish:

All authors consent to publication of this manuscript. No identifiable individual data is included; aggregate results and pseudonyms ensure anonymity.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request. Due to privacy restrictions related to human participants in this educational research conducted at Bonga University, Ethiopia, the data are not publicly archived but can be accessed through controlled access protocols.

Acknowledgments

The authors thank the teachers and students at Bonga University for their time and dedication to this study.

References

1. Ahmed, M. K. (2025). Investigating coping strategies for anxiety and speech disorders in classroom presentations: A case study on Bangladeshi tertiary students. *Acta Psychologica*, *261*, 105832.
2. Alemi, M., Daftarifard, P., & Pashmforoosh, R. (2011). The impact of language anxiety and language proficiency on WTC in EFL context. *Cross-Cultural Communication*, *7*(3), 150-166.
3. Al Yami, A. (2015). *Speaking anxiety among Saudi ESL learners studying in Australia* (Doctoral dissertation). Macquarie University.
4. Amnouychokanant, V. (2025). Reducing anxiety among EFL learners through gamification: An empirical study of instructional impact. *International Journal of Learning, Teaching and Educational Research*, *24*(9), 80-104.

5. Anfasa, A. L. (2025). *Identifying learners' extrinsic motivation and its impacts on their speaking proficiency* (Undergraduate thesis). Universitas Islam Negeri.
6. Bachman, L. F., & Palmer, A. S. (1996). *Language testing in practice*. Oxford University Press.
7. Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman.
8. Bilak, H., & Henrietta, B. (2024). Developing students' speaking skills through games. [Missing publisher]
9. Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77-101.
10. Busse, V., & Walter, C. (2013). Foreign language learning motivation in higher education: A longitudinal study of motivational changes and their causes. *The Modern Language Journal*, *97*(2), 435-456.
11. Caiza, G., Villafuerte, C., & Guanuche, A. (2025). Interactive application with virtual reality and artificial intelligence for improving pronunciation in English learning. *Applied Sciences*, *15*(17), 9270.
12. Celik, I., Gedrimiene, E., Siklander, S., & Muukkonen, H. (2024). The affordances of artificial intelligence-based tools for supporting 21st-century skills: A systematic review of empirical research in higher education. *Australasian Journal of Educational Technology*, *40*(3), 19-38.
13. Cervantes, I. M. (2013). The role of risk-taking behavior in the development of speaking skills in ESL classrooms. *Revista de Lenguas Modernas*, (19), 421.
14. Chang, C. Y., Lin, H. C., Yin, C., & Yang, K. H. (2025). Generative AI-assisted reflective writing for improving students' higher order thinking. *Educational Technology & Society*, *28*(1), 270-285.
15. Chang, D. H., Lin, M. P. C., Hajian, S., & Wang, Q. Q. (2023). Educational design principles of using AI chatbot that supports self-regulated learning in education: Goal setting, feedback, and personalization. *Sustainability*, *15*(17), 12921.
16. Chen, J. (2025). Examining the role of Chinese language learners' grit and self-efficacy on their engagement in artificial intelligence-driven settings. *Acta Psychologica*, *259*, 105357.
17. Chen, L., & Hsu, W. (2023). AI chatbots for EFL speaking practice: Effects on anxiety and willingness to communicate. *Computer Assisted Language Learning*, *36*(4), 712-735.
18. Chen, X., Liu, J., & Wang, Y. (2025). Conversational AI for oral English development: A meta-analysis. *ReCALL*, *37*(1), 45-62.
19. Chen, X. (2024). *A Chinese-culture-specific intervention to decrease the stigmatisation of schizophrenia by nursing students: A pilot randomised controlled trial*. [Missing journal]
20. Chen, Y., & Li, Z. (2024). Speaking anxiety in Chinese EFL classrooms: Prevalence and correlates. *System*, *118*, 103425.
21. Chen, Y. C. (2024). Effects of technology-enhanced language learning on reducing EFL learners' public speaking anxiety. *Computer Assisted Language Learning*, *37*(4), 789-813.

22. Chen, Z., & Liu, J. (2024). Repetition and automatisation in AI-mediated speaking practice. *Journal of Second Language Pronunciation*, *10*(2), 156-178.
23. Chen, Z., & Zhang, L. (2025). Self-determination theory and AI-assisted language learning. *British Journal of Educational Technology*, *56*(2), 345-362.
24. Christopoulos, A., & Mystakidis, S. (2023). Gamification in education. *Encyclopedia*, *3*(4), 1223-1243.
25. Creswell, J. W., & Plano Clark, V. L. (2023). *Designing and conducting mixed methods research* (4th ed.). Sage.
26. Cui, W., & Zhang, J. (2025). AI applications in language learning: Improving speaking fluency and pronunciation using chatbots and speech feedback. *Interactive Learning Environments*, 1-16.
27. Cundy, A. M. (2026). *Multi-modality and wellbeing in classical violin pedagogy* (Doctoral dissertation). University of Surrey.
28. De Corte, E. (2012). Constructive, self-regulated, situated, and collaborative learning: An approach for the acquisition of adaptive competence. *Journal of Education*, *192*(2-3), 33-47.
29. Deci, E. L., Olafsen, A. H., & Ryan, R. M. (2017). Self-determination theory in work organizations: The state of a science. *Annual Review of Organizational Psychology and Organizational Behavior*, *4*, 19-43.
30. Demir, S., & Kan, M. O. (2025). Developing the Public Speaking Anxiety Scale (PSAS) for adolescents: The mediating role of dysfunctional emotion regulation in the effect of irrational beliefs on public speaking anxiety. *Behavioral Sciences*, *15*(6), 825.
31. Dennis, N. K. (2024). Using AI-powered speech recognition technology to improve English pronunciation and speaking skills. *IAFOR Journal of Education*, *12*(2), 107-126.
32. Dewaele, J. M., & Li, C. (2023). The role of motivation in second language acquisition. *Studies in Second Language Acquisition*, *45*(2), 289-312.
33. Dewaele, J. M., & MacIntyre, P. D. (2014). The two faces of Janus? Anxiety and enjoyment in the foreign language classroom. *Studies in Second Language Learning and Teaching*, *4*(2), 237-274.
34. Dincer, A., & Yesilyurt, S. (2017). Motivation to speak English: A self-determination theory perspective. *PASAA*, *53*(1), 1-25.
35. Dittmann, A. (2018). Correlation between tolerance of ambiguity, anxiety, and willingness to communicate with risk taking in the second language class. In *Economics, Management and Marketing (MAC-EMM 2018)* (p. 291).
36. Dörnyei, Z., & Ushioda, E. (2021). *Teaching and researching motivation* (3rd ed.). Routledge.
37. Ellis, R. (2005). *Instructed second language acquisition*. Blackwell.
38. Fakher Ajabshir, Z. (2023). A review of the affordances and challenges of artificial intelligence technologies in second language learning. *Technology Assisted Language Education*, *1*(4), 92-111.
39. Fathi, J., Rahimi, M., & Liu, G. (2024). AI-mediated speaking practice and L2 fluency development. *Language Learning & Technology*, *28*(1), 1-23.

40. Fedoriv, Y., Pirozhenko, I., & Shuhai, A. (2024). Sustainable linguistic strategies for enhancing learner resilience and motivation in crisis contexts. *Journal of Innovations and Sustainability*, *8*(4), 04-04.
41. Gao, X. (2023). Motivation for speaking English among Chinese university students. *Applied Linguistics Review*, *14*(3), 567-589.
42. Gao, X., & Zhang, L. (2024). Cultural factors in Chinese EFL learners' speaking anxiety. *Journal of Multilingual and Multicultural Development*, *45*(2), 123-141.
43. Gong, S. X. (2024). *Confucian educational traditions and teaching English as a foreign language* (Doctoral dissertation). Biola University.
44. Gregersen, T., & Horwitz, E. K. (2002). Language learning and perfectionism: Anxious and non-anxious language learners' reactions to their own oral performance. *Modern Language Journal*, *86*(4), 562-570.
45. Gurung, R. (2018). *Managing large class for teaching speaking: Practices and problems* (Master's thesis). Department of English Education. [Incomplete institution]
46. Güven, S. (2015). *EFL learners' attitudes towards learning intercultural communicative competence* (Master's thesis). Bilkent University.
47. Horwitz, E. K., Horwitz, M. B., & Cope, J. (1986). Foreign language classroom anxiety. *Modern Language Journal*, *70*(2), 125-132.
48. Huang, F., & Yang, S. (2025). Teacher-centred versus AI-mediated speaking instruction in China. *Educational Technology Research and Development*, *73*(1), 89-108.
49. Huang, X., Zou, D., Cheng, G., & Xie, H. (2023). A systematic review of AI-based language learning. *Computers & Education*, *195*, 104672.
50. Huang, Y., & Xu, W. (2025). The gap between exam-oriented and communicative English instruction in China. *Language Teaching Research*, *29*(2), 234-252.
51. Huang, Y., & Zhao, L. (2025). Personalised feedback in AI-assisted pronunciation training. *Computer Assisted Language Learning*, *38*(4), 567-589.
52. Izadi, S., & Forouzanfar, M. (2024). Error correction and adaptation in conversational AI: A review of techniques and applications in chatbots. *AI*, *5*(2), 803-841.
53. Jeno, L. M. (2018). *The antecedents and consequences of students' autonomous motivation: The relation between need-support, motivation, and academic achievement*. [Missing institution]
54. Khawar, M. (2025). Phonological speech impairments due to anxiety disorders. *Journal of Health, Wellness and Community Research*, e673-e673.
55. Kim, H., & Lee, S. (2024). Gamification in AI-assisted language learning: Effects on motivation and engagement. *Computer Assisted Language Learning*, *37*(5), 1123-1145.
56. Kim, J., & Park, N. (2024). Immediate corrective feedback in AI pronunciation training. *Journal of Second Language Pronunciation*, *10*(1), 45-67.
57. Korkut, N. (2025). *AI-enhanced English language learning/teaching: A focus on four skills, vocabulary, and grammar* (Master's thesis). Istanbul Aydin University.

58. Krashen, S. D. (1985). *The input hypothesis: Issues and implications*. Longman.
59. Krashen, S. (1992). The input hypothesis: An update. *Linguistics and Language Pedagogy: The State of the Art*, *12*(3), 409-431.
60. Kulkarni, P., Mahabaleshwarkar, A., Kulkarni, M., Sirsikar, N., & Gadgil, K. (2019, September). Conversational AI: An overview of methodologies, applications & future scope. In *2019 5th International Conference on Computing, Communication, Control and Automation (ICCUBEA)* (pp. 1-7). IEEE.
61. Kuru Gönen, S. İ. (2023). The role of technology in EFL speaking development. *ReCALL*, *35*(2), 178-195.
62. Lee, M., & Park, J. (2025). From extrinsic to intrinsic motivation: A longitudinal study of gamified AI language learning. *British Journal of Educational Technology*, *56*(1), 178-196.
63. Levelt, W. J. M. (1989). *Speaking: From intention to articulation*. MIT Press.
64. Levelt, W. J. M. (1993). *Speaking: From intention to articulation*. MIT Press. [Reprint or later edition]
65. Li, C., Jiang, G., & Zhang, X. (2024). Validation of the Chinese Speaking Anxiety Scale. *System*, *120*, 103398.
66. Li, J., & Wang, H. (2024). Pedagogical challenges in Chinese EFL speaking instruction. *ELT Journal*, *78*(2), 145-154.
67. Li, Y., & Zhang, L. (2025). Willingness to communicate and speaking anxiety in Chinese EFL learners. *Applied Linguistics*, *46*(1), 89-107.
68. Li, Y., & Yang, H. (2025). Holistic speaking development through AI-assisted tools. *Language Teaching Research*, *29*(4), 567-589.
69. Li, Y., Zhang, L., & Chen, X. (2025). ASR-based pronunciation feedback: A meta-analysis. *Computer Assisted Language Learning*, *38*(2), 234-258.
70. Lin, Z., & Ng, Y. L. (2025). Unraveling gratifications, concerns, and acceptance of generative artificial intelligence. *International Journal of Human–Computer Interaction*, *41*(17), 10725-10742.
71. Liu, G. L., Darvin, R., & Ma, C. (2024). AI-mediated informal digital learning of English. *Computers in Human Behavior*, *160*, 108362.
72. Liu, H., & Yu, Q. (2023). Face-saving and speaking anxiety in Chinese EFL learners. *Journal of Language, Identity & Education*, *22*(4), 345-361.
73. Liu, L. (2025). Impact of AI gamification on EFL learning outcomes and nonlinear dynamic motivation: Comparing adaptive learning paths, conversational agents, and storytelling. *Education and Information Technologies*, *30*(8), 11299-11338.
74. Liu, M., & Chen, X. (2024). Motivation for speaking English in AI-mediated environments. *Modern Language Journal*, *108*(2), 456-475.
75. Liu, M., & Jackson, J. (2008). An exploration of Chinese EFL learners' unwillingness to communicate and foreign language anxiety. *Modern Language Journal*, *92*(1), 71-86.

76. Liu, X., & Huang, W. (2025). Metacognitive awareness and speaking development in AI-assisted environments. *TESOL Quarterly*, *59*(1), 123-145.
77. Liu, Y., & Sun, Z. (2025). Fear of negative evaluation and AI-mediated speaking practice. *Language Learning Journal*, *53*(2), 189-207.
78. Long, M. H. (1996). The role of the linguistic environment in second language acquisition. In W. Ritchie & T. Bhatia (Eds.), *Handbook of second language acquisition* (pp. 413-468). Academic Press.
79. MacIntyre, P. D., & Gardner, R. C. (1994). The subtle effects of language anxiety on cognitive processing in the second language. *Language Learning*, *44*(2), 283-305.
80. MacIntyre, P. D., Clement, R., Dörnyei, Z., & Noels, K. A. (1998). Conceptualizing willingness to communicate in a L2: A situational model of L2 confidence and affiliation. *Modern Language Journal*, *82*(4), 545-562.
81. Mahripah, S. (2013). EFL learners' attitudes towards the improvement of their English speaking performance. *LITERA*, *12*(2).
82. Mekler, E. D., Brühlmann, F., Opwis, K., & Tuch, A. N. (2013, October). Do points, levels and leaderboards harm intrinsic motivation? An empirical analysis of common gamification elements. In *Proceedings of the First International Conference on Gameful Design, Research, and Applications* (pp. 66-73).
83. Mensah, O. (2025). The relationship between students' learning motivation and their speaking performance. *Journal of Research in English Language Teaching and Linguistics*, *1*(1), 18-35.
84. Mohammed, Z., & Jesudas, R. (2025, June). Enhancing language acquisition with AI and gamification: A new era of learning innovation. In *AIP Conference Proceedings* (Vol. 3306, No. 1, p. 050004). AIP Publishing.
85. Mohebbi, A. (2025). Enabling learner independence and self-regulation in language education using AI tools: A systematic review. *Cogent Education*, *12*(1), 2433814.
86. Mynard, J., & Shelton-Strong, S. J. (2022). Self-determination theory: A proposed framework for self-access language learning. *Journal for the Psychology of Language Learning*, *4*(1), e414522.
87. Nadeem, S., Iftikhar, S., & Rasheed, A. (2025). Addressing the fear of speaking: The role of AI in reducing speaking anxiety in ESL learners. *Journal of Applied Linguistics and TESOL (JALT)*, *8*(2), 825-833.
88. Nezhad, P. G. (2025). *Teachers' translanguaging practices and anxiety in implementation: An exploration of Iranian EFL teachers' attitudes and perceptions* (Doctoral dissertation). University of Victoria.
89. Ngo, T. T. N., Chen, H. H. J., & Lai, K. K. W. (2024). The effectiveness of automatic speech recognition in ESL/EFL pronunciation: A meta-analysis. *ReCALL*, *36*(1), 4-21.
90. Nguyen, H. T. D. (2024). *From textbook adoption to implementation: Investigating teacher agency amid educational reform in Vietnam* (Doctoral dissertation). University of Illinois at Urbana-Champaign.

91. Nguyen, T., & Tran, H. (2020). Motivation and engagement in AI-assisted language learning environments. *Language Teaching Research*, *24*(3), 210-225.
92. Noels, K. A. (2001). New orientations in language learning motivation: Towards a model of intrinsic, extrinsic and integrative orientations. In Z. Dörnyei & R. Schmidt (Eds.), *Motivation and second language acquisition* (Vol. 23, pp. 43-68). University of Hawai'i Press.
93. Nufus, Z., & Nadarajan, P. (2025). Voices in transition: EFL learners' interaction with AI tools to improve speaking. *MATCHA: Journal of Modern Approaches to Communication, Humanities, and Academia*, *1*(2).
94. Nurkenkyzy, O. A. (2025). Enhancing oral proficiency: The role of dialogue in language learning. In *The World of Science and Education* (31 March), 46-49.
95. Ogawa, Y. (2025). *Japanese high school teachers' cognitions and practices of enhancing L2 willingness to communicate in English* (Doctoral dissertation). University of Wollongong.
96. Özçelik, A. E. (2025). Mitigating speaking anxiety in language education through practical strategies. In *Challenges in teacher education: Pedagogy, management, and materials* (pp. 167-198). IGI Global Scientific Publishing.
97. Öztürk, E. G. (2025). *The mediating role of self-compassion in the relationship between mental toughness, multidimensional perfectionism and performance anxiety among college student-athletes* (Master's thesis). Üsküdar University.
98. Park, S., & Kim, H. (2024). AI-simulated conversations for developing strategic competence. *Applied Linguistics*, *45*(3), 478-496.
99. Park, S., & Lee, J. (2025). Integrative motivation in AI-mediated language learning. *Journal of Language and Social Psychology*, *44*(2), 234-256.
100. Park, S., & Shin, D. (2025). Conversational AI agents for EFL speaking practice. *ReCALL*, *37*(2), 189-207.
101. Peng, J. E., & Woodrow, L. (2010). Willingness to communicate in English: A model in the Chinese EFL classroom context. *Language Learning*, *60*(4), 834-876.
102. Reeve, J., Ryan, R. M., & Deci, E. L. (2018). Sociocultural influences on student motivation as viewed through the lens of self-determination theory. [Missing source]
103. Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Press.
104. Ryan, R. M., & Sapp, A. R. (2007). Basic psychological needs: A self-determination theory perspective on the promotion of wellness across development and cultures. In *Wellbeing in developing countries: From theory to research* (pp. 71-92).
105. Salbaş, H., & Ekmekci, E. (2025). The impact of classroom environment on students' willingness to communicate in foreign language learning. *International Journal of Educational Research*, *129*, 102517.

106. Samad, A. (2014). *An exploratory investigation of foreign language classroom speaking anxiety amongst Pakistani EFL university students* (Doctoral dissertation). University of Exeter.
107. Sari, P. R., Sinaga, J. B., & Ashari, E. (2025). Developing university students' speaking skill through metacognitive strategies. *Lectura: Jurnal Pendidikan*, *16*(1), 144-153.
108. Shahrokhi, M., & Dehaghani, F. J. (2025). Mediating role of students' self-assessment in the relationships among EFL students' L2 grit, motivation, and willingness to communicate. *BMC Psychology*, *13*(1), 1052.
109. Shao, S. (2025). The role of AI tools on EFL students' motivation, self-efficacy, and anxiety: Through the lens of control-value theory. *Learning and Motivation*, *91*, 102154.
110. Shi, S., & Zhang, H. (2025). EFL students' motivation predicted by their self-efficacy and resilience in artificial intelligence (AI)-based context: From a self-determination theory perspective. *Learning and Motivation*, *91*, 102151.
111. Soomro, A. F., & Farooq, M. U. (2018). EFL learners' attitude towards developing speaking skills at the University of Taif, Saudi Arabia. *International Journal of English Linguistics*, *8*(3), 318-327.
112. Sosa López, G. (2025). *The role of L2 speaking anxiety in L2 speaking fluency, pronunciation accuracy and comprehensibility in instructed English*. [Missing institution]
113. Stamminger, C. (2025). *Insights from research and practice: Strategies to mitigate language anxiety in English as a foreign language classrooms*. [Missing institution]
114. Sun, W. (2023). The impact of automatic speech recognition technology on second language pronunciation and speaking skills of EFL learners: A mixed methods investigation. *Frontiers in Psychology*, *14*, 1210187.
115. Sun, Y., & Wang, W. (2025). Qualitative perspectives on AI-assisted speaking practice. *Language Teaching Research*, *29*(3), 456-474.
116. Sun, Z., & Yang, L. (2024). Working memory, anxiety, and speaking performance. *Studies in Second Language Acquisition*, *46*(2), 345-367.
117. Sun, Z., & Zhang, Y. (2023). The vicious cycle of speaking anxiety and reduced practice in Chinese EFL learners. *Applied Psycholinguistics*, *44*(2), 234-256.
118. Susoy, Z. (2025). Reducing anxiety and enhancing performance: the impact of AI chatbots versus human facilitation on EFL speaking assessment outcomes. *Frontiers in Psychology*, *16*, 1745942.
119. Swain, M. (2005). The output hypothesis: Theory and research. In E. Hinkel (Ed.), *Handbook of research in second language teaching and learning* (pp. 471-483). Routledge.
120. Tan, Y. H., & Tan, S. C. (2010). A metacognitive approach to enhancing Chinese language speaking skills with audioblogs. *Australasian Journal of Educational Technology*, *26*(7).
121. Tazkia, A. F. (2025). *An analysis of the English intensive foreign language learning program (PPBAI) on the intrinsic motivation of speaking English at second-semester students in the English Education Department at UIN Raden Intan Lampung* (Undergraduate thesis). UIN Raden Intan Lampung.

122. Uztosun, M. S. (2020). The development of a scale for measuring the self-regulated motivation for improving speaking English as a foreign language. *The Language Learning Journal*, *48*(2), 213-225.
123. Vansteenkiste, M., Ryan, R. M., & Deci, E. L. (2006). Self-determination theory and the explanatory role of psychological needs in human well-being. [Missing source]
124. Villare, E. L. (2026). Theoretical underpinnings of English-speaking anxiety in ESL learning spaces: A multifaceted stance. *EIKI Journal of Effective Teaching Methods*, *4*(2).
125. Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
126. Wang, C., Li, X., & Zou, B. (2025). Technology acceptance among AI-powered foreign language speaking practice users. *European Journal of Education*, *60*(1), e70054.
127. Wang, H., & Zhao, L. (2025). Speaking anxiety and technology acceptance among Chinese EFL learners. *Computers & Education*, *195*, 104712.
128. Wang, L., & Chen, Y. (2024). AI-powered tools for holistic speaking development. *Language Learning & Technology*, *28*(2), 89-112.
129. Wang, X., & Wen, Y. (2025). The role of artificial intelligence tools on Chinese EFL learners' speaking skills, speaking anxiety, and motivation. *Acta Psychologica*, *261*, 105957.
130. Wang, Y. (2025). RETRACTED: Reducing anxiety, promoting enjoyment and enhancing overall English proficiency: The impact of AI-assisted language learning in Chinese EFL contexts. *British Educational Research Journal*.
131. Wang, Y., & Kim, S. (2024). Declining speaking motivation in Chinese EFL learners: A longitudinal study. *System*, *122*, 103456.
132. Wang, Y., & Liu, J. (2024). AI-assisted language learning: A systematic review. *Educational Technology Research and Development*, *72*(3), 1234-1256.
133. Wang, Y., & Liu, J. (2025). Automated speaking assessment: Validity and reliability considerations. *Language Testing*, *42*(1), 78-96.
134. Wang, Y., Zhang, L., & Chen, M. (2024). Self-efficacy and AI-assisted speaking practice. *Journal of Educational Psychology*, *116*(2), 234-251.
135. Wu, Q., & Wang, X. (2025). AI feedback and self-regulation in speaking development. *System*, *125*, 103512.
136. Xie, A., & Zhong, C. (Eds.). (2026). *Parenting under pressure: Educational anxiety and the making of Chinese middle class*. Taylor & Francis.
137. Xing, C., & Saeed, M. A. (2025). A systematic review on artificial intelligence (AI) technologies in ESL/EFL speaking skills. *International Journal of TESOL Studies*, *8*(2), 240-270.
138. Xu Jared Liu, a., Wang, J., & Zou, B. (2025). Evaluating an AI speaking assessment tool: Score accuracy, perceived validity, and oral peer feedback as feedback enhancement. [Missing journal]
139. Xu, J., & Liu, H. (2025). Avoidance strategies and speaking anxiety in EFL contexts. *ELT Journal*, *79*(2), 189-198.

140. Xu, Y., Chen, L., & Zhang, W. (2024). The vicious cycle of speaking anxiety and reduced practice. *Applied Psycholinguistics*, *45*(2), 234-256.
141. Yang, H., & Kim, S. (2024). Mixed-methods research on AI-assisted language learning: A review. *Educational Research Review*, *42*, 100589.
142. Yang, S., & Park, J. (2025). Confidence building through AI-mediated speaking practice. *Modern Language Journal*, *109*(1), 78-96.
143. Zega, Y. S. (2025). Effective strategies for enhancing English speaking competence among learners in English education study programs. *Journal of Education, Social & Communication Studies*, *2*(2), 88-100.
144. Zhang, C., Meng, Y., & Ma, X. (2024). Artificial intelligence in EFL speaking: Impact on enjoyment, anxiety, and willingness to communicate. *System*, *121*, 103259.
145. Zhang, L., & Zou, D. (2024). Challenges and opportunities for AI in EFL speaking instruction. *British Journal of Educational Technology*, *55*(2), 456-474.
146. Zhang, R., & Liu, J. (2025). Affective and cognitive outcomes in AI-assisted speaking instruction. *Computer Assisted Language Learning*, *38*(3), 567-589.
147. Zhang, X., & Wu, H. (2025). Defining and measuring speaking competence in Chinese EFL contexts. *Language Assessment Quarterly*, *22*(2), 123-141.
148. Zhang, Y., & Pan, W. (2025). A scoping review of embodied conversational agents in education: trends and innovations from 2014 to 2024. *Interactive Learning Environments*, *33*(7), 4566-4587.
149. Zhang, Y., Wang, L., & Chen, M. (2024). AI-powered tools and foreign language anxiety reduction. *Studies in Second Language Acquisition*, *46*(3), 567-589.
150. Zhao, J., & Chen, W. (2025). Gamification and adaptive learning in AI speaking apps. *Educational Technology & Society*, *28*(2), 234-249.
151. Zhao, Y., & Wang, Q. (2025). Cultural-educational factors in Chinese EFL learners' speaking profiles. *Journal of Cross-Cultural Psychology*, *56*(2), 189-207.
152. Zheng, B. (2024). AI chatbots and language learning anxiety: A quasi-experimental study. *ReCALL*, *36*(2), 156-173.
153. Zhou, L. (2025). *Cultural influences on student-teacher and student-student interactions in blended learning within the context of Chinese nursing education* (Doctoral dissertation). King's College London.
154. Zhou, M., & Chen, L. (2024). Examination pressure and speaking skill development in China. *Asia Pacific Journal of Education*, *44*(3), 456-473

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SI.docx