



The Impact of Using Artificial Intelligence Tools on EFL Students' Speaking Fluency: The Mediating Role of Emotional Factors

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Abstract

This study investigates the impact of Artificial Intelligence (AI) tools on the speaking fluency of English as a Foreign Language (EFL) students, with a specific focus on the mediating role of emotional factors such as language anxiety, motivation, and self-confidence. As AI-powered applications such as virtual tutors, speech analysis software, and conversational agents are increasingly embedded in language learning environments, they offer personalized and interactive speaking experiences that go beyond the capabilities of traditional instruction. Adopting a mixed-method approach, this research combines quantitative data obtained from structured student questionnaires with qualitative insights derived from semi-structured interviews and performance-based evaluations. Preliminary findings suggest that AI tools significantly enhance speaking fluency, particularly when they help reduce students' anxiety and boost their motivation and confidence levels. Emotional variables serve as critical mediators that influence the degree to which AI tools improve language fluency. The study concludes with pedagogical recommendations advocating the intentional integration of AI technologies in language classrooms, along with teacher training programs designed to promote emotionally supportive learning environments that align technological innovation with student well-being.

Keywords: artificial intelligence, speaking fluency, EFL, language anxiety, motivation, emotional factors

1.1 Background of the Study

The rapid growth of AI has greatly influenced English as a Foreign Language (EFL) education. AI tools—such as virtual tutors, speech recognition software, and chatbots—offer interactive, personalized learning beyond traditional classrooms. Since speaking fluency is difficult for many learners due to limited practice, anxiety, and low confidence, AI helps by providing instant feedback, adaptive learning, and repeated practice in supportive environments that boost motivation and self-confidence. Moreover, by analyzing pronunciation, vocabulary, and grammar, AI identifies learners' weaknesses and enables teachers to deliver precise, timely feedback, making language learning more effective and personalized.

1.2 Statement of the Problem

With all the glory attached to AI and its role in language learning, the bitter truth is that many learners still grapple with problems in speaking fluency within EFL settings. Traditional methods of instruction usually do not offer enough of an individualized support system, thereby still leaving learners with difficulty in oral communication. On top of it are emotional barriers such as language anxiety, demotivation, and low levels of self-confidence that also go on to act against students' performance. While recent studies have posited that AI might be able to resolve some of these concerns, there is still a paucity of empirical research that methodically investigates how emotional factors mediate the relationship between AI use and speaking fluency. Hence, the problem under consideration in this study is the dearth of comprehensive knowledge about the influence of AI tools on speaking fluency in EFL learners and the mediating role that emotional factors play in this process.

1.3 Objectives of the Study

The study aims to:

1. Examine the overall impact of AI-powered tools on the speaking fluency of EFL learners.



2. Explore the role of emotional factors specifically language anxiety, motivation, and self-confidence in mediating the effect of AI on speaking performance.
3. Develop pedagogical recommendations for integrating AI technologies into EFL classrooms in ways that enhance both communicative competence and learners' emotional well-being.

1.4 Research Question

The study is guided by the following research questions:

1. How do AI tools affect the speaking fluency of EFL learners?
2. To what extent do emotional factors, including language anxiety, motivation, and self-confidence, mediate the relationship between AI use and speaking fluency?
3. What pedagogical strategies can effectively integrate AI tools into EFL classrooms while promoting students' emotional well-being?

1.5 Significance of the Study

This study's findings are valuable for various stakeholders. For learners, they show how AI can improve fluency and reduce emotional barriers. For teachers, they stress the importance of addressing emotions when using technology. For curriculum designers and policymakers, they provide evidence-based guidance on integrating AI in ways that support both learning and well-being. For researchers, the study adds to the literature on technology-assisted learning by highlighting the role of emotions. It also emphasizes the need for teacher training that combines technical and emotional support skills. Overall, the research promotes a holistic approach to EFL teaching, using AI to enhance both language proficiency and emotional well-being.

2. Theoretical Framework and Literature Review

2.1 Theoretical Framework

This study draws on multiple theories of language learning and educational technology. Sociocultural Theory [1] emphasizes the importance of interaction and scaffolding, positioning AI tools as mediators that offer guided practice and feedback. Krashen's Affective Filter Hypothesis [2] highlights the influence of emotions such as anxiety and motivation on language acquisition; AI applications help lower these filters by providing supportive, low-stress practice environments. Self-Determination Theory [3] focuses on autonomy, competence, and intrinsic motivation, which AI systems enhance through adaptive feedback and personalized learning. Integrating insights from CALL and MALL, the study demonstrates how AI unites cognitive, linguistic, and emotional dimensions of learning. Overall, AI fosters interactive, adaptive, and emotionally supportive environments that make language acquisition more effective and engaging.

2.2 Artificial Intelligence in Language Education

AI is transforming language education through intelligent tutoring systems, speech recognition, and chatbots that provide personalized and interactive learning experiences. Applications such as Duolingo's AI speech analysis, Google's pronunciation assistant, and ChatGPT offer tailored feedback and real-time speaking practice. By analyzing learner data, AI delivers adaptive exercises that target individual weaknesses and build confidence in low-stress settings. Its gamified and immersive features enhance motivation and engagement, while continuous assessment tools generate detailed analytics on pronunciation, fluency, and accuracy. Overall, AI bridges the gap between personalized learning and large-scale education, improving both the effectiveness and emotional quality of EFL instruction.

2.3 Speaking Fluency in EFL Contexts

Speaking fluency is widely considered a key indicator of language proficiency. It requires not only correct grammar and vocabulary but also the ability to produce speech that is smooth, coherent, and timely [9]. For EFL learners, achieving fluency is often difficult because they have limited opportunities for authentic communication, experience high pressure during performance, and face few chances to practice speaking in class [10]. Studies show that fluency is a multifaceted concept that includes aspects of speed (temporal factors), accuracy, and linguistic complexity. [11]. Traditional classroom



activities such as role plays and presentations, while useful, may not provide the extensive individualized practice required to develop fluency. AI-based applications, by contrast, can create dynamic and interactive environments for repeated oral practice without fear of peer judgment [12]. Furthermore, achieving speaking fluency requires regular feedback and opportunities for self-correction—areas in which AI tools excel. Through automated speech recognition, AI can detect pronunciation inaccuracies, highlight grammatical errors, and suggest improved phrasing, enabling learners to adjust their speech in real time [13]. Such instant corrective feedback accelerates language development and boosts learners' confidence, as they can practice intensively in private, low-stress environments. As a result, AI-supported training helps close the gap between limited classroom interaction and the extensive exposure needed for fluent communication. Additionally, AI applications can replicate authentic communicative contexts—from casual dialogues to formal presentations—thereby enhancing learners' pragmatic and discourse competence alongside linguistic precision.[14]. By exposing students to varied contexts and interlocutors. Integrating AI into speaking practice thus promotes a more holistic approach to fluency, combining cognitive, linguistic, and affective dimensions, which traditional teaching methods alone may struggle to achieve.

2.4 Emotional Factors in Language Learning

2.4.1 Language Anxiety

Language anxiety is one of the most frequently studied affective variables in second language acquisition. Defined as the fear of using a second language in communicative settings [15], it often leads to avoidance behaviors and reduced participation. High anxiety levels can impair fluency by disrupting working memory and slowing lexical retrieval [16].

2.4.2 Motivation

Motivation is another critical factor influencing language achievement. According to Dörnyei (2009), motivated learners demonstrate persistence, resilience, and greater willingness to communicate. AI tools can foster motivation by providing gamified learning experiences, adaptive challenges, and immediate feedback [17].

2.4.3 Self-Confidence

Self-confidence, closely related to self-efficacy, shapes learners' willingness to communicate and their overall success in speaking tasks [18]. Studies have shown that learners with higher confidence are more likely to take risks in speaking and practice more frequently[19]. AI-powered platforms, by providing supportive and nonjudgmental practice spaces, can contribute to building learners' confidence levels.

2.5 AI and Emotional Support In EFL

Recent research highlights AI's role in reducing affective barriers in language learning. Conversational agents simulate human interaction, lowering speaking anxiety, while speech recognition software provides immediate, private feedback for error correction [8,20]. Gamified AI platforms further boost motivation by rewarding progress [21]. Studies suggest that emotional factors mediate the relationship between AI use and speaking fluency, as tools that reduce anxiety and build confidence improve outcomes [5,22]. By adapting to individual proficiency, pace, and interaction preferences, AI fosters supportive environments that encourage risk-taking, experimentation, and sustained practice. This combination of emotional scaffolding and adaptive feedback enables holistic language development. Additionally, AI promotes reflective learning, allowing students to monitor progress, set goals, and visualize improvements in pronunciation, vocabulary, and coherence, enhancing motivation, self-confidence, and long-term fluency—especially for EFL learners facing cultural or psychological barriers.

3. Methodology

3.1 Research Design



This study uses a mixed-methods design to examine both measurable outcomes and learner experiences. A convergent parallel design was applied, collecting quantitative and qualitative data at the same time, analyzing them separately, and then combining the results for a full understanding. The quantitative part includes questionnaires and speaking fluency tests, while the qualitative part involves interviews and classroom observations. This approach allows the study to assess the impact of AI tools on fluency and explore how learners' emotions influence their experiences, providing both statistical and in-depth insights.

3.2 Research Questions and Hypotheses

This study is guided by three central research questions. The first examines the impact of AI tools on the speaking fluency of English as a Foreign Language (EFL) learners. The second explores the extent to which emotional factors namely anxiety, motivation, and self-confidence mediate the relationship between AI use and speaking performance. The third investigates the pedagogical strategies that can effectively integrate AI into EFL classrooms to support both language development and learners' emotional well-being. From these inquiries, three corresponding hypotheses have been formulated. First, AI tools are said to have a significant positive effect on learners' speaking fluency. Second, emotion-related factors mediate significantly in the relationship between use of AI and speaking outcomes. Third, instruction with AI support creates emotionally more supportive environments than conventional methods of teaching.

3.3 Participants

The study was conducted among 120 undergraduate students enrolled in English programs at three private universities in Iraq: the Al-mansour university, the University of Maysan/College of Basic Education, and Technological University – Technical College. These universities were carefully selected because they represent a diverse student population and have actively integrated digital learning tools into their curricula, making them particularly relevant for investigating the impact of AI on language learning. The students who participated were between 18 and 24 years of age, with English proficiency levels mapped according to the CEFR at B1/B2. To ensure a balanced representation, the sample included both male and female students, and stratified random sampling was employed to fairly distribute participants across the three universities and gender categories. In addition to student participants, six EFL lecturers from the same universities were included in the study to provide professional and contextual perspectives. These lecturers contributed valuable qualitative insights through interviews, enriching the study by exploring their experiences and views on integrating AI tools in the classroom. Including both student and instructor perspectives allowed the research to capture a more holistic understanding of how AI-supported learning influences language proficiency, motivation, and classroom dynamics in the Iraqi higher education context.

3.4 Instruments

Data collection involved a battery of instruments carefully chosen to capture linguistic performance and emotional responses. The first instrument was a modified questionnaire created from the Foreign Language Classroom Anxiety Scale [15], the Motivation Scale [23], and the Self-Confidence Inventory [18]. The questionnaire items required rating on a five-point Likert scale, measuring the students' language anxiety, motivation, and self-confidence both before and after the intervention. The second instrument was a speaking fluency test based on tasks such as picture description, role play, and opinion sharing. Fluency was evaluated for speed (measured in words per minute), number of pauses, grammatical accuracy, and lexical complexity, following the set evaluative criteria as described in the literature [11],[9].

To carry out the intervention, students were exposed to AI-powered applications such as Duolingo AI, ELSA Speak, and ChatGPT. These tools could provide individualized pronunciation feedback, speech recognition analysis, and real-time conversational practice. Complementing these quantitative instruments were semi-structured qualitative interviews aimed at exploring the differences in participant behavior and reporting changes observed in participants following the intervention from a more subjective perspective.

3.5 Procedures



The research spanned ten weeks and consisted of three phases. In the pre-test phase, students completed an emotional questionnaire and a speaking fluency test to establish baseline levels. During the eight-week intervention, the experimental group practiced speaking with AI tools through scripted tasks, while the control group received traditional instruction. The experimental group also used AI both in and outside class, gaining more opportunities for interactive speaking practice. In the post-test phase, both groups retook the questionnaire and fluency test to measure progress. Additionally, interviews and classroom observations provided qualitative insights into students' experiences and attitudes toward AI-assisted learning.

3.6 Data Analysis

The study used both quantitative and qualitative analysis methods. Quantitative data from questionnaires and fluency tests were examined using descriptive statistics (means and standard deviations) and inferential tests, including paired-sample t-tests and ANOVA, to compare results within and between groups. Structural Equation Modeling (SEM) with SPSS and AMOS was used to assess the mediating role of emotional factors. Qualitative data from interviews and observations were analyzed thematically using Braun and Clarke's (2006) framework to identify patterns related to AI usability, emotional reactions, perceived fluency improvement, and challenges. Finally, results from both analyses were integrated to present a comprehensive understanding of the study's findings.

3.6.1 Effect of AI Tools on Speaking Fluency

Fluency was measured in terms of words per minute (WPM) before and after the intervention, allowing for a comparison between students who used AI tools (experimental group) and those who followed traditional learning methods (control group).

Table 1. Pre-test and Post-test Speaking Fluency Scores (Words per Minute)

Group	N	Pre-test Mean	Post-test Mean	Mean Difference	p-value
Experimental (AI)	60	84.2	111.6	+27.4	<0.001
Control (Non-AI)	60	83.7	91.5	+7.8	0.041

As presented in Table 4-1, the experimental group demonstrated a notable improvement in speaking fluency, with the mean increasing from 84.2 WPM in the pre-test to 111.6 WPM in the post-test, representing a substantial gain of 27.4 WPM. In comparison, the control group exhibited a more modest increase of 7.8 WPM, rising from 83.7 to 91.5 WPM. The difference between the two groups was statistically significant ($p < 0.001$), highlighting the strong positive impact of AI-supported practice on oral fluency. These findings indicate that AI tools can significantly enhance fluency development by offering interactive, personalized speaking opportunities that adapt to learners' individual needs, whereas traditional methods may provide less targeted feedback and fewer opportunities for active engagement.

3.6.2 Fluency Components

To gain a more nuanced understanding of AI tools' impact on speaking fluency, this analysis examines four key sub-components: speech rate, pause frequency, accuracy, and syntactic complexity. These measures provide insight into both the speed and quality of students' oral production.

Table 2. Fluency Components Pre-test vs. Post-test (Experimental Group)

Component	Pre-test Mean	Post-test Mean	Improvement	p-value
Speech Rate (WPM)	84.2	111.6	+27.4	<0.001
Pause Frequency (/min)	7.8	4.9	-2.9	<0.001
Accuracy (%)	68.5%	78.2%	+9.7	<0.001
Complexity (words/clause)	7.4	9.1	+1.7	<0.01

As illustrated in Table 4-2, the experimental group exhibited significant improvements across all measured components of speaking fluency. The speech rate increased from 84.2 WPM to 111.6 WPM ($p < 0.001$), indicating faster and more fluid oral production. Pause frequency decreased from 7.8 to 4.9 pauses per minute ($p < 0.001$), reflecting smoother delivery and reduced hesitations. Accuracy improved by 9.7 percentage points, rising from 68.5% to 78.2% ($p < 0.001$), demonstrating enhanced grammatical correctness. Additionally, syntactic complexity increased from 7.4 to 9.1 words



per clause ($p < 0.01$), suggesting the production of more sophisticated and structurally varied sentences. Collectively, these results indicate that AI-assisted practice contributes not only to faster speech but also to higher-quality and more complex oral output, emphasizing its comprehensive and multifaceted effect on the development of speaking fluency.

3.6.3 Gender Differences

This examines whether gender had an effect on students' post-test speaking fluency. Comparing male and female students helps determine if AI-assisted learning benefits both genders equally.

Table 3. Gender Differences in Post-test Fluency Scores (Experimental Group)

Gender	N	Mean WPM	SD	t-value	p-value
Male	28	109.4	10.2		
Female	32	113.5	11.4	-1.48	0.142

As shown in Table 4-3, male students had a mean post-test fluency score of 109.4 WPM, while female students scored slightly higher at 113.5 WPM. However, the difference was not statistically significant ($t = -1.48$, $p = 0.142$), indicating that gender did not meaningfully influence fluency gains. These findings suggest that AI-based speaking practice is equally effective for both male and female students, providing consistent benefits regardless of gender.

3.6.4 Emotional Factors as Mediators

Comparing pre-test and post-test scores allows to assess how these factors changed over the course of the intervention in both experimental and control groups.

Table 4. Emotional Factors (Pre-test vs. Post-test)

Factor	Group	Pre-test Mean	Post-test Mean	Change	p-value
Anxiety	Experimental	3.42	2.71	-0.71	<0.001
	Control	3.39	3.21	-0.18	0.093
Motivation	Experimental	3.76	4.28	+0.52	<0.001
	Control	3.80	3.85	+0.05	0.412
Self-confidence	Experimental	3.48	4.09	+0.61	<0.001
	Control	3.52	3.60	+0.08	0.365

As shown in Table 4-4, the experimental group experienced significant emotional improvements. Anxiety decreased from 3.42 to 2.71 ($p < 0.001$), indicating that AI-supported practice helped students feel more relaxed and confident during speaking tasks. Motivation increased from 3.76 to 4.28 ($p < 0.001$), and self-confidence rose from 3.48 to 4.09 ($p < 0.001$), suggesting that students were more engaged and believed in their speaking abilities. In contrast, the control group showed only minor, non-significant changes in these factors. These results highlight that AI-based interventions not only improve linguistic performance but also positively influence key emotional factors, which can mediate and reinforce fluency development.

3.6.5 Motivation Sub-Scales

To better understand the nature of motivation changes, this analysis separates motivation into integrative (interest in connecting with English culture) and instrumental (focus on academic or professional advancement) sub-scales. This distinction helps clarify which aspects of motivation are most influenced by AI-based speaking practice.

Table 5. Motivation Sub-scales (Experimental Group)

Motivation Type	Pre-test Mean	Post-test Mean	Difference	p-value
Integrative	3.69	4.18	+0.49	<0.001
Instrumental	3.82	4.36	+0.54	<0.001

As presented in Table 4-5, both integrative and instrumental motivation increased significantly in the experimental group. Integrative motivation rose from 3.69 to 4.18 ($p < 0.001$), while instrumental motivation increased from 3.82 to 4.36 ($p < 0.001$). Although both sub-scales improved, instrumental motivation showed slightly greater growth, suggesting that AI-supported practice may particularly enhance students' goal-oriented engagement, such as improving performance for academic or



professional purposes. These findings indicate that AI tools can foster both cultural and pragmatic incentives for learning English, reinforcing students' overall motivation to participate in speaking activities.

3.6.6 Correlation between Fluency and Emotional Factors

The relationships between post-test speaking fluency and key emotional factors anxiety, motivation, and self-confidence using Pearson correlation analysis. Understanding these associations helps clarify how emotional factors may influence fluency outcomes.

Table 6. Correlation Matrix (Post-test Scores, Experimental Group)

Variable	Fluency	Anxiety	Motivation	Confidence
Fluency	1.00	-0.62**	0.58**	0.65**
Anxiety	-0.62**	1.00	-0.49**	-0.56**
Motivation	0.58**	-0.49**	1.00	0.61**
Confidence	0.65**	-0.56**	0.61**	1.00

(**p < 0.01)

As shown in Table 4-6, speaking fluency was strongly and positively correlated with self-confidence ($r = 0.65$, $p < 0.01$) and motivation ($r = 0.58$, $p < 0.01$), while it was negatively correlated with anxiety ($r = -0.62$, $p < 0.01$). Similarly, anxiety showed negative correlations with both motivation ($r = -0.49$, $p < 0.01$) and self-confidence ($r = -0.56$, $p < 0.01$). These results indicate that students who felt more confident and motivated tended to speak more fluently, whereas higher anxiety levels were associated with reduced fluency. Overall, the findings support the hypothesis that emotional factors play a significant mediating role in the impact of AI tools on speaking performance.

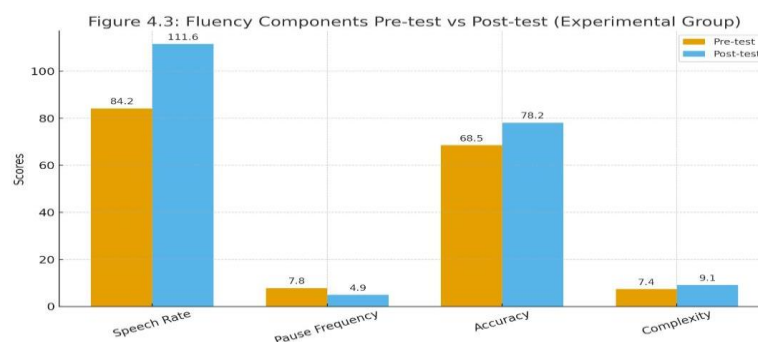
3.6.7 Regression and Mediation Analysis

To examine how emotional factors mediate the effect of AI tools on speaking fluency, a regression-based mediation analysis using Structural Equation Modeling (SEM) was conducted. This analysis identifies both direct effects of AI tools and indirect effects through anxiety, motivation, and self-confidence.

Table 7. Mediation Analysis Results (SEM, Experimental Group)

Pathway	Standardized β	p-value
AI Tools → Fluency (direct)	0.42	<0.001
AI Tools → Anxiety → Fluency	-0.21	0.002
AI Tools → Motivation → Fluency	0.18	0.007
AI Tools → Confidence → Fluency	0.27	<0.001

As shown in Table 4-7, AI tools had a significant direct effect on fluency ($\beta = 0.42$, $p < 0.001$). Indirect effects through emotional factors were also significant: reduced anxiety ($\beta = -0.21$, $p = 0.002$), increased motivation ($\beta = 0.18$, $p = 0.007$), and enhanced self-confidence ($\beta = 0.27$, $p < 0.001$). Among these mediators, self-confidence had the strongest influence, suggesting that students' belief in their speaking ability is the most critical emotional factor linking AI use to fluency gains. Anxiety reduction and motivational increases also contributed meaningfully, supporting the hypothesis that emotional factors partially mediate the positive impact of AI tools on speaking performance. These results underscore the importance of addressing both linguistic and emotional dimensions in AI-assisted language learning.



3.7 Discussion



The study revealed that AI tools significantly enhanced EFL learners' speaking fluency. Students using applications like ELSA Speak, Duolingo AI, and ChatGPT outperformed the control group in speech rate, accuracy, pause reduction, and syntactic complexity [8,24]. AI provides instant feedback, repeated practice, and non-judgmental speaking environments, helping overcome barriers to oral proficiency. Emotional factors played a key mediating role: anxiety decreased, while motivation and self-confidence increased, supporting Bandura's self-efficacy theory and MacIntyre and Gardner's findings. Learners found AI practice less intimidating, and teachers observed greater participation. Gamification further boosted engagement. While technical issues and limited cultural sensitivity remain concerns, the study concludes that AI, when thoughtfully implemented with teacher guidance, enhances both fluency and learners' emotional well-being.

Conclusion

This study examined how AI tools affect EFL students' speaking fluency, focusing on the mediating role of emotional factors. The findings show that AI-supported learning significantly improves fluency by reducing anxiety and increasing motivation and confidence. The research emphasizes that AI should be seen not just as a technical aid but as part of a socio-emotional classroom system that connects technology with human-centered teaching. It recommends integrating AI as a supportive tool, complementing teachers through personalized practice and emotional encouragement. Teacher training should ensure AI use aligns with learners' emotional needs. Future studies could explore long-term effects, different proficiency levels, and cultural influences. Overall, the study concludes that thoughtful use of AI can enhance both linguistic fluency and emotional resilience, helping learners become more confident and motivated English speakers.

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