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Effects of an AI Chatbot Mobile Application on Foreign Language Anxiety among Chinese EFL Undergraduates

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Abstract

Foreign language anxiety (FLA) is a major challenge in language learning, often unrelieved by traditional classroom approaches, especially in exam-oriented settings like China. Speaking a foreign language is particularly anxiety-inducing due to the need for spontaneous verbal communication and exposure to immediate judgment. AI chatbots offer low-stress, supportive spaces for speaking practice, but limited research exists on their effects on FLA, particularly in China. This study addressed this gap through a quasi-experimental design with 30 participants, divided into an experimental group using the AI chatbot Doubao and a control group engaging in student-to-student chat. FLA was measured at pretest, midtest, and posttest. Results showed a significant reduction in anxiety for the experimental group by midtest, with this effect persisting at posttest. These findings demonstrate that AI chatbots can reduce FLA through consistent, personalized interactions, offering valuable insights for integrating AI into EFL education. Teachers can use chatbots to create low-stress speaking environments, curriculum developers and policymakers can integrate AI tools into programs, and future research can focus on optimizing AI features to address diverse learner needs.

Keywords: Foreign Language Anxiety (Fla), AI Chatbot, Mobile-Assisted Language Learning (Mall)

Introduction

Foreign Language Anxiety (FLA) has been widely recognised as a critical factor that impedes the foreign language learning process (Yu, 2022). Over the past five decades, numerous studies have demonstrated that FLA adversely affects learners' cognitive processing (Donate, 2022), willingness to communicate (Khajavy, MacIntyre, & Barabadi, 2018), and overall language achievement (Horwitz, 2017; MacIntyre, 2017). Krashen (1982) identified FLA as an affective filter that prevents linguistic input from reaching learners' language acquisition zone, leading to phenomena such as "brain freeze" during communication. Despite its long-standing recognition, addressing FLA remains a persistent challenge, especially in

monolingual contexts like China, where authentic opportunities for English speaking practice are limited.

Traditional approaches to reducing FLA, such as task-based role play or encouraging learners to embrace mistakes, often yield mixed results (MacIntyre, 2017; Gregersen, 2020). These inconsistent outcomes stem from a failure to account for the dynamic and sociocultural nature of FLA, which fluctuates over time based on learners' interactions and experiences. Given the detrimental consequences of FLA, particularly in public speaking contexts (Horwitz, 2001; Bashori et al., 2022), there is an urgent need to identify effective strategies to address this issue. This is particularly important for Chinese undergraduate students, many of whom exhibit high FLA levels despite over six years of formal English education. The exam-oriented educational system in China places disproportionate emphasis on reading, writing, and listening skills (Butler, Lee, & Peng, 2022), resulting in limited oral practice and increased anxiety during spoken communication (Jin, Dewaele, & MacIntyre, 2021).

In the current mobile age, educational mobile technology is widely used by EFL students in classrooms, a practice known as mobile-assisted language learning (MALL) (Kukulska-Hulme, 2016). Numerous technology-based methods for reducing FLA have been explored. Mobile technology, with its evolving and expanding capabilities, enhances the classroom environment and can positively influence students' affective states, such as FLA (Kukulska-Hulme, 2019; Stockwell, 2022). Recent advancements in artificial intelligence (AI) have further expanded the capabilities of MALL by offering interactive and adaptive learning experiences (Kukulska-Hulme, 2024). Despite the growing integration of AI in language education, limited empirical research exists on its impact on learners' emotional states, particularly FLA.

In China, many undergraduates with at least six years of English learning experience and the ability to achieve high grades in English examinations suffer from high FLA level when they speaking English. China's exam-oriented educational system prioritises English reading, writing, and listening over speaking skills (Butler, Lee, & Peng, 2022), which results in limited oral practice and contributes to heightened FLA among Chinese undergraduates (Jin, Dewaele, & MacIntyre, 2021). However, with over 90% of Chinese undergraduate students regularly using smartphones and approximately 81% adopting mobile apps for learning (Zhang, 2021), mobile apps, particularly those leveraging advanced AI chatbot technology, present a promising avenue for addressing FLA.

This study addresses a significant gap in the literature by exploring the potential of AI chatbot applications to reduce FLA among Chinese EFL undergraduates. In this study, Doubao was selected as the free AI chatbot application to explore a new approach for addressing FLA. It provides a safe, relaxing, and comfortable chat environment that encourages users to express their thoughts, emotions, and feelings freely, promoting open communication in a low-pressure setting. Through its interactive virtual avatar, Doubao allows users to engage in text or video chats, creating a simulated conversational experience that supports emotional expression and helps alleviate anxiety. These features make Doubao particularly suitable for investigating its potential to alleviate FLA among Chinese EFL undergraduates, who often lack English-speaking environments. Additionally, considering the dynamic nature of FLA, the outcomes of this study offer valuable insights for educators and AI developers, and scholars by highlighting the role of AI chatbots in mitigating FLA overtime.

The significance of this study lies in its potential contributions to multiple stakeholders. For educators, the findings provide practical insights into integrating AI-powered tools to create supportive learning environments. For AI developers, the results highlight opportunities to further enhance chatbot features to meet learners' affective needs. For researchers, this study sheds light on the dynamic nature of FLA and the role of AI technology in mitigating its effects over time. By addressing these issues, the study responds to the growing demand for innovative solutions to reduce FLA and improve EFL speaking performance.This study focus on the following research question: what is the effect of AI chatbot (Doubao) application on foreign language anxiety (FLA) among Chinese EFL undergraduates between groups (experimental vs. control) and time (pretest, midtest, and posttest) on FLA?

Foreign Language Anxiety (FLA)

Foreign Language Anxiety (FLA) in language learning, as defined by Horwitz, Horwitz, and Cope (1986), encompasses self-perceptions, beliefs, emotions, and behaviors related to classroom language acquisition. This anxiety manifests as apprehension, nervousness, worry, and tension, triggering autonomic responses. FLA is a situation-specific form of anxiety distinct from general trait and state anxiety, uniquely arising within language learning contexts and particularly affecting skills such as speaking, listening, reading, and writing (Horwitz, 2001; MacIntyre, 2017; Shirvan & Taherian, 2021). Research consistently shows that FLA negatively impacts language performance and achievement (Horwitz et al., 1986; MacIntyre, 2017; MacIntyre & McGillivray, 2023), with speaking frequently identified as the most anxiety-provoking skill (Bashori et al., 2021).

To mitigate FLA, various approaches have been tested, such as community language learning (Horwitz et al., 1986) and reducing immediate error correction (Gregerson, 2020). However, these strategies have demonstrated limited effectiveness due to their lack of a solution-focused approach. As Jin, Dewaele, and MacIntyre (2021) noted, these strategies are often too time-consuming and complex for practical application in the classroom, highlighting the need for FLA reduction methods that integrate with real instructional contexts rather than merely focusing on reducing FLA. With advancements in mobile technology, mobile-assisted language learning (MALL) has increasingly shown potential for lowering anxiety levels. While substantial research has explored mobile tools to alleviate speech anxiety, there is a growing interest in using AI-powered mobile applications, specifically AI chatbots, to address FLA. AI chatbots, which simulate real-life conversations, offer learners a controlled, judgment-free environment that can help alleviate FLA. These AI chatbots provide real-time feedback and encourage language practice without the social pressures typical of traditional classrooms (Haristiani, 2019; Wang et al., 2024).

Artificial intelligence (AI) chatbot application

AI chatbots are technological tools designed to engage in conversation with users via audio and text, powered by artificial intelligence. As Pegrum (2019) explained, AI technology can be divided into two dimensions: narrow AI and general AI. General AI refers to an intelligence that can grasp and learn any intellectual task or behavior similar to human capability, representing the ideal goal of AI development and holding potential for a profound societal impact. However, as AI technology is still in its early stages, all current AI technologies fall under narrow AI (Chen et al., 2021), which refers to an intelligence that outperforms humans in specific, restricted fields, such as interactions with users (e.g., chatGPT and Doubao).

In education, narrow AI chatbots are used within specific learning and teaching settings to assist teachers and students in achieving effective learning experiences (Hwang et al., 2022). These chatbots enhance both interpersonal and intrapersonal interactions, performing tasks such as promptly responding to user inquiries, providing educational support, and guiding users through interactive dialogues. They offer conversational services in natural language, creating an authentic and comfortable learning environment that is particularly beneficial for foreign language classrooms (Jeon, 2024). Although much research on AI chatbots in language education has focused on their functionality and technical aspects, limited attention has been given to their emotional impact on learners. Despite the advantages, chatbots equipped with natural language processing and machine learning have the potential to provide users with a non-judgmental and comfortable learning environment continuously that fosters reduced anxiety and increased confidence in language practice. However, even the limited existing studies on the emotional effects of chatbots yield inconsistent findings, due to their neglect of the dynamic nature of FLA, which is shaped by contextual interactions over time (MacIntyre, 2017; Gregersen, 2020). FLA requires a dynamic approach to understanding (MacIntyre & Gregersen, 2012; Gregersen, 2020). Yet, most prior research has examined FLA in static settings, with limited exploration within dynamic systems resulting in mixed findings on this topic.

For example, in the study of Wang et al. (2024), demonstrated that using AI chatbots, such as D-ID Agent, could enhance EFL learners' willingness to communicate and self-perceived communicative competence, while reducing FLA compared to traditional classroom settings by creating a more immersive and supportive learning experience. This benefit stems from the AI chatbot's use of avatars to simulate face-to-face interactions, helping learners feel more comfortable and thus reducing FLA. Conversely, El Shazly (2021), in a case study, noted that while AI chatbots provided learners with flexible and interactive environments conducive to improving oral proficiency, they also observed a slight increase in learners' FLA. The author suggests that although AI shows promise in enhancing linguistic output, its effect on anxiety management may need further refinement to achieve consistent emotional support. Given the dynamic nature of FLA and the features of AI chatbot, this study aims to investigate the effects of AI chatbots on foreign language anxiety (FLA) over time.

Doubao AI chatbot

Doubao, the AI chatbot utilized in this study, allows learners to select a virtual conversational avatar that suits their preferences, such as the avatar’ s professional background, personality, and other traits. This AI chatbot support synchronous communication through texts and videos (Figure 1). It was selected not only for its popularity as a native Chinese AI chatbot but also for its free accessibility to registered users. Introduced by ByteDance in 2024, it is an advanced AI assistant designed to enrich user interactions through intelligent language processing and personalised content recommendations (Registration China, 2024). Doubao is focused on delivering meaningful dialogues and tailored information, making it a valuable tool for knowledge acquisition and problem-solving. With its automatic speech recognition, natural language processing and machine learning, Doubao engages in nuanced conversations, adapting to diverse linguistic contexts and user preferences. These features highlight Doubao’ s potential to provide efficient and accurate responses across various domains, including the alleviation of foreign language anxiety (FLA). By offering simulated conversations and targeted language support, Doubao fosters a familiar and supportive

English learning environment, providing learners with ample EFL speaking opportunities while helping to reduce their FLA. This chatbot enables natural dialogues, allowing users to practice both oral and written skills, thereby creating an immersive, context-rich experience that meets EFL learners' specific linguistic and emotional needs.

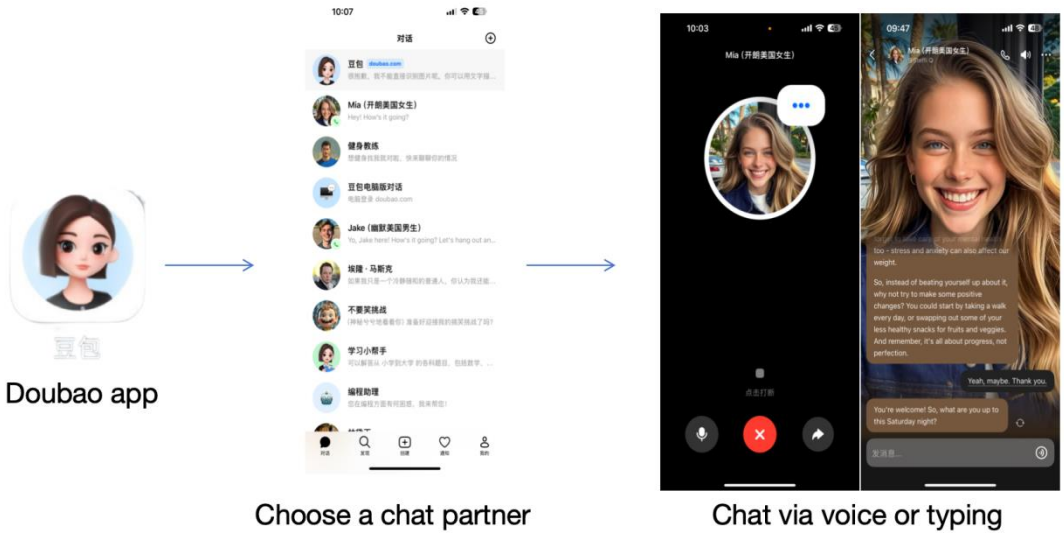

Figure 1: Screenshot of the Duobao app interface

Research Methodology

This study utilised a quasi-experimental approach, implementing a pretest, midtest and posttest control group design to examine the effects of an AI chatbot on foreign language anxiety (FLA) of Chinese undergraduate students. Conducted in the fall of 2023 at a public university in Jilin Province, China, the research took place in a second-tier institution where students, due to generally lower English proficiency levels, tend to experience higher levels of FLA compared to those in top-tier universities. Students at this university attend English classes twice a week for 90 minutes each session and allocate an additional 10-15 minutes to after-class tasks. Furthermore, each student owns at least one smartphone, a crucial part of their daily routines and learning activities, supported by the availability of free campus-wide Wi-Fi around the clock.

Participants

Two intact classes of first-year students, all non-English majors, were selected for participation in the study. Each class was instructed by a teacher with equivalent teaching experience. The study began only after obtaining the necessary institutional approvals, and students completed an electronic consent form prior to data collection. A pretest was administered to gauge the students' initial levels of foreign language anxiety (FLA). Following this, one class was randomly designated as the experimental group and the other was also randomly designated as the control group. The experimental group consisted of 15 students (13 females and 2 males), while the control group included 15 students (12 females and 3 males). All participants, aged between 18 and 20, were digital natives, reflecting their early exposure to and familiarity with digital technologies. Both groups received identical course materials to ensure consistency in class time.

Research Procedures

After the pretest in Week 1, the intervention commenced in week 2 of the fall 2023 semester and concluded in week 5, the midtest is in week 3 and the posttest is in week 5. The study was conducted within regular English classes for first-year non-English major undergraduates, dedicating 45 minutes per week to Spoken English Expression, in alignment with university guidelines. Both two groups had the same in-class teaching approach involved alternating weeks of vocabulary and grammar instruction with student presentations. The distinction between the experimental and control groups lay in the after-class assignments that is 10 minutes English speaking practice. The experimental group used an AI chatbot for their speaking practice, while the control group practiced in peer groups of 3–4 students on the same topics taught in class.

Research Instrument

Foreign Language Classroom Anxiety Scale (FLCA)

The data collection method consisted of the pretest, midtest and posttest results from the Foreign Language Classroom Anxiety Scale (FLCA), a self-report questionnaire developed by Horwitz et al. (1986) to measure Foreign Language Anxiety (FLA) as a situation-specific anxiety. This 33-item scale uses a 5-point Likert format, distinguishing FLA from general anxiety by assessing three types of anxiety: communication apprehension, test anxiety, and fear of evaluation. Scores on the FLCA range from 33 to 165, with higher scores indicating higher FLA levels. To determine a learner's FLA level, the total score is divided by 33. Horwitz et al. (1986) initially used the FLCA with 108 university students, reporting an internal reliability of $r = .93$ and a test-retest reliability of $r = .83$ ($p < .001$) after eight weeks. Since then, the FLCA has been widely used in research (Horwitz, 2001), including a study by Aida (1994), which reported a Cronbach's alpha coefficient of 0.94 based on data from 96 students, further confirming the high reliability of the scale. Additionally, the FLCA has been used to examine the correlation between FLA and learning outcomes, with numerous studies indicating a significant negative correlation between FLA and academic performance (Horwitz et al., 1986; MacIntyre, 2017; MacIntyre & McGillivray, 2023).

Data Analysis

This study employed SPSS 27 for all quantitative analyses, with the alpha level set at 0.05. Prior to addressing the primary research questions, an independent samples t-test was conducted on the pretest FLA scores between the experimental and control groups to confirm no initial differences in FLA levels. To answer the first research question, a two-way 2x3 mixed analysis of variance (ANOVA) was conducted to examine the main effect of the AI chatbot on FLA scores and to evaluate the interaction effect between treatment (experimental vs. control) and time (pretest, midtest, and posttest) on FLA scores, with treatment as the between-subjects factor and time as the within-subjects factor. Further analysis included pairwise comparisons across time with Bonferroni adjustment to control for multiple comparisons. Additionally, independent samples t-tests were conducted at each time point (pretest, midtest, and posttest) to compare the experimental and control groups, addressing the second research question.

Results

Before conducting the 2x3 mixed ANOVA to address the research question, the normality of the data was assessed using the Shapiro-Wilk test. The results indicated that the data were

normally distributed in the experimental group for the pretest, *W* (15) =.89, p= .06; midtest, *W* (15) = .89, *p* = .08; and posttest, *W* (15) = .97, *p* = .91. In the control group, the pretest showed *W* (15) = .93, *p* = .32; the midtest, *W* (15) =.91, *p* =.11; and the posttest, *W* (15) =.92, *p* =.19. Mauchly's test of sphericity indicated p = .85 > .05, suggesting that the data met the sphericity assumption, confirming equal variance of the differences between conditions. The descriptive statistics for the mean scores of FLA both in the experimental and control groups at each point of time (pretest, midtest, and posttest) are shown in Table 1. The results of the 2x3 mixed ANOVA indicated two main effects: treatment (F (1, 28) = 1347.51, *p* < .001, *ηp2* = .98) and time (F (2, 56) =25.58 , *p* < .001, *ηp2* = .48), both demonstrating large effects sizes. Additionally, there was a significant interaction effect between time and treatment (F (2, 56) = 256.37, *p* < .001, *ηp2* = .90) also indicating a large effect size (see Table 2).

Table 1
Means and standard deviations for FLA test scores in both two groups

	Pretest		Midtest		Posttest	
Group	M	SD	M	SD	M	SD
C	3.23	.14	3.77	.15	3.75	.12
E	3.26	.15	2.22	.17	2.25	.14

Table 2
Mixed ANOVA results for FLA scores

Source	df	Mean square	F	Sig.	Partial η2
Between-subjects					
Group	1	22.84	1347.51	< .001	.98
Error	28	.02			
Within-subjects					
Time	2	.61	25.58	< .001	.48
Time * Group	2	6.07	256.37	< .001	.90
Error	56	.024			

The research question investigates whether the AI chatbot (Doubao) application has a main effect on foreign language anxiety (FLA) among Chinese EFL undergraduates and whether there is a significant interaction effect between group (experimental vs. control) and time (pretest, midtest, and posttest) on FLA. The results of mixed ANOVA shows significant main effect of treatment (AI chatbot) and time on FLA, and there is a significant interaction effects between treatment and time on FLA. To confirm this outcome, pairwise comparisons with Bonferroni adjustment indicated that FLA scores significantly decreased from pretest to midtest, with a mean difference of 0.25 (*p* < .001), and from pretest to posttest, with a mean difference of 0.24 (*p* < .001). However, the difference between midtest and posttest was not significant, with a mean difference of -0.01 (*p* = 1.00). It means both treatment and time had a significant impact on reducing FLA, and the AI chatbot (Doubao) application was effective in lowering FLA levels among Chinese EFL undergraduates over time. The lack of a significant difference between midtest and posttest suggests that the reduction in FLA achieved by midtest was maintained through the end of the intervention, indicating that the AI chatbot was effective throughout the intervention period.

The research question also concerns whether the experimental and control groups differ significantly in foreign language anxiety (FLA) at each time point (pretest, midtest, and posttest). Follow-up independent t-tests at each time point. The results show no significant difference in FLA scores between the experimental group (*M*= 3.26 , *SD*= .15) and the control group (*M*= 3.23, *SD*= .14) in the pretest, *t* (28) = -.56 , *p*=.58. However, FLA scores were significantly lower in the experimental group (*M*= 2.22, *SD*= .17) compared to the control group (*M*= 3.77, *SD*= .15) in the midtest, *t* (28) = 26.69 , *p* < .001 , as well as in the posttest, where the experimental group (*M*= 2.25, *SD*= .14) also scored significantly lower than the control group (*M*= 3.75, *SD*= .12), *t* (28) = 31.73 , *p* < .001. It means that while both groups started with similar levels of FLA at the pretest, the experimental group experienced a significant reduction in FLA after using the AI chatbot (Doubao) application, as shown by the significantly lower FLA scores in the midtest and posttest compared to the control group. This suggests that the AI chatbot intervention was effective in reducing FLA among the experimental group throughout the intervention period, with this reduction evident at both the midtest and the posttest.

Discussion

The aim of this research was to investigate the effectiveness of an AI chatbot in reducing FLA among Chinese EFL undergraduates. The findings of this study revealed a significant main effect of the AI chatbot and time on FLA, along with a significant interaction effect between group and time. Additionally, follow-up independent samples t-tests indicated that the FLA levels in the experimental group were significantly lower than those in the control group at both the midtest and posttest, indicating that the intervention had a significant and lasting effect throughout the intervention period. Specifically, the findings indicated that experimental group experienced a significant decrease in FLA over time, while the control group showed an increase in FLA. The reason of the significant main effects of time and treatment on FLA echo MacIntyre's (2017) view that FLA is a complex emotion that fluctuates over time. Learners often dynamically generate affective responses in reaction to physical, cognitive, and social interactions at any given moment (Gregersen, MacIntyre, & Meza, 2014; Shirvan & Taherian, 2021), which support that the significant main effect of time and treatment (e.i. learning environments) in this study. Kruk (2021) reported that FLA is shown to fluctuate dynamically across different learning contexts, including virtual environments. His study demonstrates that FLA levels can vary significantly within and between sessions due to various factors, such as interactions with others and specific task demands overtime. This dynamic nature of FLA is consistent with findings from this study, where significant main effects of time on FLA were observed, suggesting that FLA are influenced by contextual changes and interactions over time.

Moreover, the significant interaction effect between time and treatment further indicates that the AI chatbot influenced FLA differently across time in the experimental group compared to the control group. The results of pairwise comparisons with Bonferroni adjustment further demonstrated the impact of the AI chatbot throughout the intervention period. This suggests that the reduction in FLA in the experimental group over time may be attributed to the AI chatbot intervention, which aligns with findings from previous research (Wang et al., 2024; Çakmak, 2022; Bao, 2019). Wang et al. (2024) conducted a mixed-methods study and found that students using a generative AI chatbot with a human avatar experienced a significant reduction in FLA after six-week period. The avatar enhanced engagement and

provided emotional support, helping students communicate more confidently in an immersive environment to reduce their FLA. These findings highlight the potential of AI chatbots to reduce FLA by fostering a supportive and engaging atmosphere, aligning with the results of this study. Çakmak (2022) found that using AI chatbots in L2 practice reduced anxiety and improved speaking performance, though some students faced challenges with full comprehension. Over twelve weeks, EFL students interacting with Replika showed enhanced speaking skills and felt more comfortable, particularly those anxious in traditional environments. This aligns with the present study's findings, highlighting the role of AI chatbots as supportive, non-judgmental partners in lowering FLA and promoting effective language learning environments.

In addition to exploring the effects of the intervention, the research question aims to determine whether there were significant differences in FLA between the experimental and control groups at each time point following the intervention. The significant reduction in FLA for the experimental group in the midtest compared to the control group indicates that the AI chatbot had a noticeable effect on reducing FLA during the intervention, as observed in the first research question. Additionally, the significant difference observed in the posttest suggests that this effect was maintained through the end of the intervention. This indicates that, while FLA may fluctuate, the AI chatbot intervention can help achieve a stable reduction over time. Previous studies with varying intervention durations in this topic, have consistently shown similar conclusions, further supporting these findings. Bao (2019) reported that an AI chatbot was shown to effectively reduce FLA over a four-week period. Participants who engaged in interactions with the chatbot reported decreased anxiety levels and a slight improvement in speaking skills, attributed to the AI's non-judgmental environment. Naseer et al. (2024) conducted an 8-week intervention study, which found that AI chatbots could effectively reduce FLA by providing a low-pressure environment. Participants showed a notable decrease in anxiety levels, as 78% reported reduced anxiety after the intervention. These different studies with varied intervention periods highlight the consistent effectiveness of AI chatbots in reducing FLA, regardless of the duration. They collectively support the findings of the present study, suggesting that AI chatbot interventions can create a sustained and stable reduction in language anxiety by providing supportive, low-pressure environments for learners.

Limitations

Within the context of this research, it is essential to acknowledge certain limitations that might impact the findings of this study. First, this study involved only a 3-week intervention, limiting its insight into long-term effects. Future research should include extended intervention periods and delayed posttests to examine the robustness and sustainability of FLA reduction over a longer duration. A longer intervention could provide a more comprehensive understanding of how consistent interactions with an AI chatbot affect FLA over time and whether the benefits observed in the short term persist in the long term. Second, there are only 30 participants in this study. Given the relatively small sample size and the specific identity combinations in this study, purposive sampling was considered appropriate due to the fact that this study utilized a quasi-experimental research design. This approach prioritizes obtaining a sufficient sample size to accurately measure the experimental effect rather than achieving perfect representativeness, which is critical for experimental research involving small intersectional identity groups. However, future studies

with larger and more diverse samples could enhance the generalizability of these findings and provide insights into how different demographics may experience FLA and respond to AI chatbot interventions. Last, this study used only one AI chatbot (Doubao). Given the rapid advancements in AI technology, it is essential to explore the effects of various AI chatbots on language learning outcomes. Different AI chatbots may incorporate diverse features, such as natural language processing, machine learning or synthesis technologies, each of which may uniquely impact FLA. Examining multiple chatbots would offer a broader understanding of which features are most effective in supporting language learners.

Conclusion

This study highlights the effectiveness of an AI-powered chatbot in reducing FLA among Chinese EFL undergraduates overtime. By offering a low-pressure, engaging environment, Doubao (an AI chatbot) facilitated a steady reduction in anxiety over a 3-week intervention period, with significant decreases in FLA observed in both the mid-test and post-test. This immediate reduction at both assessment points underscores the potential of AI chatbots to provide continuous support for anxious EFL learners over time through emotional support and personalized feedback from the avatar. The findings contribute to the growing evidence supporting AI chabot in mobile-assisted language learning context, demonstrating that AI chatbots can create personalized, emotionally supportive spaces conducive to reducing FLA. Furthermore, this study also offers practical implications for integrating AI chatbots into language instruction. First, AI chatbots can serve as powerful tools for personalized, immersive language practice, especially in contexts where students lack opportunities for target language speaking. Educators could apply chatbots like Doubao to supplement their formal instruction, providing a flexible space for language practice outside the classroom. Additionally, as AI technology continues to advance, AI developers may integrate additional features into chatbots, such as emotional recognition, which could provide enhanced support for students' emotional and educational needs. Finally, for scholars, future research could explore the long-term impact of AI chatbots on FLA (including delayed post-tests) and investigate the effects of different AI chatbots (e.g., ChatGPT) over time. Expanding their application to diverse demographic groups with varying educational and cultural backgrounds would further strengthen the robustness of the findings in this study.

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