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Enhancing English Speaking Motivation among Chinese University Students: The Role of Immediate Feedback in AI-Driven Chatbots

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Abstract

The rapid advancement of artificial intelligence (AI) technology has introduced innovative opportunities to university English speaking instruction. Its personalized and immediate feedback capabilities provide new avenues for enhancing students' learning motivation. However, traditional English speaking instruction faces limitations such as insufficient practice opportunities and delayed feedback, often resulting in low student motivation and suboptimal learning outcomes. While existing studies suggest that AI-driven Chatbots can boost learning motivation through immediate feedback, the specific mechanisms underlying this effect remain underexplored within the context of Chinese university English teaching. This study seeks to verify the effectiveness of AI-driven Chatbots in improving Chinese university students' English speaking learning motivation, with a focus on the role of the immediate feedback mechanism, and to propose teaching strategies informed by constructivist theory, while highlighting its theoretical and contextual significance. The research adopted a one-group pretest-posttest experimental design, involving 175 non-English major undergraduate students from Chinese universities (valid sample of 118). The AI-driven Chatbots "Doubao" was implemented over a two-week intervention period. Data were gathered via pre- and post-intervention motivation questionnaires and a post-intervention feedback perception questionnaire. Analytical approaches included paired sample t-tests, Spearman correlation analysis, and linear regression analysis to ensure robust and reliable findings. Findings revealed significant increases in students' intrinsic motivation (Cohen's $d = 0.45$) and extrinsic motivation (Cohen's $d = 0.41$) post-intervention ($p < 0.001$). Immediate feedback perception showed a significant positive correlation with both intrinsic motivation ($r = 0.602$, $p < 0.001$) and extrinsic motivation ($r = 0.531$, $p < 0.001$). Regression analysis further confirmed its predictive role in motivation enhancement (intrinsic motivation $R^2 = 0.237$, extrinsic motivation $R^2 = 0.178$). These results indicate that AI tools bolster students' sense of competence and autonomy through "scaffolding" support. The study recommends that educators incorporate AI tools into teaching practices, establish an "AI+peer" collaborative model, design contextualized speaking inquiry activities, and leverage AI feedback to foster reflective practice.

Keywords: AI-Driven Chatbots, English Speaking Learning Motivation, Immediate Feedback, Constructivism, Teaching Strategies

Introduction

With the rapid development of artificial intelligence (AI) technology, its application in education is profoundly changing language learning approaches. AI-driven Chatbots, with their convenience, personalization, and immediate feedback functions, offer new possibilities for improving students' speaking abilities and learning experiences. English speaking, as a core skill for academic communication and career development, occupies an important position in foreign language teaching in Chinese universities. However, traditional classroom teaching is limited by time, faculty resources, and feedback efficiency, resulting in students generally facing insufficient speaking practice opportunities, making it difficult to continuously stimulate and maintain their learning motivation. For example, Chapelle (2001) pointed out in research that due to limited resources in traditional language classrooms, students lack sufficient speaking practice opportunities, which directly affects learning outcomes. Besides, insufficient faculty resources and delayed feedback in Chinese university English speaking instruction weaken students' learning motivation. Therefore, how to effectively enhance university students' English speaking learning motivation has become a key issue in language education that urgently needs to be addressed.

In Second Language Acquisition (SLA) research, motivation is considered an important factor driving learning success. Gardner (1985) pointed out that learning motivation is closely related to learners' effort level and attitude, while Deci and Ryan's (1985) SDT emphasizes the positive role of intrinsic motivation in learning persistence. Dörnyei's (2001) research also shows that learners with higher motivation levels demonstrate greater persistence in language learning. However, in traditional English speaking instruction (Chen & Goh, 2011; Seraj et al., 2021), feedback is often delayed and insufficient, making it difficult for students to discover problems or perceive progress through timely guidance. This lack of feedback easily weakens learners' sense of achievement and interest, making motivation difficult to maintain. Addressing this challenge, the immediate feedback mechanism of AI-driven Chatbots provides an effective solution. For instance, by correcting pronunciation and grammatical errors in real-time, AI tools not only help learners improve skills quickly but also they may enhance their learning confidence, laying a foundation for continuous motivation stimulation.

In recent years, research on AI technology applications in language learning has gradually increased. Moybeka et al. (2023) pointed out that EFL classrooms using AI tools can significantly increase students' learning motivation, having positive effects in terms of immediate feedback, personalized instructional design, and self-efficacy enhancement. Similar findings include Kruk & Kałużna's (2024) research on English translation majors, showing that AI tools can significantly improve L2 learning students' learning enthusiasm and motivation; Yaseen et al. (2025) emphasize that personalized immediate feedback accelerates error correction and enhances learning interest and engagement through positive reinforcement. These studies consistently demonstrate the significant advantages of AI tools in improving language skills and learning experiences.

However, it is worth noting that existing research mostly focuses on the direct impact of AI tools on language skills (Yu & Trainin, 2021; Wei, 2023; Wu, 2024; Zhou & Hou, 2024), with few empirical studies exploring how the immediate feedback mechanism of AI tools specifically affects learning motivation improvement, especially in the unique context of Chinese university English speaking instruction. This research gap limits our comprehensive understanding of AI technology's role in motivation optimization and fails to provide targeted guidance for teaching practice. Therefore, this study will focus on the role of AI-driven Chatbots in promoting Chinese university students' English speaking learning motivation, with special attention to the contribution of the immediate feedback mechanism in this process, aiming to fill the aforementioned research gap and provide insights for EFL teaching practice. This study leverages Self-Determination Theory and Constructivism to explore how AI-driven immediate feedback addresses these gaps, offering both theoretical depth and practical relevance to Chinese EFL instruction."

This study proposes the following core questions:

1. Do AI-driven Chatbots significantly enhance Chinese university students' English speaking learning motivation?
2. What role does the immediate feedback mechanism play in motivation enhancement?
3. From a constructivist perspective, what practical implications do AI tools have for Chinese university English speaking instruction?

To answer these questions, this study employs a pretest-posttest experimental design combined with questionnaire surveys and quantitative analysis, selecting 175 non-English major students from Chinese universities as research subjects. Through a two-week intervention with AI-driven Chatbots, the study compares motivation changes before and after the intervention. Based on motivation theory and constructivist learning theory, the research will use empirical data to demonstrate whether AI tools can significantly enhance university students' English speaking learning motivation and analyze the role of the immediate feedback mechanism in this process. Based on this, practical implications for Chinese university English speaking instruction will be provided. The significance of this study lies in filling the empirical research gap regarding the relationship between AI technology and learning motivation, and providing data support and optimization suggestions for introducing AI technology into university English speaking instruction.

Literature Review

Challenges in Chinese University EFL Teaching and the Potential of AI Applications

In Chinese university EFL teaching, English speaking training faces many structural challenges. Chen (2024) considers large class teaching modes, insufficient teacher resources, and oral anxiety as major problems, resulting in slow development of students' speaking abilities and generally low learning motivation. Concurrent empirical research on the oral proficiency of university students in southern China proves that although 90% of teachers value the cultivation of students' oral expression abilities and their own development, due to reading and writing curriculum content focusing more on these skills, English speaking training in large classroom teaching is mainly supported by unit tasks and completed in group form, with limited practice opportunities and small student coverage. Apart from first-year students, the vast majority of non-English majors do not have specialized English listening and speaking courses, and there are few extracurricular English-speaking activities (Jiang, 2023).

Based on this predicament, research on technology-assisted language learning began early. In Chapelle's (2001) work, the author believed that technology-assisted teaching has important value in resource-scarce environments, able to compensate for the deficiencies of traditional teaching. With computer technology development to date, the large language models (represented by AI-driven Chatbots) now have received widespread attention from researchers (Song & Song, 2023; Taşçı & Tunaz, 2024; Dai & Liu, 2024). AI-driven Chatbots provide an innovative path to solving these problems by offering unlimited practice opportunities and immediate feedback. This low-cost and high-efficiency characteristic gives it broad application prospects in Chinese EFL teaching. For example, AI can help students conduct autonomous practice outside the classroom by simulating real dialogue scenarios, thus compensating for insufficient classroom time. To explore the specific application of AI tools in depth, this paper will use "Doubao" as an example to analyze its characteristics and advantages in EFL speaking learning.

Application of AI-driven Chatbots in EFL Learning and Characteristics of Doubao

In recent years, with the rapid development of artificial intelligence technology, the application of AI-driven Chatbots in English as a Foreign Language (EFL) learning has become increasingly significant. These tools provide personalized speaking practice opportunities and immediate feedback through speech recognition and natural language processing technologies, effectively addressing shortcomings in traditional classroom teaching such as limited practice time and delayed feedback (Chen & Goh, 2011; Seraj et al., 2021). In this context, similar to the internationally used large language model ChatGPT, Doubao, as a domestically developed Chinese large language model, has integrated English speaking practice functionality specifically designed for Chinese EFL learners. In this app, Doubao not only intelligently adjusts practice content based on learners' speaking levels but also helps improve learners' speaking fluency and confidence through real-time correction of pronunciation and grammar errors (Doubao, 2025). According to evaluations from app stores and forums, its oral dialogue design and interactive scenarios can stimulate EFL learners' interest in learning and enhance learner engagement.

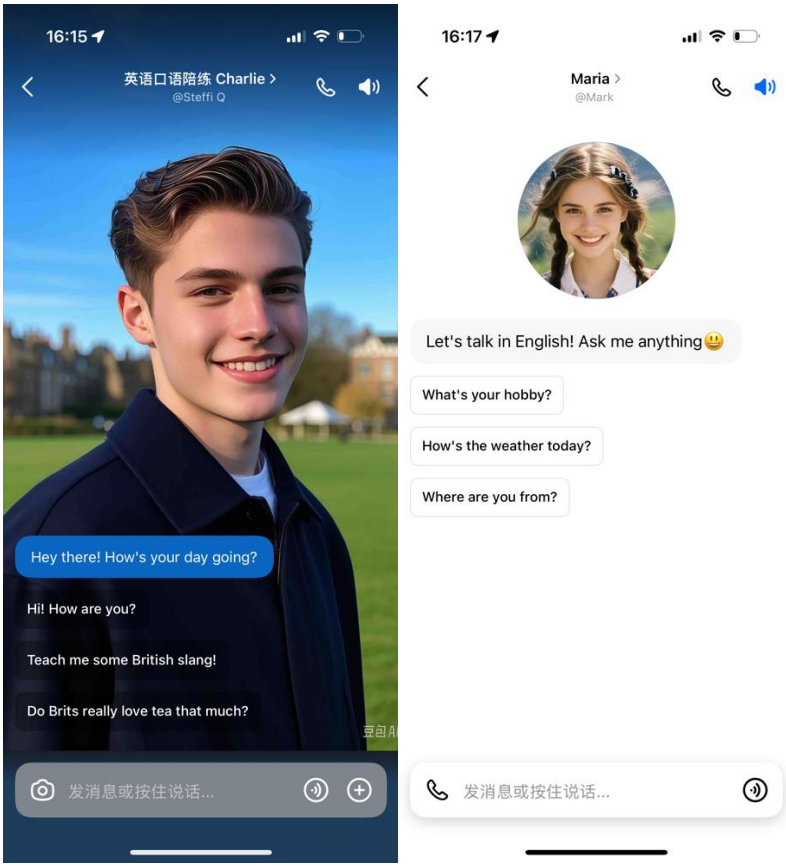

Figure 1 Doubao's English practice interface

The advantages of Doubao are reflected not only at the technical level but also in its targeted design for Chinese EFL learners. For example, its speaking practice scenarios cover daily life, academic communication, and professional situations, aligning with the actual needs of Chinese students. These characteristics make Doubao an ideal case study for researching the impact of AI tools on learning motivation. To further explore how AI tools enhance motivation through immediate feedback and personalized design, this paper will conduct an in-depth analysis combining SDT and immediate feedback theory.

The Role of Immediate Feedback in Language Learning

The importance of immediate feedback in language learning has been extensively studied and is considered one of the key mechanisms for enhancing learning outcomes. Hattie and Timperley (2007) believe that effective feedback should include three levels: **task level**, such as correcting pronunciation or grammar errors; **process level**, such as providing strategies for improving expression; and **self-regulation level**, such as cultivating learners' ability to solve problems independently. Through meta-analysis of numerous studies, they found that timely and specific feedback can significantly improve learners' performance, especially in the field of skill acquisition. Shute (2008) further points out that the immediacy of feedback is crucial for learners' motivation and confidence because it helps learners adjust quickly when errors occur, avoiding error fossilization. In English speaking learning, Li's (2010) meta-analysis research shows that immediate feedback correcting pronunciation and grammar can significantly improve learners' speaking fluency and confidence. For instance, when learners immediately learn about their pronunciation problems and receive improvement suggestions during dialogue practice, both their learning experience and motivation are enhanced.

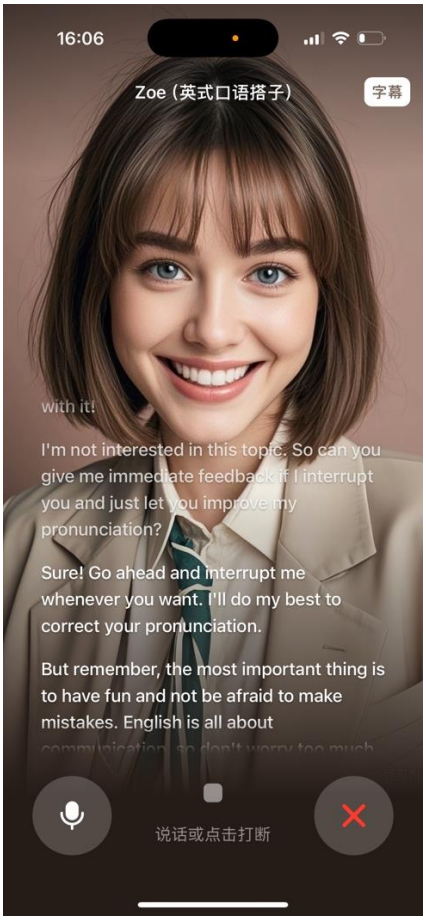

Figure 2 Doubao's corrective feedbacks

Therefore, the real-time error correction function of AI-driven Chatbots highly aligns with this theory, providing immediate personalized feedback through speech recognition and natural language processing technologies, thereby satisfying learners' need for competence. To theoretically explain this phenomenon, this paper will introduce Self-Determination Theory (SDT) to explore how AI feedback enhances motivation by meeting learners' psychological needs.

Theoretical Foundation of Learning Motivation and English Speaking Learning

Learning motivation is widely recognized as one of the key driving factors for successful language learning. Self-Determination Theory (SDT), as a core framework for studying motivation, proposed by Deci and Ryan in 1985, emphasizes that motivation is divided into two categories: **intrinsic motivation** and **extrinsic motivation** (Deci & Ryan, 1985). Intrinsic motivation stems from learners' interest and enjoyment in the activity itself, such as enjoying English speaking practice, while extrinsic motivation is driven by external factors, such as passing exams or obtaining career opportunities (Ryan & Deci, 2000). Dörnyei (2001) further points out that intrinsic motivation is particularly important in second language acquisition because it can prompt learners to actively engage and persist in learning, especially in skills like speaking that require long-term practice. Noels (2001) found in research that when learners receive positive feedback in oral interactions and feel their abilities improving, their intrinsic motivation is significantly enhanced. Additionally, research shows that the strength of learning motivation is closely related to learners' self-efficacy and sense of competence (Bandura, 1999). Based on these theories, combined with the characteristics of AI-driven

Chatbots, this paper believes that the dynamic support of AI tools can help learners build confidence in speaking practice, thereby stimulating stronger learning interest. To explain this mechanism more precisely and provide a theoretical basis for subsequent teaching suggestions, the constructivist perspective will be introduced next.

AI Feedback Mechanism from a Constructivist Perspective

Constructivist theory was first proposed by psychologist Jean Piaget in his cognitive psychology research, suggesting that learning is not passive reception of information but rather an active process of knowledge construction by learners (Waite-Stupiansky, 2022). This theory emphasizes that knowledge generation depends on learners' interaction with the environment. Building on this foundation, Vygotsky (1980) further developed constructivism in his classic work *Mind in Society*, proposing the concept of the "Zone of Proximal Development" (ZPD). ZPD refers to the dynamic area between learners' ability to complete tasks independently (actual development level) and their potential ability to complete tasks with appropriate external support (potential development level). Vygotsky (1980) believed that through "scaffolding," this external support, learners can cross the ZPD and achieve capability improvement. In the field of language learning, immediate feedback is viewed as a key form of "scaffolding" that can help learners gradually master complex skills in practice (Aljaafreh & Lantolf, 1994).

Based on this, combined with the research on AI-driven Chatbots discussed above, it can be inferred that AI-driven Chatbots provide dynamic "scaffolding" support through real-time pronunciation correction, demonstration provision, and personalized suggestions. When learners have inaccurate pronunciation during speaking practice, AI tools not only point out errors immediately but also play correct pronunciations and provide targeted suggestions. This mechanism enables learners to gradually improve their speaking abilities within the ZPD while enhancing their learning confidence. Therefore, this constructivist perspective provides theoretical support for the second research question of this study, which explores how the immediate feedback mechanism of AI-driven Chatbots enhances English speaking learning motivation among Chinese university EFL learners through "scaffolding" support.

The combination of constructivism and SDT further reveals the motivational effect of AI feedback: AI tools not only support skill acquisition through "scaffolding" but also enhance intrinsic motivation by strengthening learners' sense of competence and autonomy. However, existing research rarely systematically analyzes the mechanistic role of AI feedback on learning motivation from SDT and constructivist perspectives, especially lacking empirical exploration in Chinese university EFL teaching. This study aims to fill this gap by exploring its role in Chinese university EFL learning based on Doubao's feedback mechanism and providing insights for teaching practice. By integrating these frameworks, this study aims to advance the theoretical discourse on how technology-mediated feedback optimizes motivation in language learning.

Methodology

Research Design

This study employs a **one-group pretest-posttest experimental design** to systematically evaluate the role of the AI speaking practice tool "Doubao" in promoting English speaking learning motivation among Chinese university students, and to further explore the specific

contribution of the immediate feedback mechanism in this process. The motivation for choosing a one-group pretest-posttest design lies in its ability to effectively control individual differences (such as language ability, learning background) by measuring the same group before and after intervention, thereby enhancing the internal validity of the research (Campbell & Stanley, 2015). Compared to cross-sectional designs, pretest-posttest designs are more suitable for examining the causal effects of interventions, especially widely used in educational research to evaluate the effectiveness of teaching tools or methods (Shadish et al., 2002). In this study, a learning motivation questionnaire establishes a baseline level before intervention, and after intervention, repeated measurements are taken with the addition of an immediate feedback perception survey. This design not only captures motivation changes caused by the intervention but also directly evaluates the role of the feedback mechanism, highly aligning with the research objectives. To compensate for the limitation of lacking a control group in a single-group design, the post-test includes measurement of feedback perception to indirectly verify the source of intervention effects through students' subjective experiences.

Research Subjects

The research subjects are 175 non-English major undergraduate students from Chinese universities, aged between 18 and 25, with English proficiency at College English Test Band 4 (CET-4) level or equivalent. Sample selection employs **stratified random sampling**, drawing participants from different grade levels and gender groups of a university to ensure sample representativeness (Creswell & Creswell, 2017). The motivation for stratified sampling is to reduce sampling bias, enhance sample diversity in key variables (such as grade level, gender), thereby increasing the external validity of the research results. Participants volunteer for the study and confirm at the beginning of the experiment that they have not frequently used similar AI-driven Chatbots; this screening condition aims to reduce potential interference from prior experience on intervention effects (Cohen et al., 2017). Additionally, participants' demographic characteristics (such as age, gender, grade level) are recorded and used as control variables to ensure that changes in learning motivation are primarily attributable to the AI tool intervention rather than other external factors.

Research Tools

This study uses two main tools, all of which are designed based on educational theories and validated through pre-testing (40 participants in both pre-test and post-test questionnaire pre-testing) to ensure their reliability and validity.

- **AI-driven Chatbots**: "Doubao" is selected as the intervention tool due to its real-time pronunciation correction, grammar suggestions, and personalized practice functions, which can meet the needs of Chinese university students to improve their English-speaking abilities (Doubao, 2025). The motivation for choosing "Doubao" lies in its technical characteristics highly matching the core concepts of SDT, such as autonomy and competence (Deci & Ryan, 1985). According to SDT, learners' motivation significantly increases when their needs for autonomy and competence are met, and "Doubao's" personalized feedback and real-time interactive design precisely support this theoretical hypothesis.
- **Questionnaire Survey Tools**:
  - **Learning Motivation Questionnaire** (used in both pre-test and post-test): Designed based on SDT, using a 5-point Likert scale (1=strongly disagree, 5=strongly agree), including

intrinsic motivation (5 items, e.g., "I find learning English speaking interesting") and extrinsic motivation (5 items, e.g., "I learn English speaking for exams") dimensions, totaling 10 items. The theoretical basis for the questionnaire design is that SDT considers learning motivation to be driven by both intrinsic and extrinsic factors (Deci & Ryan, 1985). Pre-test results show Cronbach's α coefficients of 0.85 (intrinsic motivation) and 0.82 (extrinsic motivation), meeting educational research reliability standards (Field, 2018).

- **Immediate Feedback Perception Questionnaire** (used only in post-test): Contains 6 items (e.g., "AI's immediate feedback gives me more motivation to practice speaking"), using the same 5-point scale, assessing students' perceptions of "Doubao's" immediate feedback. The design motivation is based on Hattie and Timperley's (2007) feedback model, which emphasizes that immediate feedback can enhance learners' self-efficacy and motivation. The questionnaire's reliability is verified through pre-testing, with a Cronbach's α coefficient of 0.87.

Experimental Procedure

The experimental procedure is divided into three stages, totaling 15 days, as follows:

- **Pre-test Stage (Day 1)**: 175 participants fill out the learning motivation questionnaire in class by scanning a QR code, recording baseline motivation levels before intervention. The motivation for setting a pre-test is to establish a reference point for subsequent comparison of intervention effects (Shadish et al., 2002).
- **Intervention Stage (Days 2-14)**: Participants use "Doubao" for 25 minutes of English speaking practice daily, receiving immediate feedback. The daily duration of 25 minutes and two-week intervention cycle reference Kruk and Kałużna's (2024) research, who found that moderate intervention intensity is sufficient to induce measurable changes in learning motivation while avoiding learner fatigue from prolonged intervention. The daily practice frequency ensures intervention continuity, helping to consolidate the positive impact of feedback on motivation.
- **Post-test Stage (Day 15)**: Participants fill out the learning motivation questionnaire again and complete the immediate feedback perception questionnaire. The motivation for setting a post-test is to evaluate the overall effect of the intervention and directly explore the role of immediate feedback through the perception questionnaire.

Data Collection

Data is collected through an online questionnaire platform (Wenjuanxing), with all participants' identity information anonymized to protect privacy and comply with ethical requirements (Cohen et al., 2017). The research team reminds participants to complete questionnaires via WeChat before and after the intervention. Pre-testing was conducted before data collection to ensure the clarity and operability of the questionnaires; the motivation for this step is to enhance data quality and reduce measurement error (Creswell & Creswell, 2018). Since this study is a one-group pretest-posttest experimental design, whether subjects used "Doubao" for sufficient practice as required is key to data validity. Through on-site inquiry and data cleaning, a total of 118 valid questionnaires (67.4%) were collected.

Data Analysis

Data analysis employs quantitative methods, specifically:

- **Learning Motivation Change Analysis**: Using **paired sample t-tests** to compare learning motivation scores (intrinsic motivation and extrinsic motivation) before and after intervention, testing the significant impact of "Doubao" on motivation. The motivation for choosing t-tests lies in their applicability to comparing continuous variables in pretest-posttest designs, effectively evaluating intervention effects (Field, 2018).
- **Relationship Analysis between Immediate Feedback and Motivation**: Employing **Pearson correlation analysis** to explore the association between immediate feedback perception scores and learning motivation scores in the post-test. The motivation for choosing correlation analysis is its ability to reveal linear relationships between variables, providing empirical support for research question 2 (the role of feedback mechanism) (Cohen et al., 2017).
- **Statistical Tools**: Using SPSS 25.0 for analysis, with significance level set at $p < 0.05$ to ensure statistical reliability of results.

Research Ethics

- **Informed Consent**: Before the experiment, all participants sign informed consent forms, understanding the research objectives, process, and potential risks, and participating voluntarily.
- **Privacy Protection**: Participant information is anonymized, using numbers instead of names, and data is used only for research purposes.
- **Data Security**: All data is stored in an encrypted database, with original records deleted after the research concludes.
- **Non-maleficence Principle**: The experimental process does not cause any psychological or physiological harm to participants, who may withdraw from the research at any time.

Data Analysis and Results

This study employed a one-group pretest-posttest design to systematically evaluate the role of AI-driven Chatbots (Doubao) in promoting English speaking learning motivation among Chinese university students. The study collected valid data from 118 participants (N=118), who were non-English major undergraduate students from Chinese universities, aged between 18 and 25 (M=20.4, SD=1.6), with a gender distribution of 56 males (47.5%) and 62 females (52.5%). Participants' English proficiency all reached the College English Test Band 4 (CET-4) level or equivalent, with 85% passing CET-4 and 15% passing CET-6. Academic backgrounds covered science and engineering (40%), humanities and social sciences (35%), and economics and management (25%), ensuring sample diversity. Data analysis included paired sample t-tests, Spearman correlation analysis, and linear regression analysis, with results presented as follows.

Learning Motivation Change Analysis

To answer research question 1, "Do AI-driven Chatbots significantly enhance Chinese university students' English speaking learning motivation," this study used paired sample t-tests to compare changes in **intrinsic motivation** (Pretest Intrinsic Motivation, PIM vs. Posttest Intrinsic Motivation, PoIM) and **extrinsic motivation** (Pretest Extrinsic Motivation, PEM vs. Posttest Extrinsic Motivation, PoEM) before and after the intervention. The

motivation questionnaire used a 5-point Likert scale, with 5 items each for intrinsic and extrinsic motivation, taking the average score.

Table 1
Results of Paired Samples T-test

Motivation Dimension	Pretest (M ± SD)	Posttest (M ± SD)	Mean Difference	t-value	p-value	Cohen's d
Intrinsic Motivation (PIM vs. PoIM)	3.27 ± 0.89	3.82 ± 0.80	-0.55	-4.905	0.000**	0.452
Extrinsic Motivation (PEM vs. PoEM)	3.46 ± 0.73	3.85 ± 0.68	-0.39	-4.437	0.000**	0.409

Results show that post-intervention intrinsic motivation (PoIM, M=3.82, SD=0.80) was significantly higher than pre-test (PIM, M=3.27, SD=0.89), $t(117)=-4.905$, $p<0.001$; extrinsic motivation (PoEM, M=3.85, SD=0.68) was also significantly higher than pre-test (PEM, M=3.46, SD=0.73), $t(117)=-4.437$, $p<0.001$. Cohen's d effect sizes were 0.45 (intrinsic motivation) and 0.41 (extrinsic motivation), both reaching medium effects, indicating that AI-driven Chatbots significantly enhanced students' learning motivation.

Relationship between Immediate Feedback and Motivation

To answer research question 2, "What role does the immediate feedback mechanism play in motivation enhancement," this study first confirmed through the Jarque-Bera test that the data did not conform to normal distribution (IFP p=0.037, PoIM p=0.001, PoEM p=0.000), thus employing Spearman correlation analysis to assess the relationship between **immediate feedback perception** (IFP) and post-test motivation (PoIM and PoEM).

Table 2
Results of Spearman Correlation

Variables	Correlation Coefficient (r)	p-value	Sample Size (N)
IFP vs. PoIM	0.602**	0.000	118
IFP vs. PoEM	0.531**	0.000	118

Spearman correlation analysis shows that IFP has a strong positive correlation with post-test intrinsic motivation (PoIM) ($r=0.602$, $p<0.001$) and a significant positive correlation with post-test extrinsic motivation (PoEM) ($r=0.531$, $p<0.001$), indicating that immediate feedback perception is significantly correlated with learning motivation enhancement.

Predictive Effect of Immediate Feedback on Motivation Improvement

To quantify the predictive effect of IFP on motivation enhancement, this study constructed linear regression models with IFP as the independent variable and intrinsic motivation improvement (PoIM - PIM) and extrinsic motivation improvement (PoEM - PEM) as dependent variables, respectively.

Table 3
Summary of Linear Regression Results

Dependent Variable	B	SE	β	t-value	p-value	R^2	F (df)
Intrinsic Motivation Improvement (PoIM - PIM)	0.913	0.152	0.487	6.003	0.000**	0.237	36.041 (1, 116)
Extrinsic Motivation Improvement (PoEM - PEM)	0.621	0.124	0.422	5.016	0.000**	0.178	25.164 (1, 116)

Note: **p < 0.01

Regression analysis shows that IFP significantly predicts intrinsic motivation improvement (B=0.913, SE=0.152, β=0.487, t=6.003, p<0.001), with model explanatory power R^2=0.237; IFP also significantly predicts extrinsic motivation improvement (B=0.621, SE=0.124, β=0.422, t=5.016, p<0.001), with model explanatory power R^2=0.178. Results indicate that IFP has a stronger predictive effect on intrinsic motivation improvement.

Teaching Implications from a Constructivist Perspective

From a constructivist perspective, Doubao, through immediate feedback perception (IFP) as "scaffolding," supports students in actively constructing speaking knowledge within the ZPD (Vygotsky, 1980). Regression analysis shows that IFP significantly enhances students' sense of competence and interest (β=0.487, p<0.001), thereby strengthening intrinsic motivation, consistent with SDT (Deci & Ryan, 1985). This suggests that teachers can integrate AI tools' feedback mechanisms into instructional design, enhancing learning interest and sense of achievement through immediate error correction and encouragement.

In summary, through paired sample t-tests, Spearman correlation analysis, and linear regression analysis, this study verified the significant promotional effect of AI-driven Chatbots on learning motivation and revealed the key predictive role of immediate feedback perception, particularly its more significant impact on intrinsic motivation enhancement. These findings underscore the broader theoretical and contextual contributions elaborated in the conclusion.

Suggestions and Implications

Based on the integration of empirical research on Chinese university English speaking instruction and a constructivist perspective, this study has answered research question 1 (enhancement of student learning motivation by AI tools), research question 2 (the role of immediate feedback), and research question 3 (practical implications of AI tools for teaching), and provides innovative practical suggestions for university English speaking instruction. These suggestions are based on constructivist theory from the literature review and aim to stimulate student initiative and improve speaking abilities and learning experiences through deep integration of technology and teaching.

Building an "AI+Peer" Collaborative Speaking Learning Model

Constructivism emphasizes that learners negotiate and construct knowledge in social interactions. Research question 3 shows that students have a high acceptance of AI-driven Chatbots (such as "Doubao"), but some students desire more interpersonal interaction. Therefore, it is suggested that teachers design an "AI+Peer" collaborative learning model: students complete thematic dialogue tasks (such as business negotiations) in groups through

AI, followed by role-playing or group discussions in the classroom, combining AI's personalized language input (such as vocabulary suggestions) with peers' immediate feedback. This model not only utilizes AI's precise support but also deepens meaning negotiation through peer interaction, enhancing fluency and creativity in oral expression.

Developing "Contextualized Speaking Inquiry" Activities Based on AI

Research question 1 shows that AI tools significantly enhance students' intrinsic motivation, which highly aligns with the concept of "situated learning" in constructivism. Lave and Wenger (1991) emphasize the value of situated learning in the literature, and this suggestion injects new teaching vitality into it through AI technology. Specifically, to stimulate student initiative, teachers can use AI to design contextualized speaking inquiry activities. For example, based on real scenarios (such as overseas shopping or academic communication), students complete simulated dialogues through AI, analyze feedback to optimize expressions, and then present results in class for guidance. This method integrates speaking practice into life-like situations, encouraging students to actively construct language abilities in problem-solving, enhancing both participation and skill transfer capabilities.

Using AI Feedback to Support "Reflective Speaking Practice"

Schön's (2003) theory of reflective learning emphasizes the key role of reflection in professional practice and learning. He believes that when practitioners face complex, uncertain, and unique problem situations, relying solely on traditional theoretical knowledge and technical skills is often insufficient; reflection is needed to understand the nature of problems and find effective solutions. Research question 2 reveals the key role of immediate feedback in motivation enhancement, while constructivism views reflection as a core component of knowledge construction. Teachers can guide students to conduct "reflective speaking practice" using AI feedback: after completing AI tasks, students record problems identified in feedback (such as difficulties with connected speech or monotonous intonation), develop personalized improvement plans (such as imitation practice), and share reflection results with classmates for discussion. This approach cultivates metacognitive abilities through AI's objective analysis and students' self-monitoring, transforming speaking learning from passive input to active exploration.

Promoting "AI+Teacher" Dual-Track Teaching Assessment

Research questions 2 and 3 indicate that AI's objective feedback and students' positive experiences provide new perspectives for assessment. It is suggested that universities adopt an "AI+Teacher" dual-track assessment model: AI quantitatively assesses pronunciation accuracy and fluency, while teachers focus on pragmatic abilities and on-site expression. For example, students first complete standard tests through AI to obtain basic scores, then engage in conversations with teachers to demonstrate creative expression. The dual-track system reduces teacher burden, combines technological and humanistic assessment, ensures fairness and comprehensiveness, and aligns with constructivism's demand for diversified assessment (Jonassen, 1991).

Future Research and Limitations

Although this study empirically validated the positive impact of the AI-driven Chatbots "Doubao" on the English speaking motivation of Chinese university students, several limitations in its design and implementation may affect the interpretability and

generalizability of the findings. Firstly, the study adopted a single-group pretest-posttest design without a control group, which complicates efforts to exclude the influence of external variables, such as maturation effects or exposure to alternative learning resources. Furthermore, the intervention spanned only two weeks, a duration too brief to assess the long-term effects of the AI tool, especially considering that students may still be adapting to the technology during this initial phase. To address these shortcomings, future research should employ a randomized controlled trial (RCT) design with a control group and extend the intervention period to a full semester or beyond. Incorporating multiple measurement points (e.g., at weeks 4 and 8) would enable researchers to monitor dynamic shifts in motivation over time, thereby strengthening the study's internal validity and capacity for causal inference.

Secondly, constraints related to sample selection and variable control further limit the study's applicability. The sample was restricted to 118 non-English major undergraduates from a single university, lacking diversity in terms of geographic regions, institutional types, and academic disciplines, which undermines the external validity of the results. Additionally, the study failed to adequately account for confounding variables such as learning styles or instructor support, potentially inflating the perceived effectiveness of the AI tool. The absence of standardized practice content and usage frequency during the intervention also introduced inconsistencies that compromised the reliability of the findings. To overcome these issues, future studies should expand the sample size to encompass students from varied backgrounds and collect supplementary contextual data through questionnaires or interviews. Advanced statistical techniques, such as structural equation modeling (SEM) or hierarchical linear modeling (HLM), could provide deeper insights into the interplay between the AI tool and other influencing factors.

By addressing these limitations, future research can more accurately evaluate the efficacy of AI-driven Chatbots in fostering learning motivation and offer more robust, evidence-based recommendations for enhancing English speaking instruction in higher education settings. Such extensions would further illuminate the contextual significance of AI tools in addressing the unique challenges of Chinese EFL settings.

Theoretical and Contextual Significance

This study contributes significantly to the theoretical understanding of motivation in language learning by integrating Self-Determination Theory (SDT) and constructivist perspectives in the context of AI-driven language instruction. From a theoretical standpoint, our findings extend SDT by demonstrating how the immediate feedback mechanism of AI-driven Chatbots, such as Doubao, fulfills learners' psychological needs for competence and autonomy, thereby enhancing intrinsic motivation (Deci & Ryan, 1985). Additionally, the application of constructivist principles—particularly Vygotsky's (1980) concept of "scaffolding"—reveals how AI tools can serve as dynamic support structures, facilitating active knowledge construction in speaking practice. By bridging these frameworks, this research enriches the theoretical discourse on technology-enhanced language learning, offering a nuanced perspective on how AI-mediated feedback can align with motivational and pedagogical theories to foster meaningful learning outcomes.

Contextually, this study addresses a critical gap in the application of AI tools within the specific setting of Chinese university English speaking instruction, where traditional methods often fail to provide sufficient practice opportunities and timely feedback (Chen, 2024). The findings highlight the practical relevance of AI-driven Chatbots in overcoming these structural challenges, particularly in large-class settings with limited faculty resources. By demonstrating the effectiveness of immediate feedback in enhancing both intrinsic and extrinsic motivation, this research provides actionable insights for Chinese educators seeking to integrate technology into EFL instruction. Furthermore, the proposed teaching strategies—such as the "AI+peer" collaborative model and contextualized speaking inquiry activities—offer a culturally sensitive approach that aligns with the needs of Chinese learners, thereby contributing to the broader discourse on technology-supported language education in non-Western contexts.

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