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Unraveling Primary School EFL Students' Willingness to Communicate with Artificial Intelligence

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abstract

Background: The pervasive application of artificial intelligence (AI) in educational contexts has inevitably prompted discussion regarding its influence on learning as well as users' intention to adopt AI tools. Despite growing attention, empirical research that explores how AI is actually used in English learning remains limited. Even fewer studies have examined primary school students' willingness to communicate with AI (AI-WTC).
Aims: This study aims to investigate Chinese primary school students' willingness to communicate with AI in English learning and examine whether demographic variables such as grade and gender influence their AI-WTC using the AI-WTC scale.
Methods: This study selected 657 students from several primary schools in Jiangsu Province, China. Three volunteers in the survey sample participated in semi-structured interviews. The study employed SPSS 26.0 and Mplus 8.3 to analyze the data collected by questionnaire. We conducted a univariate normality test and performed confirmatory factor analysis (CFA). We adopted descriptive statistics, one-way ANOVA and the independent-samples t-test to explore the levels and demographic variation of EFL students' willingness to communicate.
Results: Results revealed that Chinese primary school students demonstrate a relatively high level of AI-WTC. Furthermore, neither gender nor grade showed significant effects on students' AI-WTC. Possible reasons were provided from practical and theoretical perspectives.
Conclusion: This paper discusses the limitations of the study and directions for future research. This study fills a theoretical gap by examining AI-WTC in primary school students and offers practical implications for early AI integration in language education.

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1. Introduction

English language teaching has shifted focus toward actual communication and use of the target language recently; thus, communication was then regarded as one of the main purposes of L2 learning (Budiman & Liu, 2025; Gallagher, 2019; Peng, 2020; Lei, 2021). Thus, Willingness to Communicate (WTC) is considered a crucial variable in second language learning. MacIntyre et al. (1998) originally defined WTC as "readiness to enter into discourse

at a particular time with ba specific person or persons, using an L2." Over the past decades, the research on learners' WTC has started to draw researchers' attention (Dewaele & Pavelescu, 2021; Lee & Lee, 2020; Lin & Wang, 2025; Solhi & Thumvichit, 2025). Research has found inconsistent results regarding students' WTC levels, with some studies reporting high levels (Bukhari & Cheng, 2017; Huang & Zou, 2024), moderate levels (Altıner, 2018; Ebn-Abbasi et al., 2024), and low levels (Wang & Liu, 2017). With the pervasive use of AI in English learning, recent empirical literature has demonstrated that artificial intelligence (AI) exerts a significant influence on learners' willingness to communicate (WTC) in language learning (Ouyang et al., 2024; Jiang & Chen, 2025; Wang & Zou, 2025). In particular, several studies have reported that AI-supported learning can effectively enhance learners' WTC (Fathi et al., 2024; Zhi & Wang, 2024).

Despite these findings, notable gaps remain in the existing literature concerning learners' willingness to adopt technology in English learning. First, previous studies have found diverse results regarding the factors influencing learners' initial willingness to use technology, as well as their intention to continue using technological tools. For example, Cui et al. (2025) revealed that interaction scenarios exert significant effects on learners' willingness to communicate with AI (AI-WTC). Factual information retrieval generated the highest score, whereas academic knowledge inquiry and language skills support elicited the lowest. What's more, Huang and Zou (2024) found that perceived enjoyment exerts a significant positive influence on EFL learners' willingness to communicate with AI (AI-WTC). Specifically, learners who derive greater enjoyment from AI-enhanced speaking tools demonstrate heightened readiness to engage in communicative interactions with AI. Second, existing research on primary school students has predominantly concentrated on emotional impact in English learning (e.g., Jin et al., 2025; Wang, Huang et al., 2025), English learning performance (e.g., Ma et al., 2025), and AI-assisted English learning (e.g., Wen et al., 2025), whereas empirical studies specifically examining primary school learners' willingness to communicate with AI remain scarce.

This study investigated Chinese primary school EFL students' willingness to communicate with AI and examined differences across gender and grade levels. By extending the research focus from secondary to primary education, the study addresses the gaps in the existing research. By investigating these connections, this research aims to highlight the potential of AI-mediated interaction in English learning, which helps enhance young learners' willingness to engage in communication, compensate for limited speaking opportunities and mitigate the problem of "mute English" (Zhang, 2022).

1.1. Studies On Willingness to Communicate with AI: A Brief Review

1.1.1. Conceptualizing Willingness to Communicate with AI

The term "willingness to communicate" expanded from "unwillingness to communicate" in Burgoon (1976). In McCroskey's (1992) study on native language communication, he defined WTC as an individual's "stable personality trait," used to predict their willingness to engage in daily communication. MacIntyre et al. (1998) reframed it, defining WTC as "readiness to enter into discourse at a particular time with a specific person or persons, using an L2." This reformulation shifted the focus of research from static personality traits to situational and variable communicative intention.

Several studies have confirmed the internal structure of the WTC through factor analysis, identifying multiple sub-dimensions and demonstrating strong reliability and validity (MacIntyre et al., 1998; Fernández-Barrionuevo et al., 2020). The WTC scale originally developed by McCroskey and Baer (1985) encompassed multiple communication contexts (interpersonal, group, meeting, and public speaking) and receiver types (strangers, acquaintances, and friends), providing an early empirical foundation for conceptualizing WTC as a multidimensional construct. However, other research has treated WTC as a unidimensional construct, which also exhibits high reliability and validity (Cheng & Xu, 2022; Huang & Zou, 2024; Zhi & Wang, 2024). More recent studies have recognized WTC as a complex variable influenced by the interaction of linguistic (e.g., Wang et al., 2021), emotional (e.g., Lee, 2022; Liu, H., Fan, J., et al., 2025), and social factors (Peng, 2019; Zhang et al., 2018).

The rapid development of AI has had a profound impact on language learners, particularly in influencing their emotions, AI literacy, and willingness to communicate (WTC) in a second language (Liu & Fan, 2024; Liu, 2026). Interactions with AI agents, including chatbots, voice assistants, or adaptive feedback systems, significantly influence learners' second-language WTC (Guo et al., 2023; Fathi et al., 2024; Zhang, C. et al., 2024; Zhi & Wang, 2024). The integration of AI technologies has created a more accessible and facilitative communicative environment, thereby reducing the psychological barriers of L2 learners, which. For instance, AI-mediated conversational agents, such as chatbots, have been proven effective in enhancing English as a Foreign Language (EFL) learners' WTC (Ayedoun et al., 2015). Moreover, AI-assisted speaking tools like EAP Talk can enhance learners' willingness to communicate with AI and increase their perceived enjoyment, which in turn influences their satisfaction and continuance intention to use AI for speaking practice (Huang & Zou, 2024).

1.1.2. Unpacking Related Studies of Willingness to Communicate with AI

Willingness to communicate (WTC) is widely recognized as a critical factor across diverse domains, including healthcare (e.g., Shahzad et al., 2023), cross-cultural academic adaptation (e.g., Wang et al., 2026), and others. When this concept was introduced to the field of second language acquisition, literature showed that WTC had already been the focus of L2 learning research given its importance in enhancing L2 learning (Lee & Drajati, 2019; Lee, 2020; Wang & Derakhshan, 2023). Research indicates that willingness to communicate (WTC) is crucial for L2 learners, playing a significant role in both language development and L2 learning achievement (Joe et al., 2017; Mahmoodi & Moazam, 2014). Cheng and Xu (2022) found that gender, grade, and academic major significantly influence learners' WTC.

With the development of technology, research about WTC has expanded into digital and AI-mediated topics (Cui et al., 2025; Guan et al., 2025). Huang and Zou (2024) emphasize that WTC with AI influences learners' perceptions of usefulness and satisfaction. Peng and Liang (2025) reveal that WTC with ChatGPT exhibits a dynamic relation to learners' perceived ease of use, usefulness, and attitudes toward the tool. These studies broaden research dimensions of WTC from face-to-face communication to digital learning and interaction.

Studies have shown that junior and senior high school students exhibit varying levels of willingness to communicate with AI, which is influenced by multiple factors, such as anxiety (e.g., Zhang, C. et al., 2024), enjoyment (e.g., Zhang, C. et al., 2024), AI literacy (Liu & Fan, 2024), and perceived value (Liu, 2026). However, research on primary school students' WTC

with AI (AI-WTC) remains scarce. Most Chinese students begin learning English in primary school, making the early stage crucial for fostering their learning interest and enthusiasm for English. Given years of education in school, a considerable number of Chinese students are still unwilling or afraid to speak or use English in communication, a phenomenon commonly referred to as "mute English" (Zhang, 2022). Traditional classrooms can hardly provide learners with sustained, low-anxiety opportunities for communication. For this reason, exploring new approaches is particularly imperative. AI technology is expected to create more opportunities for learners' communication by offering a personalized, repeatable, and low-pressure communicative environment. It can not only provide a new possibility for students to learn or use English but also may promote their WTC in English.

This study investigates Chinese primary school students' willingness to communicate with AI as second language (L2) learners. It aims to identify the level of their communicative willingness with AI in English learning and whether gender and grade would have an influence on AI-WTC, thereby laying a theoretical and practical foundation for enhancing primary school students' English communication with the assistance of AI in subsequent practice. The present study adopts a mixed-methods approach to examine EFL students' AI-WTC in China by addressing the following questions:

1. What are the levels of Chinese EFL students' AI-WTC in primary schools?
2. What are the differences in Chinese EFL students' AI-WTC with regard to gender and grade?

2. Methods

This study adopted a mixed-methods approach. Quantitative data were collected first and subsequently explained with qualitative findings (Creswell and Clark, 2017). More specifically, quantitative data were employed to investigate the extent of EFL learners' AI-WTC within the Chinese educational context, as well as its differences in light of demographic factors. Qualitative data then further explained the quantitative results.

2.1. Research participants

The participants in this study were 700 primary school students from Jiangsu province in China who were recruited using the convenience sampling method. This approach was chosen for its ability to minimize selection and sampling bias (Mackey & Gass, 2011). Participants had to meet these inclusion criteria: (1) currently attending a primary school in the chosen province; (2) between 8 and 12 years old; and (3) free from serious learning difficulties or cognitive disorders that would affect their involvement in the study. Students were excluded if they (1) missed the data collection sessions or (2) failed to obtain permission from a parent or guardian (Li et al., 2025). A total of 683 questionnaires were collected in this study, with a response rate of 97.6%. 26 questionnaires were excluded due to invalid responses, such as selecting the same options for all items or repetitive answers. After screening the invalid responses, a valid sample of 657 students was obtained. Among them, 340 were male, 317 were female; 220 were from grade 4, 342 were from grade 5, and 95 were from grade 6. All participants were native Chinese speakers with English as a foreign language (EFL) (see Table 1 for details).

Table 1. Basic information of participants

		Male		Female		Total	
		N	%	n	%	N	%
Grade	4	110	16.7	110	16.7	220	33.4
	5	183	27.8	159	24.2	342	52.0
	6	47	7.1	48	7.3	95	14.4

We also invited three participants to join the interview part of the current study. In selecting the interviewees, we set up the following criteria: both male and female EFL students were involved; they were enrolled in different grades; they had used different kinds of AI before; and they showed great willingness to share experience (see Table 2). Additionally, to ensure diverse perspectives on AI-WTC, we purposively selected participants based on their questionnaire scores.

Table 2. Basic information of the three interviewees.

	Student A	Student B	Student C
Gender	Male	Male	female
Grade	4	5	6
Time for using AI	2.5h-4.5h	0.5h-2.5h	0.5h-2.5h
Types of AI used	0-2	0-2	3-5
Mean Score	5.00	1.53	5.67

2.2. Research instrument

2.2.1. Willingness to communicate with AI scale

In this study, the willingness to communicate with AI (AI-WTC) scale was adapted from Huang and Zou (2024). This is followed by the 6-point Likert scale, varying from 1 (totally disagree) to 6 (totally agree). The questionnaire items were translated and modified to better fit the context of AI-assisted English learning in Chinese classrooms. Specifically, the term "foreign language" was replaced with "English" to better align with the participants' learning environment (e.g., with AI support, I can envision myself effectively communicating with locals in a foreign country using English). In addition, items that were unsuitable or potentially confusing (e.g., Item C2) were removed, as most primary school students in the sample had limited or no experience studying or living abroad. In our sample, the adapted scale demonstrated strong psychometric properties and showed high internal consistency reliability (α=0.895).

2.2.2. Interview protocol

An interview protocol was employed to conduct the semi-structured interviews. We designed some questions to explore whether grade and gender influence their willingness to communicate with AI. The following questions were focused on in the interview:

a. Have you used AI before? What AI do you usually use? How often do you use them?
b. Have you tried communicating with AI in English? How did it feel?
c. Under what circumstances do you use AI to learn English?

To ensure participants could fully understand the questions and express themselves clearly, the interview was done in Mandarin, and the sequence of the open-ended questions was changed in accordance with the response of each participant.

2.3. Data collection

The data collection process was conducted in two parts: the questionnaire and the semi-structured interview. The questionnaires were distributed via Wenjuanxing, an online questionnaire system. Participants were informed that their information would be kept anonymous and confidential during the research process. They were also encouraged to fill in the questionnaire based on their real learning experiences and feelings. The results would only be used for English learning research and would not affect their actual English academic achievements.

2.4. Data analysis

All quantitative data were recorded and analyzed using SPSS 26.0 and Mplus 8.3. We conducted a univariate normality test to examine the distributional characteristics of the data and performed confirmatory factor analysis (CFA). Descriptive statistics were also used to present participants' overall WTC levels. We adopted descriptive statistics, one-way ANOVA and the independent-samples t-test to explore the levels and demographic variation of EFL students' willingness to communicate. In addition, qualitative analysis was employed to analyze the interview data (Dörnyei, 2007; Miles et al., 2014).

Before the interview started, the researcher explained the purpose of the interview with the promise to use it for research purposes only. The researcher recorded the conversation after students' consent. The outline of the interview was flexibly adapted to the students during the process. The recordings were transcribed for analysis after the interviews and checked by the interviewees. The transcripts were then organized and analyzed to support the analysis of the deeper reasons behind the quantitative data.

3. Results

3.1. Normality and item analysis results

A univariate normality test was conducted, and the skewness and kurtosis indices for each item were found to be below the cut-off values of 3.0 and 10.0, respectively, indicating a normal distribution of the collected data (Kline, 2016). Next, item analysis was performed to assess the discriminative validity of each item. Specifically, an independent-samples t-test was conducted to compare the top 27% and bottom 27% of the surveyed participants. We then conducted an item-total correlation analysis to examine the relationship between each item and the overall scale. The data showed that all items met the correlation coefficient criterion ($r > 0.40$, $p < 0.01$; Field, 2013).

3.2. Results of the confirmatory factor analysis

This well-validated scale is unidimensional and has demonstrated robust psychometric properties in prior research. Therefore, exploratory factor analysis was deemed unnecessary, and we proceeded directly to confirmatory factor analysis (CFA) to verify the factor structure. Following confirmatory factor analysis, no items were deleted, indicating that the scale had a good fit (see Figure 1). The following cutoffs were used to evaluate the validity: SRMR < 0.1,

RMSEA < 0.08, and CFI and TLI > 0.9 (Hair et al. 2019). The RMSEA and SRMR were 0.000 and 0.003, respectively, while the CFI and TLI exceeded 0.90 (CFI = 1.000, TLI = 1.002), and internal consistency was high (α = 0.895). The values exceeded the previously mentioned cut-off scores. Regarding convergent validity, the average variance extracted (AVE) value was 0.657, and the composite reliability (CR) value was 0.884, demonstrating good convergent validity of the model.

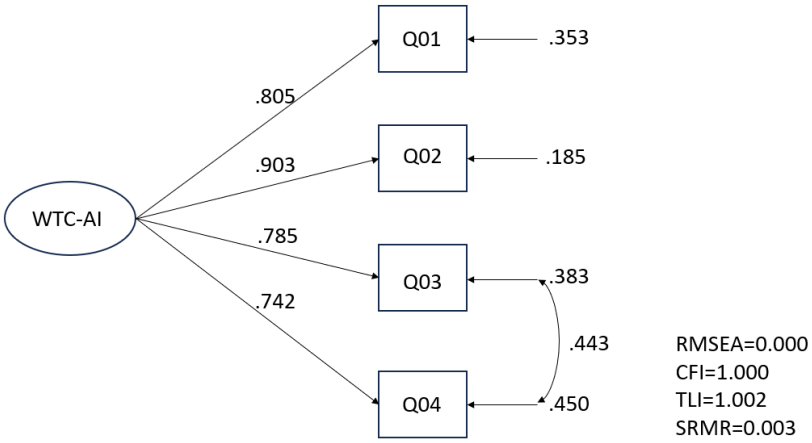

Figure 1. Graphical representation of the unidimensional model and factor loadings of AI-WTC

3.3. General description of EFL students' willingness to communicate with AI

This section addresses the first research question: What are the levels of Chinese primary school EFL students' willingness to communicate with AI (AI-WTC)? AI-WTC was measured using a 6-point Likert scale. The results revealed that participants exhibited a high level of AI-WTC overall (M = 4.38, SD = 4.423), indicating that Chinese primary school students demonstrate a strong willingness to use AI for English learning in their daily lives. Table 3 summarizes these descriptive statistics. Qualitative interview data were also collected to further explain these quantitative results, as shown in the following extracts:

Extract 1
I quite enjoy chatting with Doubao[①] in English. It replies quickly and is really funny. I really like talking to it (Student A, 2025/1/20).

Extract 2
My mom sometimes asks Doubao to tell me English stories. When I have any question, I ask it (Student B, 2025/1/20).

Extract 3
I like using my dad's iPhone to talk to Siri (an artificial intelligence assistant on the iPhone). It's very simple. When I prepare for the KET (Key English Test, Cambridge English Qualification at A2 level), I can practice my oral English with Siri. It is so smart that it can give me lots of different answers, which helps me a lot in my oral English (Student C, 2025/1/20).

Based on the three extracts, the high level of willingness to communicate with AI in primary school students can be found. Overall, students perceive AI tools as engaging,

[①]A free Chinese AI chatbot, developed by ByteDance (https://www.doubao.com)

accessible, and supportive communication partners, which encourage frequent and voluntary use. As shown in Extract 1, the immediacy and humor of AI responses make English communication both engaging and enjoyable, thereby increasing students' motivation to interact in English. Extract 3 indicates that AI is also valued for its practical learning functions, particularly in supporting oral English practice and exam preparation. Students consider AI to be easy to use and capable of providing a wide range of helpful responses. Additionally, Extract 2 suggests that AI has become integrated into students' learning routines, serving as a readily available source of language input and assistance. Taken together, these findings suggest that AI not only supports language learning cognitively but also creates a positive, low-effort, and engaging environment.

Table 3. The levels of students' willingness to communicate with AI

Min	Max	*M*	*SD*	Skewness	Kurtosis
1.00	6.00	4.38	1.11	-0.667	0.212

3.4. Effect of demographic variables on EFL students' willingness to communicate with AI

3.4.1. Gender differences in EFL students' willingness to communicate with AI

According to the data in Table 4, the independent-samples t-test revealed that there was no significant gender difference in students' willingness to communicate with AI among the 657 valid participants (AI-WTC) ($t = 0.33$, $p > .05$). Although male students ($M = 4.390$, $SD = 1.151$) reported slightly higher mean scores than female students ($M = 4.361$, $SD = 1.056$), the mean difference ($MD = 0.029$) was minimal and not statistically significant.

Table 4. The independent-samples *t*-test of EFL students' AI-WTC on gender.

Male		Female		MD	t (655)
M	*SD*	*M*	*SD*		
4.390	1.151	4.361	1.056	0.029	0.330

$p > 0.05$

Students in primary schools, regardless of gender, are immersed in digital technologies and frequently exposed to AI applications in both their academic and social lives. Such experiences may foster comparable levels of confidence and willingness to engage with AI-based communication, regardless of gender. As illustrated in the following interview extracts:

> Extract 4
> When I get home from school and finish my homework, I often want to play on my phone. But my dad usually won't let me play games. When I'm bored, I chat with Doubao. I just make a voice call, and we can talk. It's really simple. Doubao told me that my English is really good, which makes me so happy (Student A, male, 2025/1/20).

> Extract 5
> I like using AI to learn English. When I encounter problems in English, I am used to asking AI. I am not anxious at all when I communicate with it. Even though I make mistakes, nobody blames me. It will correct the mistakes so I can gain more knowledge while communicating with AI (Student C, female, 2025/1/20)

Based on these two students, gender does not appear to have a significant impact on WTC. Both female and male students exhibit similar communication behaviors and attitudes, as both feel comfortable and at ease in various communication contexts. They express a willingness to engage in communication, whether with a friend or an artificial intelligence system. For instance, the male student communicates with his friend using voice calls, while the female student communicates with AI to solve problems in English. Both students demonstrate an openness to communication and a sense of ease, suggesting that the context and nature of the interaction are more influential than gender. Additionally, both students seem to enjoy these interactions without significant fear of judgment or anxiety. This indicates that factors such as the medium of communication, familiarity with the communication partner, and the absence of negative consequences play a more crucial role in shaping their willingness to communicate than gender itself. Thus, gender does not appear to have a decisive impact on their overall communication willingness. Instead, factors such as the mode of communication, comfort with the communication partner, and the lack of pressure in the interaction seem to play a more prominent role.

3.4.2. Grade differences in EFL students' willingness to communicate with AI

A one-way ANOVA was conducted to examine whether EFL students' willingness to communicate with AI differed across grades. The results indicated that there was no statistically significant difference among the three grade levels ($F = 0.89$, $p = .41$). Descriptive statistics showed that the mean AI-WTC score for Grade 6 students was slightly higher than those for Grade 4 and Grade 5 students; however, the magnitude of these differences was small and did not reach statistical significance (see Table 5). This finding suggests that students' willingness to engage in AI-mediated communication does not significantly differ across grades.

Table 5. One-way ANOVA of EFL students' AI-WTC in different grades

Grade 4 (*n*=220)		Grade 5 (n=342)		Grade 6 (n=95)		F (2,654)	Sig.
M	*SD*	*M*	*SD*	*M*	*SD*	0.890	0.411
4.369	1.181	4.343	1.051	4.513	1.119		

Regardless of grade, students follow similar routines, with equivalent English instructional hours at school and comparable amounts of free time after school. Whether they choose to spend that time gaming, browsing, or interacting with AI, all of them enjoy similar free time after school. This ensures that all students have comparable opportunities to engage with digital devices for either learning or leisure. See more details in the interview excerpts below:

> Extract 6
> I usually play on my tablet after school. Sometimes when I need to learn English, or when my mom asks me to, I use English learning app. I typically use Doubao when I want to practice oral English (Student A, Grade 4, 2025/1/20).

> Extract 7
> I can only use my phone on weekends or after school, since our school doesn't allow electronic devices. My mom wanted me to take the KET, so she had me talk to Siri after school (Student B, Grade 5, 2025/1/20).

Extract 8
We can't use AI at school because we aren't allowed to bring phones. I usually enjoy watching documentaries or scientific movies. I find robots fascinating. They can understand what we say, both in Chinese and English. I started chatting with AI on my dad's phone. I only practice English with it when I have free time (Student C, Grade 6, 2025/1/20).

The interview evidence reveals that students share highly similar schedules in terms of their interaction with AI in English. First, all three participants mentioned that they use electronic devices mainly after school or on weekends, as they are not permitted to access digital technologies during school hours. Second, students' willingness to communicate with AI in English was primarily shaped by parental influences or individual interests, rather than grade-specific academic demands. For instance, Student A practiced spoken English through specific applications under the guidance of her parents or personal interest; Student C engaged in English conversations with the voice assistant "Siri" to prepare for an exam. Student B communicated with AI out of curiosity about technology and robotics. In conclusion, all three participants viewed AI as an easily accessible and user-friendly conversational partner. Their willingness to communicate with AI in English was largely influenced by their opportunities to access digital devices and their personal or familial learning needs, rather than their grade level.

4. Discussion

4.1. Profiles of primary EFL students' willingness to communicate with AI

In general, primary EFL students demonstrated a high level of AI-WTC in this study, suggesting that AI-mediated interaction could serve as an effective tool for learning English, particularly in proficiency in oral communication. The findings in the present study partly align with previous empirical evidence from Huang and Zou (2024), in which the result of descriptive analysis showed that AI-WTC of university EFL learners is relatively high. Previous studies have reported descriptive statistics of learners' willingness to communicate, indicating generally moderate to high levels of WTC (e.g., Altıner, 2018; Bursalı & Öz, 2017; Bukhari & Cheng, 2017; Ebn-Abbasi et al., 2024).

The high levels of willingness to communicate with AI among students can be attributed to several key factors. Firstly, the interactive experience with AI is engaging due to its quick responses (Wang & Lo, 2025) and humor (Zargham, 2023). AI's rapid response can solve students' problems timely and give feedback instantly. This quality of AI interactions contributes significantly to students' willingness to communicate. Additionally, when preparing for English proficiency exams, some students use AI as a practice partner to simulate test scenarios. AI's quick responses and novel problem-solving approaches effectively help them practice oral English, further motivating them to utilize AI in English learning. Secondly, the ease of use has an influence on users' acceptance of technology (Davis, 1989). According to technology acceptance models, such as the Technology Acceptance Model (TAM) (Davis, 1989) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), it has been argued that factors like perceived usefulness and ease of use play a more decisive role in shaping users' achievement-related choices and performances. The ease of using AI for practical tasks, such as exam preparation, makes students more likely to engage in

communication with AI. Thirdly, AI systems reduce digital learning anxiety and thereby partially enhance engagement among Chinese EFL learners. Students engaging with AI allows them to ask questions without fear of judgment. The absence of negative evaluation in AI interactions helps reduce anxiety, encouraging students to communicate more freely. Together, these factors, such as humor, convenience, and a low-pressure environment, foster a high level of WTC among students when interacting with AI. This finding aligns with previous empirical evidence indicating that AI technologies serve not only as instructional tools but also as emotional and communicative mediums that support learners' willingness to engage in communication (Chen, Y et al., 2025; Huang & Zou, 2024; Zhang, C et al., 2024).

However, among the 657 samples in this study, a minimal proportion of students (0.91%) exhibited low levels of AI-WTC. This result is explicable. Interview data revealed that students were generally prohibited from using mobile phones during school days; therefore, they had limited opportunities to access AI tools (Student C). Furthermore, extant literature indicates that the pervasive use of intelligent technologies poses significant challenges for both students and educators. Perceived ease and perceived usefulness have an impact on acceptance of chatbots (Chocarro et al., 2023). Individuals with limited AI proficiency or AI literacy may demonstrate resistance toward integrating AI into learning processes. Thus, this study argues that low AI-WTC is the product of complex interplay among technology acceptance, situational constraints, and individual differences.

4.2. Effect of demographic variables on EFL students' willingness to communicate with AI

4.2.1. Effect of gender on EFL students' willingness to communicate with AI

This study found that neither gender nor grade had a significant effect on students' AI-WTC. The findings in the present study partly align with previous empirical evidence, in which the results indicated that gender had no significant effect on WTC (Afghari & Sadeghi, 2012; Baker & MacIntyre, 2000; Valadi et al., 2015).

One plausible explanation for no significant gender differences is that students are frequently exposed to AI technologies in both academic and social contexts (Liu, 2026), which may help foster comparable levels of confidence and willingness across genders. Furthermore, the antecedents of WTC are multifaceted, and gender alone may exert limited influence on communicative willingness. Liu, H., Lv, C., et al. (2025) suggested that communicative willingness, whether in interpersonal or human-machine interaction contexts, is predominantly shaped by psychological and contextual factors, rather than gender itself. However, other studies have demonstrated that gender significantly influences WTC (Altıner, 2018; MacIntyre et al., 2003; Maftoon & Sarem, 2013). This finding is consistent with Cheng and Xu (2022), who reported that female language learners are more eager to participate in communication activities than male learners. Khany and Nejad (2017) demonstrated that personality traits significantly predict L2 willingness to communicate, suggesting that individual differences in personality play a crucial role in learners' communicative behaviors. These inconsistent findings across studies suggest that the effect of gender on WTC may be moderated by cultural background, educational context, language skill type, and measurement instruments.

4.2.2. Effect of grade on EFL students' willingness to communicate with AI

This study found that grade does not have a significant effect on students' AI-WTC. This finding is inconsistent with previous research. Fernández-Barrionuevo et al. (2020) found that

age had a significant negative effect on WTC in productive skills (speaking and writing), except for listening. Cheng and Xu (2022) found a U-shaped relationship, with WTC being highest among university students aged 19 to 21.

One possible reason for no significant effect of grade on primary school students is the similarity in curriculum structure. Although students are in different grades, their schedules are similar. The school day is highly structured with classes, morning exercises, lunch breaks, and other activities, leaving little free time. After-school hours are often filled with homework and extracurricular classes arranged by parents, leaving students with limited free time. As a result, the time primary school students spend using AI does not vary between different grades. The second reason is the school regulations and parental supervision, which limit students' access to electronic devices. With the ban on mobile phones at school, primary school students only have the chance to use electronic devices after school. However, students at all grades are encouraged by their parents to reduce their use of electronic devices.

Taken together, these findings suggest that gender and grade have no significant effect on students' willingness to communicate with AI (AI-WTC). Despite being in different grades, students experienced similar conditions in terms of school technology policies, schedules, and access to AI tools, leading to comparable opportunities for AI-mediated English communication. In such contexts, AI-WTC seems to be driven more by situational and individual factors, such as family support, personal interest, and learning goals, than by developmental differences related to grade level. This suggests that, within primary education contexts, AI-WTC may function as a context-dependent psychological construct, largely independent of gender and grade effects.

5. Limitations and future research

This study also has several limitations that suggest directions for future research. The sample was drawn from a relatively small number of schools, and the interview sample size was limited. Therefore, the generalizability of the findings requires further verification. Future studies could expand the sample scope and further examine the various factors influencing primary school students' AI-WTC and their interrelationships.

6. Conclusion

This study investigates Chinese primary school students' willingness to communicate with artificial intelligence in English (AI-WTC) and examines the influence of gender and grade. The findings reveal that students generally demonstrate a high level of AI-WTC, largely driven by the intrinsic features of AI tools. In particular, the humorous, user-friendly, and low-pressure nature of AI environments helps reduce learners' anxiety and encourages active communication. The study also finds no significant differences in AI-WTC across gender and grade levels. This can be attributed to similar access to AI tools among students and the stronger influence of situational factors (e.g., family support) and individual factors (e.g., interest and learning goals) compared to demographic characteristics. Theoretically, this study fills an important gap by providing empirical evidence on AI-WTC at the primary education level, which has been underexplored in prior research. Practically, the results support the integration of AI technologies into early language learning contexts. The study highlights that educators

and parents should prioritize contextual and individual variables over demographic factors when fostering students' willingness to communicate. It is recommended that teachers create supportive learning environments with immediate feedback mechanisms to sustain engagement and communication. Additionally, although most students show high acceptance of AI, a small proportion exhibit low AI-WTC. This suggests the need for structured school-based AI practice opportunities and explicit instruction on effective AI use to reduce anxiety and improve acceptance.

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