

Diffusion of Chatbots as Conversational Partners in Chinese Language Teaching: Insights From a Case Study (聊天机器人作为虚拟语伴在中文教学中的传播——基于教师视角的个案研究)

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Abstract: The emergence of advanced and versatile chatbots, represented by ChatGPT, has reignited discussions on their use in language education. However, the extent to which using chatbots as virtual language partners can benefit language learning is still controversial. To provide more insights into this question, this study investigates chatbot diffusion among three Chinese language teachers through a bottom-up perspective. Grounded in the Diffusion of Innovation (DOI) theory, the findings revealed the dynamic impact of communicative channels and innovation attributes on teachers' chatbot adoption, which enriched the accountability of DOI in this context. The findings also revealed the teachers' attitude shift from reluctant to willing to use chatbots, which highlighted using the curriculum-informed approach to tailor chatbot use to specific teaching demands. Overall, the study demonstrates the sustainable potential of chatbots as language partners, as this approach innovates the conventional practice of Communicative Language Teaching by facilitating socialization-oriented practice.

摘要: 以 ChatGPT 为代表的新型多功能聊天机器人的出现,再次引发了在语言教育中应用聊天机器人的热烈讨论。然而,将聊天机器人作为虚拟语言伙伴这一策略在多大程度上能够真正促进语言教学仍存在争议。为进一步探讨这一问题,本研究从自下而上的视角出发,考察了聊天机器人的使用在三位汉语教师中的传播过程。基于创新扩散理论(Diffusion of Innovation, DOI)视角,本研究论证了传播渠道与创新特征对教师使用聊天机器人的动态影响,因而拓展了该理论在这一研究语境下的解释力。本研究同时揭示了三位教师从犹豫到积极使用聊天机器人的态度转变,突出了以课程为导向,将聊天机器人的使用与具体教学需求相结合的重要性。总体而言,本研究论证了聊天机器人作为语言伙伴在语言教学中的可持续发展潜力,这一使用促进了以社交为导向的语言实践练习,创新了传统的计算机辅助交际式语言教学模式。

Keywords: Chatbot; Diffusion of Innovation; teachers' perspectives; Communicative Language Teaching; Computer-assisted language learning

摘要: 聊天机器人、创新扩散理论、教师研究、交际式语言教学、计算机辅助语言教学

1. Introduction

Chatbots are software interfaces or computer-based dialogue systems that simulate human-like conversations (Chen et al., 2020; Rodríguez Cardona et al., 2019). The term “chatbot” is a “neologism” (Rodríguez Cardona et al., 2019, p. 2) derived from “chat” and “bot”, highlighting their capability to facilitate real-time conversational interaction between humans and software robots.

The approach of using chatbots as language partners has a long history, dating back to the 1980s (Bibauw et al., 2019). This approach aligns with the “broad assumption” (Bibauw et al., 2019, p. 829) of Communicative Language Teaching (CLT), which prioritizes learners' proficiency in communication and abilities to manage negotiation and communication strategies (Savignon, 1991; Swain & Suzuki, 2008). However, its effectiveness remained limited for several decades, as reflected in the relatively low number of related publications—fewer than 20 per year over the subsequent 30 years (Bibauw et al., 2019). This limited diffusion can primarily be attributed to the technological constraints of early chatbots (Coniam, 2008; Qian et al., 2023). They relied on pattern-matching rules to interpret and respond to user inputs based on predefined responses, which often led to decontextualized responses. Thus, they were regarded as “idiots” (Gallacher et al., 2018, p. 70) rather than partners by language learners. Recent advances in artificial intelligence chatbots have improved their ability to generate contextually appropriate and relevant responses. Despite these improvements, concerns remain. Studies have shown that these chatbots can still provide inaccurate information (Lo et al., 2024) and often produce wordy and repetitive language (Kohnke et al., 2023), which may not serve as ideal input for language learners. Consequently, they are not yet considered capable of teaching independently (Van Horn, 2024). In this regard, technological advancement alone is insufficient to render chatbots competent language partners, and the question of their effectiveness in language learning remains open.

Language teachers' perspectives are important but underexplored in answering this question. Teachers are considered the “lynchpin” (Arnold & Ducate, 2015, p. 1) who play an essential role in the success of technology-involved learning events. Their attitudes toward technology decide whether it can be used in classes and thus influence students' attitudes and use of it. However, teachers' perspectives based on hands-on experience with chatbots were not fully explored. According to the exploration of human-chatbot collaboration in 24 studies, Ji et al. (2023) found that teachers either played a minimal role or were entirely absent. In several studies focusing on teachers' perspectives, most did not involve teachers' hands-on use of chatbots, as noted by Timpe-Laughlin et al. (2022). This

led to a neglect of the dynamics between teacher perspectives and actions, as teachers' perspectives might change while using them (Van Den Branden, 2009). Therefore, this study aims to fill this gap by revealing teachers' perspectives based on their hands-on experiences with chatbots in the contextualized teaching process.

2. Literature review

2.1 Diffusion of Innovation Theory

Everett Rogers' Diffusion of Innovations (DOI) theory (2003) is an empirical framework that explains a universal process of how an innovation is adopted in a population from a social and dynamic perspective (Rodríguez Cardona et al., 2019; Frei-Landau et al., 2022; Grgurović, 2014; Kaminski, 2011). It explains “the process in which an innovation is communicated through certain channels over time among the members of a social system” (Rogers, 2003, p. 5). It includes three basic constructs: adopter categories, innovation attributes, and the innovation-decision process, as shown in Figure 1.

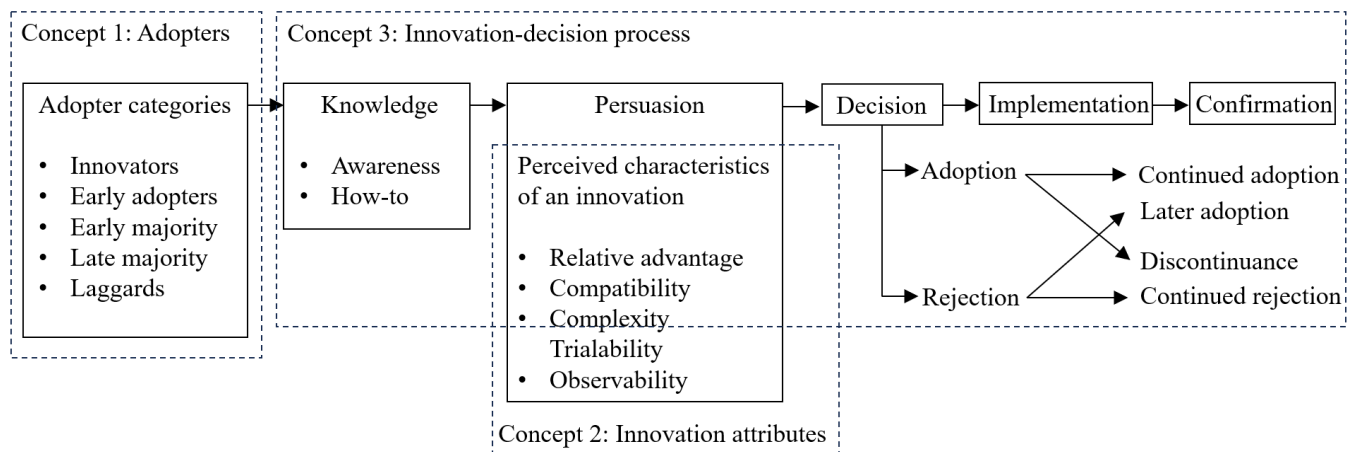


Figure 1 The framework of DOI (Derived from *Diffusion of Innovations, Fifth Edition* by Everett M. Rogers. Copyright (c) 2003 by The Free Press. Reprinted with permission of the Free Press: A Division of Simon & Schuster.)

Adopters are the subjects during the diffusion process. Rogers (2003) divided a population into five categories according to their propensity to adopt a specific innovation: innovators, early adopters, early majorities, late majorities, and laggards. These groups are distinguished based on their willingness to take risks to try innovation and the desire to be trendsetters in an industry (Kaminski, 2011). The further along in this sequence, the more cautious and sensitive these groups are about the boundaries of the social system, peer impact, and costs (Kaminski, 2011; Sahin, 2006). Five attributes describe the object—innovation. Relative advantage is defined as the extent to which an innovation is perceived as superior to the idea it replaces, which frequently co-occurs with disadvantages. Compatibility refers to the extent to which an innovation is seen as aligning with the values, prior experiences, and demands of potential adopters. Complexity denotes the intricate nature of comprehending and integrating an innovation. It frequently co-occurs with

simplicity and ease of use (Jwaifell & Gasaymeh, 2013). The fourth attribute, trialability, quantifies the extent to which an adopter can experiment with the innovation. Observability refers to the extent to which the results or benefits of adopting an innovation are visible or easily noticeable to others. It encompasses the idea that innovations that yield tangible and visible outcomes are more likely to be adopted.

The innovation-decision process in DOI consists of five distinct stages, demonstrating the comprehensive process that individuals or organizations go through from the awareness of innovation to full integration (Bax, 2003; Chambers & Bax, 2006). The knowledge stage focuses on individuals becoming aware of the innovation and learning how it works. Two key types of knowledge are emphasized here: awareness knowledge and how-to knowledge. The former involves basic awareness of the existence of innovations, while the latter relates to understanding the practical steps required to use them effectively. The persuasion stage is when potential adopters form opinions about the innovation. In the decision stage, individuals decide whether to adopt or reject the innovation. Decisions are influenced by various factors, such as personal desires, peer pressure, social situations, and researchers' intervention in empirical settings (Frei-Landau et al., 2022; Grgurović, 2014). The implementation stage is when the innovation is used. Users begin to examine its outcomes and adapt it to their specific needs. Feedback during this phase is crucial, affecting whether adopters will continue to use the innovation. If the outcomes are favorable, the innovation is likely to be more deeply integrated into daily routines. In the confirmation stage, the innovation becomes a part of the users' routine practices. Promoting innovation to others is an important indicator of this stage (Grgurović, 2014).

The implementation of DOI in computer-assisted language learning (CALL) conceptualizes the process of the diffusion of technological innovations by offering a structured approach to understanding how they are adopted and evaluated (Grgurović, 2014; Markee, 1992). Accordingly, it informs language teaching by providing a cohesive set of "guiding principles for the development and implementation of language teaching innovations" (Markee, 1992, p. 229), ultimately facilitating effective organizational reforms (Stoller, 1994). The five attributes can be used to understand adopters' perspectives, which play a mediating role in influencing adopters' attitudes (Ayanwale & Ndlovu, 2024; Fatemi Jahromi & Salimi, 2013). For example, Jwaifell and Gasaymeh (2013) used the five attributes to explain the participants' use of interactive whiteboards and the factors that might affect their decision to use them. The results revealed that relative advantages were the strongest predictor of the teachers' adoption. Moreover, it could be found that these attributes carried different weights in varying contexts. While some studies found that relative advantage had the strongest influence on adopters' attitudes (Rodríguez Cardona et al., 2019; Jwaifell & Gasaymeh, 2013), some others demonstrated that observability and trialability were the most closely related attributes to adopters' attitudes (Martins et al., 2004). In this regard, investigating the different weights these attributes carry contributes to identifying specific and practical issues in unique contexts, ultimately leading to strategies to better address the specific needs or concerns of adopters in different educational settings. It should be noted that DOI is a sociological theory that regards the diffusion process as a form of communication, which is influenced by social factors, such as communication channels and change agents. The channels of this communication are

categorized as mass media and interpersonal interaction. Interpersonal interaction is usually more powerful to create or change strong attitudes held by an individual (Sahin, 2006). Change agents also play a pivotal role in facilitating the shift in users' attitudes. For instance, in Grgurović's (2014) study, the author assumed the role of a change agent by helping teachers recognize their need for a learning management system and persuading them to integrate it into their teaching. Similarly, El Shaban and Egbert (2018) identified professional development facilitators as key change agents, who equipped teachers with the necessary knowledge to use the "English Center" and fostered positive attitudes toward its implementation. It can be seen that in these examples, different individuals took on the role of change agents, such as the author in Grgurović's (2014) and the professional development facilitators in El Shaban and Egbert's (2018). This highlights the importance of social intervention in shaping teachers' attitudes toward technology use.

2.2 CLT and computer-facilitated CLT

CLT has inspired the practice of language teaching process, from the teaching aims and methods to the assessment of learning outcomes. The theoretical foundation of CLT is the concept of communicative competence, introduced by Hymes (1972). This concept emphasizes that learning a language involves more than just knowledge of grammar and structures; it requires understanding how to use language appropriately in various social contexts. CLT aims to develop learners' communication proficiency in real-life situations. To achieve this goal, this approach emphasizes learning through communication rather than rote memorization or isolated grammar exercises. Consequently, the assessment of this approach emphasizes a process-oriented perspective (Teh, 2021), focusing on learners' progress and performance in communicative tasks rather than traditional tests.

Developing the practice of CLT is one of the focal points of related studies. Nunan (1991) listed five features of the communicative approach, which include "a focus on interactive communication, usage of authentic materials, the availability of chance for learners to work on, the inclusion of own experiences to aid in learning, and the linkage between classroom learning and real-world application" (Teh, 2021, p. 66). In classroom settings, activities such as role-plays and discussions are frequently adopted (Littlewood, 2013). However, these conventional approaches often fail to address the issue that students might feel "embarrassed and lazy to speak" (Teh, 2021, p. 65) in language classes. Computer-facilitated CLT is a supplement to conventional methods. Huang and Liu (2004) defined the connection between CLT and CALL as "computer simulation" (Huang & Liu, 2004, p. 1) and further categorized it into instruction-oriented and fun-oriented. However, they also have limitations: the former follows predefined instructions, limiting learners' initiated interaction and control during the conversations, while the latter usually involves virtual tasks, such as establishing a town in the virtual world, which may distract from real-life communication settings (Huang & Liu, 2004).

Computer simulation facilitated by chatbots may have the potential to overcome the limitations of conventional approaches. Interaction with chatbots has been evidenced to be meaningful for language learners. For example, Yin and Satar (2020) demonstrated that interaction between chatbots and language learners included the patterns of negotiation of meaning, which provide opportunities for second language development (Yin & Satar,

2020). Fryer et al. (2019) found that learners' interest in conversing with chatbots rebounded after the temporary novelty effect as they found in Fryer et al. (2017), which contributed to sustainable learning motivation. Besides, chatbots have the potential to engage learners in communications that incorporate the five features of CLT practice listed by Nunan (1991). Conversations with chatbots have been proven to occur in an anxiety-free environment (Hapsari & Wu, 2022; Hsu et al., 2021), which helps learners to focus on communication. Given that chatbots provide individualized responses, learners must create their own responses rather than repeating predefined ones. This requires them to use their language knowledge flexibly. Meanwhile, it has also been found that users might establish emotional connections (Yuan et al., 2024) and friendships (Skjuve et al., 2021) with chatbots, which may influence their social interaction and relationships. Although the broader social impact of this is uncertain, it highlights that users do have self-disclosure when communicating with chatbots. This self-disclosure is meaningful for language learning, as it requires learners to use the language to discuss their real-life experiences, as emphasized by Nunan (1991).

Given chatbots' potential in CLT practice and limited insights into chatbot-facilitated CLT, the following research questions will be addressed in this study:

1. How does the approach of using chatbots as language partners currently diffuse among language teachers?
2. How does chatbot use align with the principles of CLT?

3. Methodology

3.1 Participants

This study recruited three language teachers who teach Chinese as a second language, ranging from 25 to 35 years of age. All participants taught in the same beginning-level Chinese course at a university in New Zealand while the interviews were conducted. This is a blended learning program that integrates both online and in-person instruction. Teacher A is a Malaysian and Chinese heritage speaker with two years of experience teaching Chinese, while Teachers B and C are both Chinese native speakers with more than five years of teaching experience. The three teachers had experience of teaching a variety of levels (beginning through advanced) and learners (from preschool learners to adults).

3.2 The chatbot Xiaoming

The chatbot demo Xiaoming was developed using the free plan of the platform Collect-Chat¹. The chatbots built on this platform are basically rule-based, which rely on predefined responses. The main reason for selecting this platform was its user-friendly interface, which allowed teachers to create their own chatbots without requiring any programming expertise. It employed a “drag and drop” builder system, offering the

¹ c.f., <https://collect.chat>

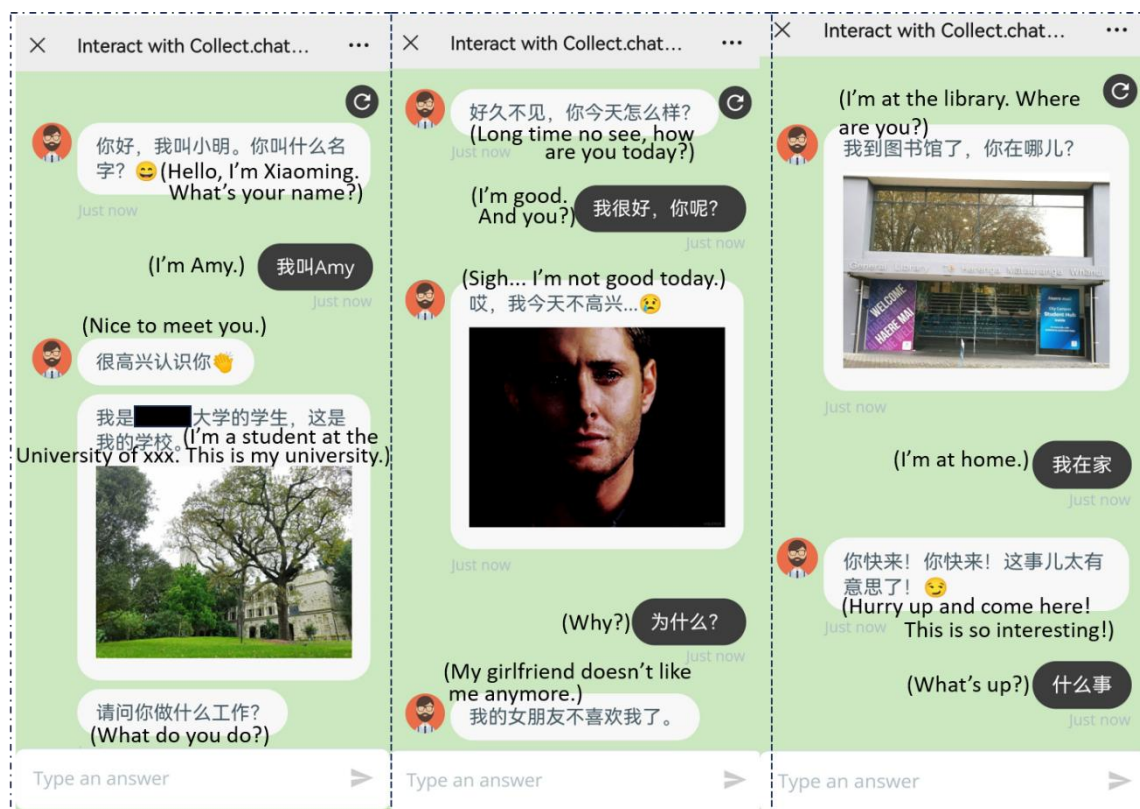
flexibility for teachers to easily customize it to align with specific teaching objectives and needs (Vázquez-Cano et al., 2021). The teachers manually input Xiaoming's responses, as illustrated in Figure 2 (Any information that could reveal the identity of students or the university was concealed.). The chatbot then interacted with users by delivering these predefined sentences.



Figure 2 The editing interface of Xiaoming

Xiaoming included dialogues under three communication scenarios, which were adapted from the content of the textbook *Integrated Chinese* (Volume 1)². The dialogues consisted of the topics of self-introduction, planning weekends with friends, and talking about family members. According to the content, the scenarios were named *Hello Xiaoming*, *Sad Xiaoming*, and *Gossip Xiaoming*. There was a logical relationship among them. Students conversed with *Hello Xiaoming* first. In this conversation, students and Xiaoming introduced themselves to each other like meeting a new friend. It was followed by *Sad Xiaoming*, which was about arranging some activities on weekends to cheer Xiaoming up, as he was sad because of a quarrel with his girlfriend. In the third scenario, students were supposed to study at the library with Xiaoming. However, Xiaoming was distracted by the gossip of Wenzhong Gao and Xiaoying Gao, who were part of the main characters in the textbook. Students started conversing with Xiaoming via scanning QR codes. Figure 3 a. to c. (see next page) shows samples of the conversations under each scenario. Given that Xiaoming could only respond using pre-defined sentences, it was designed to initiate and guide the conversations to maintain the logical coherence of the conversations as much as possible. The chatbot-student conversations were collected by the platform as shown in Figure 4 (see next page).

² Yuehua Liu, Tao-chung Yao, Nyan-Ping Bi, et al., *Integrated Chinese: Simplified Characters Textbook, Level 1*, 4th ed. (Boston: Cheng & Tsui, 2017).



a. Hello Xiaoming

b. Sad Xiaoming

c. Gossip Xiaoming

Figure 3 Interfaces of the three conversation scenarios

Xiaoming:	你好, 我叫小明。你叫什么名字? ... (Hello, I'm Xiaoming. What's your name?)	请问你做什么工作? (What do you do?)	你多大了? (How old are you?)	我今年二十岁, 我属羊 🐏. (I'm twelve. My zodiac is 🐏.)
Student 1:	我叫Thor (I'm Thor.)	我没有工作, 所以现在是大学的学生 (I don't have a job. I'm currently a university student.)	我八岁 (I'm eight.)	我的属是猴 (My zodiac is monkey.)
Student 2:	我叫Ho (I'm Hozxxxxxx.)	我是大学生 (I'm a university student.)	我今年二十岁 (I'm twelve.)	我也属羊 (My zodiac is also 🐏.)
Student 3:	你好, 我叫Bella (Hello, I'm Bella.)	我也很高兴认识你。我也是大学的一名大学生 (Nice to meet you, too. I'm also a student at xxx university.)	我是十九岁。你呢? (I'm nineteen. And you?)	我也属羊! (My zodiac is also 🐏.)
Student 4:	我叫李 (I'm Zxxxx Li.)			
Student 5:	我叫Issy (I'm issy.)	我也是大学的学生 (I'm also a student at xxx university.)	我十八岁 (I'm eighteen.)	我属猴 (My zodiac is 🐏.)
Student 6:	你好我叫Kim (Hello, I'm Hxxxxxx Kim.)	我在咖啡工作, 也是学生 (I work at a coffee shop. I'm also a student.)	21	不知道 (I don't know.)
Student 7:	我叫Lilith (I'm Lilith.)	我没有工作 (I don't have a job.)	我是十九岁 (I'm nineteen.)	我也属羊 (My zodiac is also 🐏.)
Student 8:	你好, 我叫丁 (Hello, I'm Kxxxxx Ding.)	我是一个学生。 (I'm a student.)	二十一岁。 (Twenty-one.)	属蛇 (Snake.)

Figure 4 The records of chatbot-student conversations

3.3 Procedure

First, the research of this study designed the initial version of Xiaoming with Collect-Chat and presented it to the three participants. The researcher briefly introduced Xiaoming's functions, including how to interact with Xiaoming, adapt its content, and monitor its conversations with students. The participants were invited to test and adjust Xiaoming before applying it to their classes.

Next, the participants used Xiaoming in their classes. All three classes were conducted based on the same learning content, which was about reviewing the vocabulary and sentences from Lessons One to Five of Integrated Chinese 1. The students in the three classes shared similar learning backgrounds of Chinese, who started from the beginning level and had studied in the same Chinese course for 12 weeks.

After applying Xiaoming to their classes, semi-structured interviews were conducted individually, following a protocol of interview questions that were guided by the theory of DOI. The questions consisted of participants' general experiences with educational technology and chatbots and their specific perspectives on the adoption of Xiaoming (see Appendix). The interviews were conducted on the same day after the participants used Xiaoming in their classes, and all lasted for approximately one hour. Additional questions were asked to clarify and explore the individualized experiences of the interviewees. Informed consents were obtained from the participants to audio-record the interviews.

3.4 Analysis

The interview data were subjected to qualitative analyses. The audio recording of interviews was transcribed verbatim. The transcriptions were then segmented into episodes that "sustained focus on one topic over a longer period of time or were similar in tone" (Boschman et al., 2015, p. 253). These episodes were further segmented into topical exchanges. Each exchange referred to bigger units corresponding to one of the three main concepts of DOI, namely, adopter categories, innovation attributes, and innovation-decision process. This segmentation followed the coding scheme illustrated in Figure 1.

In an effort to minimize researcher bias and ensure interrater reliability, this study followed the approach of Huang et al. (2019), which adopted a similar approach to examine English teachers' technology acceptance. Following the initial coding by the author, the second coder, who is a doctoral student in Applied Linguistics with experience in coding interview data, conducted a thorough review to ensure the accuracy and completeness of the codes. This verification process involved cross-referencing the codes with the original statements and obtaining validation from each participant while coding their respective transcripts. Throughout this validation procedure, any discrepancies were deliberated by both coders, leading to a consensus on all the coding.

4. Results

4.1 The teachers' perspectives of chatbot use: through the lens of their adopter categories

The three teachers had not attempted to integrate chatbots into their teaching prior to this study. Their perceptions of chatbot integration categorize them as either late majority or laggards. To be more specific:

Teacher A belongs to the group of the late majority, who was characterized by her skeptical, cautious attitude and her reliance on trusted advisors. Her reluctance to use chatbots for teaching primarily stemmed from her perceived “technological immaturity” (Teacher A) of chatbots. She tested ChatGPT by inputting her Master’s thesis topic to see how it would respond. The responses were quite shallow, leading her to believe that current chatbot technology was not yet intelligent enough. This impression discouraged her from further engaging with chatbots. This reluctance indicated her uncertainty about the advantages and disadvantages of using chatbots for language teaching, which is a significant obstacle to adopting a new technology (Sahin, 2006). When asked about when she would feel confident or motivated to use chatbots, she said she would rely on the suggestions of teaching experts from her family. She noted:

I often ask my dad and cousins for suggestions about how to integrate technology into my teaching, as they are all teachers and much better at using technology than I am. They have created their own platforms, websites, and even games for their students. So, I believe they would figure out how to use chatbots before me, and I would like to listen to their sharing.

Teacher B was also categorized as part of the late majority, whose reluctance to use chatbots for teaching can be mainly attributed to her perceived mismatch between the complexity of chatbot language and her students’ language proficiency. She explained:

The language complexity of chatbots like ChatGPT is far beyond my students’ proficiency in Chinese, most of whom are beginners. It is ineffective to have them practice with chatbots that use language far above their level.

Interestingly, she was proactive in adopting other technologies. She believed that interaction was essential for students to learn a language and that technology made language teaching more vivid and engaging. This belief was even more evident in her online teaching. She was in charge of the online course for this language program, where she adopted many applications and platforms, such as Padlet, Flipgrid, and Google Forms, to organize activities. Her different attitude toward chatbots indicates that teachers’ perceptions of chatbot use may not be significantly related to their previous experiences with technologies. This may be attributed to the distinct, and perhaps unconscious, way in which chatbots are perceived compared to other technological tools, as noted by Liu et al. (2024).

Teacher C exhibited traits consistent with the laggards, who preferred conservative teaching methods and maintained a passive attitude toward technology use. She prioritized direct and meaningful practice and the efficient use of in-class time. This teaching belief

led her to view technological tools as unnecessary in language teaching. She only used technology when other alternatives were worse, which is one of the typical features of laggards, according to Kaminski, J. (2011). Teacher C said:

I am usually pretty passive when it comes to using educational technology...the class is mostly about practicing. I think it is more important to have students just dive into practice instead of going for those fancy setups.

When asked about her opinions of chatbot use, although she found chatbots helpful for personal tasks, particularly for searching for information and entertainment, she was concerned about the cost and necessity of using chatbots for language teaching. She noted:

Teachers have limited preparation time. Especially for those lacking digital literacy, the learning curve for new technologies is costly. Technology evolves rapidly, and it is neither essential nor practical for language teachers to keep up with every new advancement, as this imposes overwhelming pressure.

In summary, the reasons that have hindered teachers from using chatbots for teaching include their perceived disadvantages, the mismatch with teaching demands, the complexity of use, and the lack of how-to knowledge.

4.2 The teachers' attitude shift: the mediating role of the five attributes of innovation

Surprisingly, the three teachers, who were initially reluctant to integrate chatbots into their teaching, changed their attitudes after experiencing the process of tailoring the chatbot Xiaoming to their teaching. This shift has manifested the mediating role of the five attributes of chatbots and the alignment between chatbot use and CLT practice.

Relative advantages: Socialization-oriented communication practice

The relative advantages of chatbots highlight their potential to facilitate socialization-oriented communication practice. This potential lies in the features of chatbot-facilitated conversation practice. Firstly, chatbots engaged students in conversation flows, allowing them to practice how this language was used in communication. This can be primarily attributed to the “syntactical level” (Teacher B) practice provided by chatbots. This feature distinguishes chatbots from the technologies that provide isolated practice focusing on either vocabulary or grammar, as noted by Teacher C. Also, chatbots enable students to concentrate on conversation flow by creating an anxiety-free environment. This environment was particularly beneficial for introverted students who might hesitate to engage in competitive activities, like those provided by Kahoot, or group work. Their conversations with chatbots were only visible to the teacher, ensuring them a feeling of “security,” as highlighted by Teacher A. She also underscored the capability of chatbots to provide quick and smooth responses, which smoothened conversation flows between chatbots and students.

Another feature that enhances socialization-oriented practice is to provide authentic communication practice. In this study, Xiaoming was designed to converse with students based on their campus life. Teacher A underscored the images used by the chatbot during

conversations, which depicted buildings on campus, such as the library and café, that students frequently visited. She noted:

Images are not frequently used in other chatbots. These images make the conversation more vivid and engaging, as well as more realistic, because they are from students' familiar real-life situations.

To strengthen the authenticity of conversations, an exaggerated storytelling approach was adopted to bring Xiaoming's personality to life—he had a Chinese girlfriend and loved to gossip. Teacher B stated, “The personality of Xiaoming exhibited a degree of humor and theatricality, making the conversation interesting and engaging, and it made Xiaoming feel like a friend.”

Engaging students in real social situations is also essential for effective socialization-oriented practice. Conversing with Xiaoming resembled the texting format, a common mode of communication in modern life, and the communication scenarios were based on real-life situations, as noted by Teacher B:

The texting format of Xiaoming mirrors everyday life; it is like having a casual conversation with a friend on social media. The content, design, and feedback from Xiaoming all feel very natural and easy to understand. Especially at the start, when students were first introduced to Xiaoming, it felt like meeting a new friend introducing themselves.

Compatibility: Tailoring chatbots with a curriculum-informed approach

The compatibility of chatbots with language learning can be enhanced through a curriculum-informed approach, which eliminates teachers' perceived mismatch between chatbot use and language teaching. In this study, Xiaoming's compatibility was manifested in two aspects: its alignment with the target learning content and its alignment with teachers' needs. The teachers emphasized how well Xiaoming corresponded with the learning material, reinforcing key vocabulary and grammar from their curriculum.

Xiaoming's conversations closely follow the topics and dialogue structures from the textbook, making it an effective review practice for students. (Teacher A)

The practice provided by Xiaoming was closely aligned with the learning content and highlighted the frequently used words and grammar we have learned, allowing students to focus directly on essential exercises, which made it highly efficient. (Teacher C)

Chatbots can also be flexibly compatible with teachers' teaching needs. In this study, Teacher A, who emphasized interaction during the learning process, used Xiaoming to supplement her in-class activities, which provided additional practice opportunities and made the practice more engaging. Teacher B focused on students' recognition of Chinese characters. She edited the conversations to include new sentences using the characters they had learned. This edition slightly challenged the students' current knowledge and provided opportunities for them to work on the characters by themselves, which is an essential process to develop their language proficiency (Nunan, 1991). Teacher C wanted to better understand students' grasp of the content they were going to learn, which could help her

better manage the pace of the upcoming class. She suggested using the chatbot to assess students' knowledge of upcoming content at the start of a lesson.

Complexity: Less challenging than perceived

The complexity of using chatbots, which initially hindered teachers from integrating them into their teaching practice, was reduced after their hands-on experiences with chatbots. Teachers' concern about "the cost-effectiveness ratio" (Teacher C) of using chatbots was essentially tied to the perceived complexity. However, it turns out that using chatbots was not as complex as she had thought. In this study, after the authors introduced the platform Collect.Chat and provided the script of Xiaoming, the teachers were able to adjust it themselves, as this process did not require any expertise in computer science or programming. Meanwhile, the in-class implementation of Xiaoming was straightforward and user-friendly for both teachers and students. For teachers, the time and effort needed to set up Xiaoming was minimal, and there was no need to explain complex usage rules to the students. From the students' perspective, the process was equally simple—they could start conversations with the chatbot by simply scanning a QR code. This ease of use contributed to the overall efficiency of Xiaoming as a teaching tool. It changed Teacher C's attitude toward chatbot use. She noted:

Firstly, the students have a very low cognitive load to understand this. They do not need to grasp a bunch of rules first and then explore them. They can directly scan it and understand the task they need to perform, which saves a lot of time in the classroom. I think, during practice, they can fully unleash their creativity, work on their grammar, and experiment with different sentence structures. So, it is a very efficient activity.

Trialability: Opportunities for testing and adjusting chatbots

This attribute allowed the teachers to experience chatbot use from a student's perspective and customize chatbots according to their expectations. During this testing phase, the teachers recognized Xiaoming as an effective tool for engaging students in conversation practice. However, they also identified that it was not responsive enough to student input that deviated from the current dialogue. Therefore, they made adjustments based on their experiences and expectations.

Teacher A introduced prompts that would be triggered when students intentionally used off-topic responses. These prompts were designed humorously, featuring emojis, question marks, or phrases like “别扯远了，朋友！（Back to the topic, mate!）” to steer students back to the intended conversation. Meanwhile, she extended the conversation, which could increase more turn-taking between the chatbot and students and thus better engage the students in the communication flow.

Teacher B's adaptation of the chatbot reflected her focus on the compatibility and authenticity of the conversations. She replaced certain words with those she believed the students should pay more attention to. Meanwhile, she modified the dialogues to better align with real-life logic. For example, she changed the greeting in the second conversation from “你好” (hello) to “好久不见” (long time no see), to make the dialogue more natural as people who met their old friends. She replaced the AI-generated portrait image used in

the first conversation, which was supposed to be the photo of Xiaoming's girlfriend. According to Teacher B, the original image appeared "scary" and detracted from the students' conversation experience. By implementing a more visually appealing and approachable image, she aimed to create a more engaging and comfortable communication atmosphere for students.

Observability: Visible communication process

The process of chatbot-student conversations is observable by teachers, which enables them to monitor students' performance and reactions during conversations. This is a form of process-oriented assessment. In this study, chatbot-student communications were observed through two accesses: the records of the conversations provided by the platform Collect.Chat, and teachers' in-class observation of students' reactions to Xiaoming. The records of chatbot-student communication revealed that most students completed the conversation practice, although a few did not take it seriously. Teacher A emphasized students' engagement with the practice and closely monitored their responses. If she found a student did not take the practice seriously, she would ask them to redo the conversations. The records helped Teacher B decide when to intervene. She would explain and highlight the points where most students did not respond properly. It was also observed that Xiaoming could trigger students to talk about their own experiences, which was highlighted by Nunan (1991) as an essential step for learners to practice their communicative proficiency. This could be attributed to the conversation content, which was based on students' campus life, as well as the anxiety-free environment for communication, as previously noted by Teachers A and B.

The teachers' observation of students' reactions confirmed the effectiveness of chatbots in engaging students in conversation practice:

The class was silent when most students concentrated on practising with the chatbot. After all, this is a new way to have conversations; they were attracted by Xiaoming. (Teacher A)

The students enjoyed the conversations with the chatbot. I could tell it from their facial expressions and their laughter every now and then. (Teacher B)

When I walked around to see how they interacted with the chatbot, some students stopped me and discussed with me their conversations with the chatbot. They enjoyed conversing with the chatbot, and it also increased my interaction with the students. I asked them some questions about their conversation content. (Teacher C)

4.3 Teachers' adoption of chatbots: Their innovation-decision process

Teacher A exhibited awareness but limited how-to knowledge of chatbots at the knowledge stage. She tested ChatGPT once and concluded that current chatbots were not technologically mature enough. Besides this technological issue, her reluctance to further explore their use could be attributed to her reliance on her trusted advisors. This was further evidenced in the persuasion stage. When the researcher demonstrated Xiaoming during a planning meeting for upcoming classes, Teacher A did not contribute much to the decision-making process and chose to use the chatbot only after other teachers had decided to do so.

This indicates the impact of interpersonal channels on her technology use. Her attitude toward the chatbot changed during the implementation stage. She recognized the effectiveness of Xiaoming and remarked positively about its use:

Practicing conversations with Xiaoming is more vivid than the conventional methods. It allows students to create their own sentences rather than copying others' answers. Apparently, the students are interested in this new approach.

Teacher A also expressed a desire to continue using chatbots in the future, which indicates a positive descriptor for her confirmation stage, although she changed jobs after the semester and did not have the opportunity to implement this intention.

Compared to Teacher A, Teacher B had more knowledge and was more positive about chatbot use. She used chatbots, particularly ChatGPT, for her personal tasks such as revising her CV and searching for information. However, she was hindered from using them for teaching by her perceived mismatch between the complexity of language used by chatbots and her students' language proficiency. This concern was addressed during the persuasion stage when she learned about Xiaoming from the researcher and discovered that Xiaoming's conversations were tailored to the content she was teaching. Based on the version of Xiaoming provided by the researcher, she edited some content to help students practice the words and sentences that she deemed important. She recognized the capabilities of chatbots as conversation practice partners and noted:

To some extent, chatbots can work as better conversation partners than teachers. As a teacher, although I am a native speaker, sometimes I worry about making language mistakes that might mislead my students. Chatbots can provide accurate sentences and avoid accidental errors.

Similar to Teacher B, Teacher C had positive experiences with chatbots in dealing with her personal tasks but lacked the knowledge of using them for language teaching. Her concern about the complexity of using chatbots, due to her preference for straightforward teaching methods, hindered her from using them for teaching. Her concern about the complexity coexisted with her uncertainty about the effectiveness of chatbots, referred to as "the cost-effectiveness ratio" in the previous section. Her attitude changed during the persuasion and implementation stages. She realized that using chatbots was not as complicated as she had perceived when the researcher introduced Xiaoming to her. This realization made her willing to use Xiaoming in her class. Her hands-on experience with the chatbot further strengthened her intention to use chatbots. She noticed Xiaoming's capability to engage students in conversation flows, which distinguished it from other technologies. In the confirmation stage, she continued to use Xiaoming and recommended it to new teachers in the language teaching program.

The teachers' decision processes were influenced by both mass media and interpersonal communications. Mass media played an important role in the knowledge stage, as evidenced by the teachers' widespread awareness of chatbots, especially prevalent ones such as ChatGPT. Interpersonal communications had a greater impact on their adoption of chatbots, as the researcher played an essential role in addressing the teachers'

perceived obstacles and changing their attitudes toward chatbots. This aligns with Rogers' (2003) explanation of these two communicative channels.

5. Discussion

The perceptions and hands-on experiences of the three teachers in this study can be viewed as a microcosm of the language teaching community's encounter with chatbots. It reveals how teachers' attitudes shifted from reluctance to willingness to integrate chatbots into their future teaching practices. This trajectory provides a snapshot of the current state of chatbot diffusion in language teaching, as well as insights into using chatbots as a new tool to facilitate CLT practice.

The discussion of advanced chatbots in mass media, particularly GenAI-empowered ChatGPT, has given teachers a contradictory impression of chatbots, characterized by both open attitudes and concerns about implementation. The discussion has brought chatbots into the spotlight, contributing to a high level of awareness among the teachers at an early stage of technology adoption. This early familiarity is uncommon compared to other technologies, which usually receive less widespread attention. Notably, all three teachers demonstrated awareness of ChatGPT and had personal experience using it. In this regard, their understanding of chatbots appears to be largely limited to ChatGPT, with no mention of other kinds of chatbots. This aligns with Rogers' (2003) assertion that the influence of mass media on the diffusion process is generally limited. This limited impact is also reflected in teachers' behaviors. When it came to practical implementation, teachers were hindered by concerns such as the complexity and compatibility of chatbots, as mentioned before. They seemed not to be motivated to address these concerns independently before the intervention of this study. Nevertheless, these reservations did not equate to a rejection of chatbot use. On the contrary, the teachers maintained open attitudes and curiosity about using chatbots for teaching, as evidenced by their rapid shift in attitudes towards chatbots later. Overall, mass media have led to a cautious yet intrigued stance among teachers, characterized by a general awareness of chatbots' potential, a limited understanding of the broader landscape of this technology, and hesitancy to take action due to perceived obstacles.

Interpersonal communication was the key factor that changed teachers' attitudes towards chatbot use. This aligns with Rogers' (2003) statement that interpersonal communication was usually more impactful than mass media. In this case study, the authors, who were teacher-researchers, played the role of the change agent in influencing the teachers' chatbot adoption. By introducing a curriculum-informed chatbot, the teacher-researchers helped mitigate the perceived barriers that initially hindered the teachers from adopting chatbots, especially in terms of the compatibility and complexity of integrating chatbots into language teaching. Interpersonal communication also happened between peers, as seen in Teacher A's experience. She reported her reliance on her trusted colleagues, and her decision to use chatbots was influenced by Teachers B and C. These findings align with the broader concept of social intervention as an essential factor in the diffusion of innovations. Social intervention, in this context, refers to the support and communication provided by an expert or peer, which can bridge teachers' initial

perspectives and their hands-on experience with innovations. It is essential during the persuasion stage of the innovation-decision process (Grgurović, 2014; Rogers, 2003).

The presence of the teacher-researcher also demonstrated that a curriculum-informed approach is key to overcoming early-stage barriers to chatbot integration. In this study, perceived challenges related to chatbot compatibility and complexity were mitigated through these curriculum-informed solutions. By grounding the chatbot's use within the curriculum, the teacher-researchers demonstrated how the chatbot could effectively meet the teachers' teaching needs, thus making the technology more relevant and easier to integrate. This approach bridged the gap between the perceived mismatch of the technology and the teachers' instructional needs. Meanwhile, the initial version provided by the teacher-researchers allowed the teachers to test and adapt the chatbot without feeling overwhelmed by the complexity of tailoring it to their own contexts. In this regard, the role of the teacher-researchers was mainly manifested through their enactment of the curriculum-informed approach.

Moreover, chatbot-facilitated CLT introduces a new dimension that extends beyond the traditional categories of instruction-oriented and fun-oriented approaches. While instruction-oriented CLT focuses on structured learning activities and fun-oriented CLT emphasizes engaging and entertaining methods, the use of chatbots enables a socialization-oriented CLT practice. This practice is characterized by providing authentic social interactions that mirror real-life communication. This was emphasized by Teacher B, who highlighted the authentic communication scenarios and formats that simulated daily text-based digital communications. This compensates for fun-oriented CLT, which usually provides tasks or activities based on virtual and decontextualized scenarios (Huang & Liu, 2004) that cannot be directly used in real-life communications. Moreover, chatbots can effectively engage students in communication flows that are aligned with the five features of effective CLT practice listed by Nunan (1991). They provide “anxiety-free environments” (Teacher A) where students can concentrate on communication practice; use authentic materials and “social formats” (Teachers B and C) that help students talk about their own experiences with the target language; and adjust their language complexity to encourage students to work on their own sentences. These features compensate for the limitations of instruction-oriented CLT practice by providing meaningful communicative tasks (Huang & Liu, 2004; Teh, 2021). In this regard, the socialization-oriented CLT practice facilitated by chatbots is characterized by preparing students for real-life social occasions. It allows learners to practice language skills in dynamic, interactive contexts, fostering a sense of connection and engagement. This unique aspect distinguishes chatbots from other technologies used for CLT and may also be leveraged to contribute to sustainable chatbot use in language education.

6. Conclusion, implication, and limitation

To get contextualized insights into the diffusion of chatbots as virtual language partners and fill the gap in studies on teachers' perspectives based on their hands-on experiences (Ji et al., 2023; Mishan & Timmis, 2015; Timpe-Laughlin et al., 2022), this study explores Chinese language teachers' perspectives and use of chatbots as virtual

language partners. From a bottom-up perspective, it has been found that under the heated discussion on chatbots, their implementation in language teaching is still limited. The new wave of chatbots has raised widespread awareness among language teachers, which fosters curiosity and an open attitude toward chatbots. However, this awareness may not be directly translated to chatbot implementation because teachers' knowledge of chatbots is still limited, and some perceived obstacles hinder them from using chatbots for teaching practice. In this regard, social intervention, especially by change agents who can bridge general-purpose chatbots with particular teaching contexts, is essential for further integration of chatbots. This integration is meaningful for language education, given chatbots' potential to enhance CLT practice and their user-friendly feature, which requires no technological expertise. Overall, the findings indicate that it is time to focus on appropriate arrangements for chatbot use rather than technological issues, as noted by Fryer et al. (2020).

This study also provides implications to enhance chatbot integration in language education:

First, a systematic understanding of chatbots is required. It can be seen that teachers' understanding of chatbots is fragmented, mainly based on prevalent ones, such as ChatGPT, while overlooking the diversity of the chatbot family. This family includes both intelligent chatbots and simpler ones like Xiaoming in this study. In this regard, synthesizing and delivering a comprehensive understanding of the broad spectrum of chatbots to language teachers is required (Bibauw et al., 2019). This will lead to a solid understanding of chatbots, effectively addressing the perceived obstacles of teachers.

Second, addressing the lack of how-to knowledge and encouraging hands-on experiences with chatbot use might be the next step to forward chatbot integration in language education. This is significant because, as Timpe-Laughlin et al. (2022) note, "what teachers say they do may not necessarily be the same as what they actually do in the classroom" (p. 1213). They can contribute to further addressing the perceived obstacles of chatbot use, as well as the uncertainty of the effectiveness of chatbot use.

Third, this study highlights the importance of adopting a curriculum-informed approach to tailor chatbots to particular teaching contexts. This is the key step to ensure that chatbots serve as meaningful virtual language partners. It should be the core of teachers' how-to knowledge of chatbot use, which underscores teachers' expertise in guiding the purposeful and pedagogically sound implementation of chatbots.

In terms of limitations, it should be noted that the results in this study come from a small sample of teachers who were involved in a single language program. Thus, the extent to which these findings can be extrapolated to other contexts remains uncertain. Meanwhile, this study focuses on teachers' perspectives and thus lacks responses from students, whose views are also essential for exploring the role of chatbots in facilitating CLT practices. This indicates the demands for future studies to explore various contexts and stakeholder perspectives, as well as those that will provide statistical evidence based on large-scale participants.

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Appendix

Interview questions

1. Please introduce your teaching background in CFL, including how long you have been in this field, the institutions you have worked for, the levels you teach, and what you prioritize in your teaching.
2. What do you know about chatbots?
3. How do you use chatbots?
4. Why don't you use chatbots for your teaching?
5. What do you think about Xiaoming in terms of its relative advantages, complexity, compatibility, trialability, and observability?
6. How do you think of chatbots as virtual language partners?