English Teaching, Vol. 80, No. 1, Spring 2025, pp. 45–69
DOI: https://doi.org/10.15858/engtea.80.1.202503.45
https://journal.kate.or.kr

Exploring EFL Learners' Acceptance of ChatGPT: Application of the Extended Technology Acceptance Model*

Myunghwan Hwang, Eunmi Lee, and Hee-Kyung Lee**

Hwang, Myunghwan, Lee Eunmi, & Lee, Hee-Kyung. (2025). Exploring EFL learners' acceptance of ChatGPT: Application of the extended technology acceptance model. *English Teaching, 80*(1), 45–69.

This research, grounded in the extended technology acceptance model, aimed to explore the relationships among factors influencing Korean EFL learners' acceptance of ChatGPT for English learning in a voluntary usage context. To this end, a questionnaire was distributed to college students who had used ChatGPT for language learning, utilizing a convenience sampling method. A total of 400 responses were analyzed to test hypotheses using structural equation modeling (SEM). Findings revealed that learners' perceived usefulness significantly predicted their intention to continue using ChatGPT, while perceived ease of use did not. Moreover, learners' result demonstrability was found to be a predictor of perceived usefulness, whereas subjective norm was not. Both playfulness and output quality significantly influenced learners' perceived ease of use. This study identified key factors that could enhance EFL learners' acceptance of ChatGPT by improving perceptions of usefulness and ease of use, offering valuable insights for integrating ChatGPT into English education.

Key words: technology acceptance model, ChatGPT-integrated teaching and learning, ChatGPT acceptance model, structural equation modeling, AI technology

*This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2023S1A5B5A16079327).

**First Author: Myunghwan Hwang, Research Professor, Center for Cognitive Science, Yonsei University

Second Author: Eunmi Lee, Research Professor, Keimyung Student Success Center, Keimyung University

Corresponding Author: Hee-Kyung Lee, Professor, Graduate School of Education, Yonsei University; 50 Yonsei-ro, Seodaemun-gu, Seoul 03722, Korea; Email: heelee@yonsei.ac.kr

Received 10 December 2024 ; Reviewed 23 January 2025; Accepted 20 March 2025

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1. INTRODUCTION

With the rapid advancements in artificial intelligence (AI) technology, the potential for generative AI-powered chatbots has garnered significant attention in second language education (Almusharraf & Alotaibi, 2023; Sun, 2023). In particular, ChatGPT is renowned as the key player. Driven by advanced applications of large language models (LLMs), deep learning techniques and natural language processing, ChatGPT has been expected to offer substantial support to both learners and educators in second language settings owing to its capabilities that surpass earlier chatbots. For example, ChatGPT distinguishes itself from previous chatbots by engaging in natural conversations and generating coherent, lengthy texts across various genres (Alharbi, 2023; Dwivedi et al., 2023; Raheem, Anjum, & Ghafar, 2023). It can also translate, summarize texts (Ningrum, 2023), correct grammatical errors, and evaluate writing (Dwivedi et al., 2023; Raheem et al., 2023).

However, regardless of how advanced a technology is, its effective use in educational environments and the realization of its benefits depend on its acceptance and implementation in teaching and learning processes (Linh & Wu, 2023; Liu & Ma, 2024). Accordingly, recent research has examined the prerequisites for accepting ChatGPT in English language teaching (ELT) settings. Notably, these studies have predominantly utilized the Technology Acceptance Model (TAM), which fundamentally explains the intention to continue using technology through its perceived ease of use and perceived usefulness. The findings show that ease of use and usefulness are critical for teachers and learners to accept and utilize ChatGPT in English teaching and learning. Moreover, it has been established that the factors such as user motivation (Zou, Lyu, Han, Li, & Zhang, 2023) and perceived convenience (Peng, Xu, & Xu, 2023) precede perceived ease of use and perceived usefulness. In summary, for ChatGPT to be successfully adopted in English educational settings, it must be easy to use and provide significant benefits for English learning or teaching. Additionally, it is important to manage the necessary external conditions to ensure users perceive ChatGPT as user-friendly and beneficial for teaching or learning.

As noted earlier, the high regard for ChatGPT's potential in English education has driven previous research to focus on identifying the conditions necessary for its successful acceptance and integration in ELT settings. However, a comprehensive review of prior studies has revealed several limitations. First, earlier studies on the acceptance conditions of ChatGPT in the ELT field have primarily concentrated on perceived usefulness and perceived ease of use as the main factors influencing learners' acceptance (Hellemans, 2023; Liu & Ma, 2024; Mutammimah, Rejeki, Kustini, & Amelia, 2024; Peng et al., 2023; Zou et al., 2023). However, these studies have not adequately examined the precursor conditions for usefulness and ease of use. To implement more practical educational measures, it is crucial to understand the reasons users find the technology easy to use and are satisfied with

its results. Second, although several studies have explored the antecedent conditions for ease of use and usefulness based on the extended TAM models, there are still several issues to be addressed. To begin with, these studies have predominantly focused on teachers rather than learners (Alrishan, 2023; Dehghani & Mashhadi, 2023). While teachers play a crucial role in English education, learners may have different experiences and perceptions of the same technology, as well as different purposes for using it. Consequently, the antecedent conditions for ease of use and usefulness identified for teachers cannot be presumed to be applicable to learners. In addition, the antecedent conditions for learners' usefulness and ease of use are found to be less specific. That is, prior studies have presented these conditions as composite variables rather than as distinct external factors (Hellemans, 2023; Lee, Yu, & Lim, 2020; Lin & Yu, 2023). Therefore, this approach has failed to ensure specificity and prioritize their importance.

This study aims to address the gaps identified in previous research. First, it introduces the ChatGPT Acceptance Model (CAM), an adaptation grounded in TAM3—an extended version of the original Technology Acceptance Model—to determine key factors influencing EFL learners' adoption of ChatGPT. Within this model, subjective norm and result demonstrability were identified as key predictors of learners' perceived usefulness, while playfulness and objective usability were specified as predictors of perceived ease of use. Moreover, the model assumes a self-directed learning environment, wherein learners voluntarily use ChatGPT, aligning with the growing trend of such environments at the tertiary level. Second, it examines the relationships among the factors within the CAM, with a particular focus on identifying the factors that best explain perceived usefulness, ease of use, and learners' intention to continue using ChatGPT for language learning. Ultimately, the study proposes pedagogical strategies that facilitates the seamless adoption of ChatGPT and its effective integration into language teaching and learning. The specific research objectives driving this investigation are outlined below:

1) Do subjective norm and result demonstrability impact EFL learners' perceptions of ChatGPT's usefulness? If so, which one has a greater effect on perceived usefulness?
2) Do playfulness and objective usability affect EFL learners' perceived ease of use for ChatGPT? If so, which one has a stronger influence on ease of use?
3) Do perceived usefulness and ease of use shape EFL learners' intentions to continue using ChatGPT? If so, which one plays a more significant role in influencing their intention?

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2. Literature Review

2.1. The Impact of ChatGPT in ELT Pedagogy

ChatGPT, launched by OpenAI in November 2022, is a versatile generative AI chatbot designed for multiple purposes. It can engage in smooth conversations and perform tasks such as translation, answering questions, and even generating creative texts, previously regarded exclusive to humans. Thus, it is recognized for its potential as a scaffolding tool for language learning support (Ningrum, 2023).

Specifically speaking, the use of ChatGPT in learning English can aid in the improvement of learners' English skills and positively influences their affective attributes which can enhance the learning process. For example, consistent findings show that EFL learners have enhanced their language skills including writing (Maghamil & Sieras, 2024; Song & Song, 2023), speaking (Pratiwi, Efendy, Rini, & Ahmed, 2024), grammar (Maghamil & Sieras, 2024; Song & Song, 2023) and vocabulary (Mugableh, 2024; Zhang & Huang, 2024) with the help of ChatGPT. Furthermore, using ChatGPT in the English learning process has helped reduce EFL learners' anxiety about speaking and writing in English (Song & Song, 2023), while also significantly boosting their motivation to learn English (Ali, Shamsan, Hezam, & Mohammed, 2023; Yildiz, 2023).

The ChatGPT's effectiveness as a useful English learning tool is also evident in the feedback from learners who have utilized it. More specifically, learners indicated that ChatGPT improved their language skills (Im, 2023; Mun, 2024; Phuong, 2024; Shaikh, Yayilgan, Klimova, & Pikhart, 2023; Syahid et al., 2023), helped them complete language tasks (Hasanah & Nurcholis, 2024; Im, 2023; Lee & Park, 2023), offered personalized support (Bin-Hady, Ali, & Al-humari, 2024; Rahim, Rahim, Razawi, & Mohamed, 2023; Syahid et al., 2023), and promoted their autonomy in learning English (Xiao & Zhi, 2023). Learners also noted that ChatGPT is user-friendly (Bin-Hady et al., 2024; Shaikh et al., 2023), and that they experienced high efficiency in acquiring information due to its immediate feedback, flexible and contextual responses, and conversational method (Bin-Hady et al., 2024; Fitria, 2023; Mun, 2024; Shaikh et al., 2023), all of which streamlined the learning process. Additionally, learners reported that using ChatGPT increased their motivation and confidence in learning English while reducing their anxiety (Liu, 2023; Mun, 2024; Rahim et al., 2023).

To summarize, learners can enhance their English skills and enjoy various positive learning experiences through ChatGPT. However, for ChatGPT to be a beneficial tool in English learning and positively impact learners, it needs to be effectively integrated into learners' learning routine. This necessitates consistent use and interaction with ChatGPT. Thus, it is important to discuss how to increase learners' intention to continue using

ChatGPT. This study explores the relationship between the intention to continue using ChatGPT and the factors that affect this intention, suggesting ways to promote the ongoing use of ChatGPT among English learners.

2.2. The Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), created by Davis in 1989, aims to predict the probability of new technology adoption within organizations and to explain the adoption process (Davis, 1989). TAM has been highly regarded as one of the most effective frameworks for comprehending the factors that facilitate the acceptance of new technologies. Furthermore, the model is frequently considered more effective than related models, such as the Theory of Reasoned Action or the Theory of Planned Behavior, in predicting intentions to accept technology (Venkatesh & Davis, 2000).

In its initial version, the TAM included perceived usefulness and perceived ease of use as the main predictors of users' intentions to adopt a technology and continue using it (Davis, 1989). Perceived usefulness describes the extent to which an individual believes that employing a particular system or technology will improve their job performance or productivity. On the other hand, perceived ease of use denotes the extent to which an individual believes that using the system or technology will require minimal effort. Despite its success in explaining the intention to use technology, the original TAM lacked detail on the sources of perceived usefulness and perceived ease of use (Marikyan & Papagiannidis, 2023). This limitation led to the model's expansion to elucidate these factors in various contexts, thereby enhancing the original TAM.

The original TAM was initially expanded to TAM2 by adding factors that influence perceived usefulness (Venkatesh & Davis, 2000). Specifically, TAM2 includes subjective norm, job relevance, output quality, and result demonstrability as key factors. Subjective norm refers to the influence from others to adopt new technology like ChatGPT (e.g., recommendations from teachers or friends to use ChatGPT). Job relevance indicates the relevance of the technology to specific tasks (e.g., the suitability of using ChatGPT fine-tuned for English learning). Output quality signifies the excellence of results from using the technology (e.g., Objective improvement in learners' English skills). Result demonstrability pertains to the clarity and visibility of the technology's results (e.g., learners' experience and perception of ChatGPT's usefulness).

Next, TAM2 expanded on the factors that influence perceived ease of use, with further elaboration in TAM3 (Venkatesh & Bala, 2008). The primary factors contributing to perceived ease of use include computer anxiety, computer self-efficacy, perception of external control, playfulness, perceived enjoyment, and objective usability. Computer anxiety indicates the level of fear associated with using computers, while computer self-

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efficacy denotes confidence in one's computer abilities. Perception of external control is the belief that organizational and technical support is available to solve problems with technology. Playfulness is the enjoyment and engagement derived from using computers for exploration and experimentation (e.g., creative manipulation of ChatGPT in a state of flow). Perceived enjoyment is the pleasure and interest gained from using technology, and objective usability is the actual usability of the technology, as determined by objective measures like task completion time, or error rates (e.g., prompt feedback for L2 writing from ChatGPT).

2.3. Theoretical ChatGPT Acceptance Model (CAM) for English Learners

The TAM provides the advantage of adaptability and presents a structural framework for the acceptance of new technologies (Venkatesh & Bala, 2008). This allows researchers to develop models based on TAM that address the acceptance intentions of specific technologies within their particular contexts. Leveraging this flexibility, this study proposed a theoretical ChatGPT acceptance model (CAM) for EFL learners and regarded perceived usefulness (PU), perceived ease of use (PEU), subjective norm (SN), result demonstrability (RD), playfulness (PF), and objective usability (OU) as crucial factors influencing learners' intentions to continue using ChatGPT (ICUC) in an autonomous English learning environment that integrates ChatGPT.

More specifically, PU was operationalized as learners' perception of ChatGPT's utility for completing English language tasks, while PEU referred to the ease with which learners believe they can use ChatGPT for these tasks. These two variables have been recognized as key factors in technology acceptance from the beginning of TAM, supported by extensive research, where PU had a direct effect on the intention to use technology (Al-Abdullatif, 2023; Jeong, 2023; Venkatesh & Davis, 2000), and PEU influenced the intention to use technology indirectly via PU (Shen & Eder, 2009; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003). Nonetheless, some studies have also indicated that PEU can directly affect technology acceptance (Hellemans, 2023; Jeong, 2023; Zou & Huang, 2023). This study presents the following hypotheses, based on the relationships among PU, PEU, and ICUC.

H1. PU will positively predict ICUC.
H2. PEU will positively predict ICUC.
H3. PEU will positively predict PU.

Next, SN was defined as the degree to which individuals are encouraged by their surroundings to use ChatGPT for English learning, and RD as the degree to which learners recognize and can convey the usefulness of ChatGPT to others. Previous research shows that

these two variables are the most influential in predicting the PU of technology (Venkatesh & Bala, 2008). RD has been found to consistently explain PU in various technology acceptance scenarios (Soodan, Jamwal, Rana, Sharma, & Chakraborty, 2024; Venkatesh & Bala, 2008; Yuan, Lin, Yang, Wang, & Hsu, 2021), and SN has also been confirmed to explain PU positively (Izuagbe, Ifijeh, Izuagbe-Roland, Olawoyin, & Ogiamien, 2019; Venkatesh & Bala, 2008). It is noteworthy that RD continues to influence technology acceptance over time, regardless of technology adaptation, while SN's influence diminishes with adaptation (Venkatesh & Bala, 2008). Moreover, in environments where technology use is autonomous, SN's impact on PU has been reported to be minimal (Venkatesh & Davis, 2000). This study, considering the relationships among SN, RD, and PU, proposes the following hypotheses:

H4. SN will positively predict PU.
H5. RD will positively predict PU.

Lastly, PF was defined as the perceived extent to which learners experience exploration, experimentation, and engagement while using ChatGPT, whereas OU as the usability learners perceive when using ChatGPT for English language tasks. Both PF and OU have been considered variables that directly affect PEU. It is important to note that higher levels of PF and OU correspond to higher perceived levels of PEU (Ajala & Adetimirin, 2018; Burney, Ali, Ejaz, & Siddiqui, 2017; Ke, Sun, & Yang, 2012; Shen & Eder, 2009). However, findings from prior studies suggest that the effect of PF on PEU can decrease over time, while the effect of OU on PEU can increase over time (Venkatesh & Bala, 2008). Based on these relationships, this study has established the following hypotheses:

H6. PF will positively predict PEU.
H7. OU will positively predict PEU.

The proposed CAM for English Learners is depicted in Figure 1. Meanwhile, taking into account the factors such as the learner traits, Korean English learning environment, the technical features of ChatGPT, and the need for a parsimonious model, the CAM omitted variables such as computer anxiety, computer self-efficacy, perception of external control, job relevance, perceived enjoyment and output quality. The reasoning behind these exclusions is detailed below.

First, this study did not address computer anxiety or computer self-efficacy, primarily because ChatGPT's user-friendly platform and interface make it highly accessible and promote natural, human-like interactions. As a result, using ChatGPT is simple and straightforward. Previous research suggests that the impact of computer anxiety or self-

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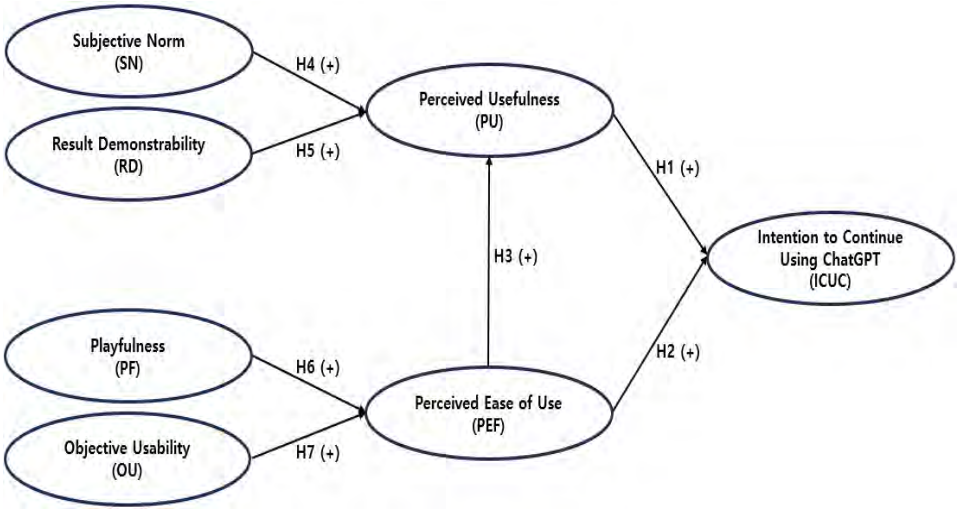
efficacy on technology adoption might be contingent on the technology's complexity. Specifically, the effect of these factors on perceived ease of use tends to increase with more complex technology but decreases when the technology is easy to use (Beaudry & Pinsonneault, 2005; Compeau & Higgins, 1995; Venkatesh & Bala, 2008). Indeed, EFL learners generally perceived ChatGPT as easy to use (Shaikh et al., 2023). Therefore, given the simplicity of ChatGPT, it is reasonable to predict that computer anxiety and computer self-efficacy would have little influence on learners' perceived ease of use.

FIGURE 1

Theoretical ChatGPT Acceptance Model (CAM) for English Learners



Second, the perception of external control is closely connected to the availability of technical support for errors occurring during the use of ChatGPT. Nonetheless, in reality, it is impossible for users—whether individuals, universities, or other institutions—to access the source of these errors. The only viable method to resolve technical issues that arise in the ChatGPT process is to contact the developers. Additionally, to the best of our knowledge, there is very limited official support for the use of ChatGPT in Korean universities because the integration of ChatGPT into conventional language teaching and learning contexts is still under discussion. Given the difficulty in exerting external control over ChatGPT, we concluded that it would be inappropriate to survey users' perceptions of external control.

Third, this study also excluded job relevance. As previously discussed, job relevance typically pertains to the connection between job duties and the use of technology. Therefore, the relationship between Job relevance and perceived usefulness was deemed more applicable to interactions between teachers and ChatGPT than to those between learners and ChatGPT.

Fourth, considering the significant overlap between perceived enjoyment and playfulness, perceived enjoyment was omitted from the model for the sake of model parsimony. Specifically, both constructs capture the positive emotional reactions users have when engaging with technology, affecting key factors such as perceived ease of use. Since playfulness inherently encompasses enjoyment through exploration and fun, it effectively captures the emotional responses that drive technology acceptance. Moreover, as English learning through learners' voluntary engagement with ChatGPT is expected to involve substantial exploration, creativity, and self-directed learning, playfulness was deemed more suitable than perceived enjoyment.

Lastly, output quality was omitted from CAM because learners encounter practical difficulties in objectively determining whether the outcomes they obtain through ChatGPT are of higher quality. In particular, it is hard for learners to gauge the objective improvement in their language skills such as writing, vocabulary, and grammar after using ChatGPT, as compared to their abilities prior to the interaction. Learners typically recognize and express the benefits gained from their interactions with ChatGPT, which are more effectively reflected in result demonstrability rather than in output quality.

3. METHODOLOGY

3.1. Sampling Procedure and Participants

We adopted a quantitative approach to test our research hypotheses, using a questionnaire to gather data through a convenience sampling method. The questionnaire was created in Korean by the researchers using the Google Survey platform, and distributed across various platforms. First, it was shared via the learning management system (LMS) of a class taught by one of the study members at a private 4-year university located in the Daegu region of South Korea. The class, a mandatory one-credit general education class graded on a pass/fail basis, enrolls approximately 2,200 students per semester. It focuses on enhancing knowledge of AI-related topics across diverse disciplines and is delivered through remote video lectures, where students watch pre-recorded video lectures throughout the course and complete assignments based on designated tasks. Given the course objectives and its structure, it was deemed suitable for recruiting target participants for this study. Second, the questionnaire was also distributed through social media platforms, such as Naver Cafes, to include participants from various demographic groups.

The survey was conducted over a period of about five months. The recruitment criteria included: (1) participants must have a Korean EFL background; (2) participants must be college students; (3) participants must have used a generative AI chatbot for autonomous

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language learning; and (4) participants must voluntarily participate, adhering to ethical standards. A total of 783 Korean EFL college students were recruited based on these criteria. Of these, 383 samples were excluded. Specifically, consent to participate in the survey was not provided by 41 respondents. 266 respondents stated that they had never used a chatbot for learning English, while 76 respondents reported using other chatbots, such as Bing and Bard, but not ChatGPT. Furthermore, after analyzing the data, the responses of 50 participants were judged to be insincere and were subsequently excluded. Consequently, 400 samples were used for data analysis, satisfying the absolute minimum sample size requirement of 200 (Kline, 2016) and the relative requirement that the sample size should exceed 10 times the number of observed variables (Bae, 2011) for structural equation modeling (SEM).

The demographic profile of the 400 participants is as follows: Among them, 54.3% (N = 217) were male, and 45.8% (N = 183) were female. In terms of age distribution, 65.3% (N = 261) were aged 20–22, 24.8% (N = 99) were aged 23–25, and the remaining 10.1% were older than 26. Concerning their academic majors, 29.5% (N = 118) were engineering majors, 23.0% (N = 92) were in social sciences, 20.8% (N = 83) were in humanities, 16.0% (N = 64) were in arts, 9.0% (N = 36) were in natural sciences, and 1.8% (N = 7) were in other disciplines. Approximately 58.8% were freshmen, 18.3% (N = 73) were juniors, 13.8% (N = 55) were seniors, and 9.3% were sophomores. This uneven distribution of academic years may be attributed to the higher proportion of freshmen enrolled in the university course through which the questionnaire was distributed. Furthermore, more than 55.5% (N = 222) of participants reported having 10 to 15 years of English learning experience, 37.8% (N = 151) had less than 10 years, and 6.8% (N = 27) had more than 15 years.

3.2. Instruments

This study adopted 27 items from the TAM3 concepts, allocated as follows: 3 items for ICUC, 4 items for PU, 4 items for PEU, 4 items for SN, 4 items for RD, 4 items for PF, and 4 items for OU. These measures were evaluated using a 5-point Likert scale, where 5 represented ‘strongly agree’ and 1 represented ‘strongly disagree.’ The items were minimally adapted to refer to ChatGPT for this study, based on scales used in previous studies such as Davis (1989), Venkatesh and Davis (2000), and Venkatesh and Bala (2008) for ICUC, PU, and PEU, Almahri, Bell, and Merhi (2020), Habibi et al. (2023), and Venkatesh and Bala (2008) for SN, Venkatesh and Bala (2008) for RD, and Venkatesh and Davis (2000) for PF and OU (see Appendix for the complete list of items). Finally, the scale reliability calculated prior to data cleaning was found to be satisfactory, with Cronbach’s α values of .828 for ICUC, .833 for PU, .785 for PEU, .892 for SN, .841 for RD, .856 for PF, and .788 for OU.

3.3. Data Analysis

This study employed SEM to test the hypotheses. Before the analysis, several preliminary data analyses were conducted. First, descriptive statistical analysis was conducted to examine the distribution, mean, and standard deviation of each item and the components of CAM. Second, multicollinearity among variables and the adequacy of the sample were assessed using the Variance Inflation Factor (VIF), Bartlett's test of sphericity, and the Kaiser-Meyer-Olkin (KMO) test. Third, the scale's convergent and discriminant validity, including reliability, were assessed through Cronbach's α, composite reliability (CR), and average variance extracted (AVE). Fourth, the correlation coefficient was calculated to investigate the relationships between variables of TAM3. Fifth, the robustness of the measurement model was assessed using various model fit indexes such as χ^2/df, RMR, GFI, TLI, CFI, and RMSEA. Finally, SEM was applied to explore the hypothesized relationships between the variables of TAM3. The robustness of the structural model was evaluated using the same model fit indexes as those used for the measurement model. The analyses were performed using SPSS 22.0 and Amos 18.0, with a statistical significance threshold set at $p < .05$ for hypothesis testing.

4. Results

4.1. Measurement Model Analysis: Data Appropriateness, Scale Reliability, and Validity

As stated earlier, this study tested the hypotheses proposed by CAM using SEM, with the MLE method employed for parameter estimation. To ensure the validity of the results from the SEM, the normality of the observed variable distributions was confirmed before estimating parameters. Additionally, confirmatory factor analysis (CFA) was conducted to verify that each concept within the model was accurately measured as intended. Specifically, convergent validity for each concept was assessed by confirming that the standardized regression coefficient was ≥ 0.5, CR was ≥ 0.7, AVE was ≥ 0.5, and Cronbach's α was ≥ 0.6 (Yu, 2012). Furthermore, discriminant validity for each concept was evaluated by ensuring that AVE was greater than the squared correlation coefficients, or $Ø^2$ (Fornell & Larcker, 1981). Detailed results on data appropriateness, as well as the reliability and validity of the measurement tools, are presented in Table 1 below.

To start, to assess the convergent validity of each construct, standardized regression coefficients, CR values, Cronbach's α and AVE values were calculated for the observed variables. The results showed that all observed variables except for 3 items had standardized

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regression coefficients of 0.5 or higher, CR values of all constructs were above 0.8, Cronbach's α values exceeded 0.7, and the AVE was at least 0.5 or higher. The 3 items which failed to meet the criteria were PEU2 (*M* = 4.24, *SD* = .684, *SK* = -.672, *K* = .864), RD1(*M* = 3.90, *SD* = .836, *SK* = -.737, *K* = .747), and OU3(*M* = 3.67, *SD* = .824, *SK* = -.173, *K* = -.351), which of all were subsequently deleted. Furthermore, to validate the discriminant validity of all constructs, the condition AVE > $\emptyset^2$ was confirmed, establishing that AVE values for all constructs were higher than the highest squared inter-construct correlation (*r* = .751 for PU and ICUC, $\emptyset^2$ = .56), thereby verifying the discriminant validity of the measurement tool.

TABLE 1

Results of the Measurement Model

Construct	Item	*M*	*SD*	*SK*	*K*	β	CR	AVE	Cronbach's α
ICUC	ICUC1	4.25	0.800	-1.076	1.26	.75	.884	.718	.828
	ICUC2	4.13	0.871	-.860	.330	.85			
	ICUC3	4.30	0.747	-.847	.243	.76			
PU	PU1	4.08	0.786	-.676	.222	.81	.901	.695	.833
	PU2	4.20	0.707	-.742	1.003	.71			
	PU3	4.14	0.791	-.677	.191	.75			
	PU4	4.19	0.684	-.552	.571	.70			
PEU	PEU1	4.18	0.781	-1.06	1.933	.63	.830	.620	.729
	PEU3	4.15	0.754	-.502	-.347	.74			
	PEU4	4.23	0.700	-.752	1.005	.70			
SN	SN1	3.40	1.055	-.102	-.835	.81	.886	.661	.892
	SN2	3.27	0.999	-.050	-.563	.87			
	SN3	3.26	1.074	-.168	-.693	.80			
	SN4	3.19	1.025	-.065	-.612	.81			
RD	RD2	4.08	0.784	-.705	.486	.67	.853	.661	.783
	RD3	4.08	0.824	-.686	.287	.75			
	RD4	4.13	0.752	-.458	-.372	.79			
PF	PF1	3.94	0.828	-.717	.635	.79	.895	.682	.856
	PF2	4.04	0.840	-.780	.625	.84			
	PF3	4.06	0.847	-.895	1.073	.76			
	PF4	4.05	0.865	-.899	.940	.72			
OU	OU1	4.17	0.711	-.380	-.525	.70	.847	.648	.755
	OU2	3.83	0.820	-.443	.075	.75			
	OU4	3.92	0.735	-.445	.392	.69			

Note. ICUC = Intention to Continue Using ChatGPT; PU = Perceived Usefulness; PEU = Perceived Ease of Use; SN = Social Norm; RD = Result Demonstrability; PF = Playfulness; OU = Objective Use

Next, skewness and kurtosis values were examined to determine if the remaining observed variables adhered to a normal distribution. The findings indicated that skewness values for all variables ranged between -2 and +2, while kurtosis values fell between -7 and +7, signifying that the observed variables were normally distributed (Hair, Black, Babin, & Anderson, 2010). Moreover, sample adequacy was evaluated using the Kaiser-Meyer-Olkin (KMO) test, and Bartlett's test of sphericity. The KMO value was .939, and Bartlett's test of sphericity was significant (χ^2 [276] = 5193.28, $p < .001$), confirming that the covariance matrix among the observed variables is not an identity matrix. These findings indicate the presence of correlations between variables, suggesting that the data meet the conditions necessary for SEM analysis.

Meanwhile, we examined how well the measurement model accounted for the data. The model fit indexes showed that the model fit the data satisfactorily as displayed in Table 2, meeting the model fit criteria (Yu, 2012), with χ^2/df = 1.50, SRMR = .034, GFI = .93, TLI = .97, CFI = .98, and RMSEA = .04.

TABLE 2

The Measurement Model Fit

Model Fit Type	χ^2/df	SRMR	GFI	TLI	CFI	RMSEA
Measurement Model	1.50	.034	.93	.97	.98	.04
Fit Criteria	≤ 3.0	≤ .05	≥ .90	≥ .90	≥ .90	≤ .08

4.2. Descriptive and Correlation Analysis of Variables

Before conducting the hypothesis test, the distribution, correlations, and multicollinearity among the seven latent variables comprising the CAM were examined. The findings are presented in Table 3.

Analyzing the means of each latent variable revealed that, with the exception of SN, all variables had means close to 4 points. In particular, ICUC showed the highest average, whereas SN exhibited the lowest, reflecting a strong willingness among Korean EFL learners to persist in using ChatGPT for English learning, coupled with a low inclination to accept ChatGPT through others' recommendations or advice.

Regarding variable relationships, according to the criteria defined by Yoon (2000)—a range of .00–.20 indicating nearly no correlation, .20–.40 representing a weak correlation, .40–.60 signifying a moderate correlation, and above .60 indicating a strong correlation—ICUC showed strong correlations with PU ($r = .751$, $p < .01$) and PEU ($r = .666$, $p < .01$). Additionally, PU exhibited a weak correlation with SN ($r = .299$, $p < .01$) and a strong correlation with RD ($r = .633$, $p < .01$). Similarly, PEU demonstrated moderate correlations with PF ($r = .535$, $p < .01$) and OU ($r = .467$, $p < .01$).

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Moreover, the skewness values for the seven latent variables ranged from -2 to 2, while the kurtosis values ranged from -7 to 7. This suggests that all latent variables are normally distributed, further justifying the use of MLE for parameter estimation in SEM. Finally, as a result of assessing multicollinearity among variables, the VIF values for all variables in the CAM ranged from 1.108 to 2.536, indicating no multicollinearity.

TABLE 3

Results of Descriptive and Correlation Analysis

	ICUC	PU	PEU	SN	RD	PF	OU
ICUC	1						
PU	.751**	1					
PEU	.666**	.683**	1				
SN	.206**	.299**	.282**	1			
RD	.694**	.703**	.633**	.282**	1		
PF	.549**	.531**	.535**	.279**	.607**	1	
OU	.519**	.525**	.467**	.217**	.566**	.557**	1
M	4.230	4.155	4.188	3.277	4.094	4.024	3.973
SD	.697	.606	.601	.903	.657	.706	.620
SK	-1.098	-.803	-.786	-.046	-.601	-.887	-.495
K	1.134	.585	.502	-.737	-.148	.949	-.115

Note. ICUC = Intention to Continue Using ChatGPT; PU = Perceived Usefulness; PEU = Perceived Ease of Use; SN = Social Norm; RD = Result Demonstrability; PF = Playfulness; OU = Objective Use; SK=Skewness; K=Kurtosis

** $p < .01$

4.3. Hypothesis Testing for CAM

Before proceeding with hypothesis testing, the CAM model's fit to the data was evaluated. As illustrated in Table 4, the structural model of CAM was well-suited to the data.

TABLE 4

The Structural Model Fit

Model Fit Type	χ^2/df	SRMR	GFI	TLI	CFI	RMSEA
Measurement Model	1.77	.047	.92	.96	.96	.04
Fit Criteria	≤ 3.0	≤ .05	≥ .90	≥ .90	≥ .90	≤ .08

The study's proposed hypotheses were then tested. The results, displayed in Figure 2 and Table 5, showed that all hypotheses, except for Hypothesis 2 and 4, were supported. To elaborate, PU positively predicted ICUC (β = .89, $p < .001$), and PEU positively predicted PU (β = .50, $p < .001$). Similarly, RD positively predicted PU (β = .53, $p < .001$), PF positively predicted PEU (β = .36, $p < .001$), and OU positively predicted PEU (β = .45, $p < .001$). In contrast, PEU did not predict ICUC (β = .05, $p = .63$), and SN did not predict PU (β = .00, $p = .99$). Together, these results indicate that PU is the primary predictor of ICUC,

RD is the main predictor of PU, and although PEU is influenced by both PF and OU, OU has a stronger effect on PEU than PF.

FIGURE 2

Structural Model for CAM

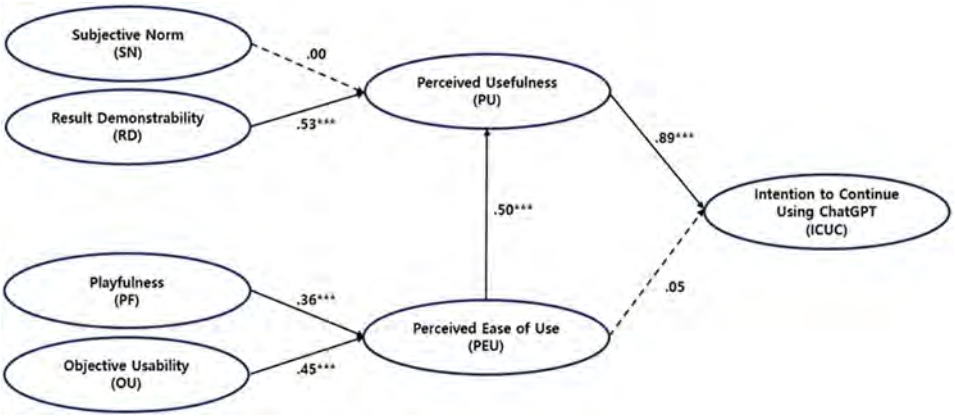

TABLE 5

Results of Descriptive and Correlation Analysis

Hypotheses	β	*t*	*p*	Testing results
H1: PU → ICUC	.89	8.57	< .001	Support
H2: PEU → ICUC	.05	.48	.63	Reject
H3: PEU → PU	.50	7.39	< .001	Support
H4: SN → PU	.00	.02	.99	Reject
H5: RD → PU	.53	8.01	< .001	Support
H6: PF → PEU	.36	4.40	< .001	Support
H7: OU → PEU	.45	5.00	< .001	Support

Note. ICUC = Intention to Continue Using ChatGPT; PU = Perceived Usefulness; PEU = Perceived Ease of Use; SN = Social Norm; RD = Result Demonstrability; PF = Playfulness; and OU = Objective Use

5. Discussion

This study aimed to investigate the conditions and their relationships that can explain Korean EFL learners' acceptance of ChatGPT in a voluntary use environment. In particular, this study carried out the investigation by introducing a CAM tailored for ChatGPT-integrated language teaching and learning, grounded in the extended TAM3. The model successfully explained the data gathered and offered a theoretical foundation for understanding the conditions that enable learners to accept ChatGPT and engage actively in English classes utilizing this technology. Furthermore, it aided in examining the

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interconnections among these conditions, not only enhancing our understanding of learner adoption perceptions but also providing practical insights for designing and implementing effective chatbot-driven learning teaching and learning strategies. Thus, the CAM's implications extend beyond academic contributions, offering a roadmap for educators, policymakers, and curriculum developers to create more learner-centered and accessible technological solutions in English education. More specifically, the structural analysis findings of the CAM and their pedagogical implications are discussed below.

First, in investigating whether PU and PEU predict ICUC, it was found that only PU acts as a predictor of ICUC. Additionally, analysis showed that PEU positively influences PU. These findings align with earlier studies, which revealed that PU directly predicts the intention to use technology (Al-Abdullatif, 2023; Jeong, 2023; Venkatesh & Davis, 2000), whereas PEU does not (Shen & Eder, 2009; Venkatesh & Davis, 2000; Venkatesh et al., 2003). Furthermore, previous research utilizing the TAM model to examine the effects of PU and PEU on the intention to use technology generally have suggested that PU has a greater influence than PEU in predicting it (Venkatesh & Davis, 2000; Venkatesh et al., 2003). By integrating the current study's findings with those from prior research, it becomes evident that for achieving high ICUC, the productivity derived from ChatGPT use is more crucial than its ease of use.

The stronger influence of PU over PEU in shaping the ICUC may be attributed to ChatGPT's practical features that enhance English learning efficiency, along with the convenience it provides. Research has repeatedly indicated that English learners can improve their learning efficiency by utilizing ChatGPT. For example, ChatGPT can offer instant feedback (Tseng & Lin, 2024), even when English teacher is not available. Additionally, learners can now save time on searches by leveraging ChatGPT, thus making their learning process more efficient (Xu, Feng, & Chen, 2023). Furthermore, learners can engage with ChatGPT in real-time, enabling them to practice English conversation in a natural context whenever they choose (Üstünbaş, 2024). On the other hand, ChatGPT functions as a conversational chatbot, making it accessible to learners without requiring specialized AI knowledge. Studies have consistently demonstrated that when a technology is user-friendly, PEU may not significantly affect the intention to adopt it (Zou et al., 2023).

Second, among the factors influencing PU, only RD was found to predict PU, while SN did not impact PU. These results may be due to the context in which EFL learners voluntarily use ChatGPT for language learning. Prior research indicates that the effect of SN on PU can vary depending on the level of autonomy present. In simple terms, when autonomy is ensured, the influence of SN on PU is generally minimal (Venkatesh & Davis, 2000). Moreover, in environments where technology use is mandatory, the impact of SN on PU is significant only initially, but it tends to diminish or disappear over time (Venkatesh & Bala, 2008). This study, conducted in a context where English learners autonomously use

ChatGPT, thus aligns with earlier findings that SN does not predict PU.

In contrast, RD has been recognized as a significant factor in predicting PU regardless of the technology usage environment. This is because the tangibility of the outcomes from using a technology not only helps users more clearly perceive the benefits they gain, but it also clarifies the rationale for employing the adopted technology (Venkatesh & Davis, 2000). Given the nature of RD, a higher level of RD can strengthen EFL learners' belief in the strong link between using ChatGPT and achieving tangible results in language tasks, which can lead to greater satisfaction with the technology (Goodhue & Thompson, 1995). Furthermore, increased visibility of results when using ChatGPT can motivate users to devote more time and effort to the innovation, thereby reaching their usage goals more quickly, enhancing the quality of learning outcomes in a more noticeable way, and ultimately increasing PU. Indeed, this argument is supported by studies showing that RD can prompt users to engage more actively with the technology, thus driving the enhancement of PU (Venkatesh & Bala, 2008). These findings highlight the importance of learners directly engaging with and building positive experiences with ChatGPT during English learning to enhance PU, rather than relying on external incentives such as recommendations and praise for ChatGPT from others.

Third, PF and OU as predictors of PEU revealed that both factors significantly influence PEU, aligning with findings from previous research (Ajala & Adetimirin, 2018; Burney et al., 2017; Ke et al., 2012; Shen & Eder, 2009). Although PEU did not have a direct impact on the ICUC in this study, it plays a critical role in PU (Shen & Eder, 2009; Venkatesh & Davis, 2000; Venkatesh et al., 2003). Thus, identifying factors that influence PEU is still essential. More specifically, the average PF score in this study suggests that EFL learners have likely approached using ChatGPT in a creative and playful manner. Moreover, their originality may enhance their positive emotions and attitudes toward ChatGPT, reducing anxiety and making the technology easier to use. The similar effect of PF on PEU has been reported in prior studies, where users who are comfortable experimenting with technology tend to exhibit a lower fear of mistakes (Venkatesh et al., 2003; Webster & Martocchio, 1992) and greater user engagement (Moon & Kim, 2001) as well as intrinsic motivation to use the technology (Venkatesh & Davis, 2000). This leads to deeper exploration of the technology (Moon & Kim, 2001), facilitating more effortless and convenient use.

Meanwhile, OU is closely associated with the efficiency and effectiveness of task completion (Venkatesh & Bala, 2008). Hence, for OU to be well-perceived, technology must support faster and more accurate task completion. Studies consistently demonstrate that learners have a positive perception of ChatGPT's OU. For instance, learners have expressed satisfaction with the prompt responses and immediate feedback provided by ChatGPT (Bin-Hady et al., 2024; Fitria, 2023; Mun, 2024; Shaikh et al., 2023). Additionally, ChatGPT has been recognized to own a user-friendly interface (Bin-Hady et al., 2024; Shaikh et al., 2023)

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and a conversational interaction style with learners (Bin-Hady et al., 2024; Fitria, 2023), making it relatively straightforward for users to learn how to use it. reducing cognitive load, and thus increasing the likelihood that learners will find ChatGPT easy to use.

The findings from this study could have several pedagogical implications that may help EFL learners accept ChatGPT and incorporate the technology into their English learning.

First, in this study, we discovered that heightened awareness of PU is vital for improving ICUC, and that enhancing learners' RD is key to increasing PU awareness. This indicates that English teachers who plan to incorporate ChatGPT into their lessons should provide experiences that allow learners to recognize and appreciate ChatGPT's effectiveness in their English studies. Teachers should particularly focus on developing learners' metacognition about the effectiveness they can experience with ChatGPT. This involves discussing with students the advantages and disadvantages of using ChatGPT for specific language tasks. Additionally, learners should be given opportunities to reflect on and evaluate their English learning outcomes through interactions with ChatGPT, which can help them develop an in-depth understanding of ChatGPT's impact on their learning journey.

Second, RD refers to the apparent effectiveness of ChatGPT in the English learning process, which is inherently linked to solving various issues that may arise when using ChatGPT for language tasks. To improve RD, teachers thus should anticipate the different problems learners might encounter with ChatGPT and provide solutions beforehand. Recently, it has been noted that learners' lack of skill in prompt writing significantly reduces the visibility of ChatGPT's effectiveness (Hwang, Jeens, & Lee, 2024). Since ChatGPT communicates with learners through conversation, with prompts serving as the medium, instructing learners in prompt engineering can markedly increase ChatGPT's effectiveness in English learning and make this effectiveness more apparent.

Third, the study found that PF positively impacts learners' PEU. This suggests that teachers need to implement further strategies to elevate PF levels to enhance learners' PEU. To boost learners' PF in using ChatGPT, teachers can create various interactive activities such as games, quizzes, conversations, and role-playing, which can increase engagement between learners and ChatGPT. Specifically, teachers can assign different personas to ChatGPT and change these personas to facilitate communication with learners. This approach can encourage diverse interactions between learners and ChatGPT, thereby effectively increasing learners' adaptability to using ChatGPT.

Lastly, educators can enhance learners' OU and its influence on PEU through several initiatives. To begin with, they can provide thorough guidelines for using ChatGPT. These guidelines should elaborate on how ChatGPT's responses change with prompt presentation and how to craft prompts for more accurate results, thereby lowering learners' burden and anxiety. Next, educators should stay updated with the latest developments in ChatGPT. As ChatGPT undergoes continuous upgrades with new features, educators should periodically

introduce these updates to learners, evaluate their practicality, and ensure learners face no inconvenience in utilizing the tool.

6. Conclusion and Suggestions

This study seeks to explore the relationships among factors influencing the intention to adopt ChatGPT and propose a model for Korean EFL learners' intention to adopt ChatGPT in an autonomous English learning environment, grounded in the TAM3. By examining the antecedents of PU and PEU, the study identifies key conditions that should be emphasized to enhance PU and PEU for EFL learners. Although many studies have focused on ChatGPT adoption among teachers, research on the adoption conditions for EFL learners has been relatively insufficient. Consequently, this study makes a significant academic contribution by validating a model for ChatGPT adoption among EFL learners, providing a theoretical foundation for adopting ChatGPT in English education, and ultimately addressing research gaps. Additionally, based on the effects of PU on ICUC, RD on PU, and PF and OU on PEU, the study offers strategies for teaching and learning to promote ChatGPT adoption and use. Therefore, it also provides pedagogical contributions to English education. Finally, the CAM proposed in this study provides a foundational framework for understanding and promoting the adoption of ChatGPT among EFL learners. As such, this model can serve as a basis for developing more comprehensive models aimed at explaining the smooth integration of ChatGPT or other AI-powered tools in AI-supported language learning environments.

This study, however, has several limitations. First, since it was conducted with Korean EFL learners, it is unclear whether the same outcomes would be observed among learners from different cultural backgrounds. Therefore, further validation of the proposed CAM is necessary with learners from various cultural contexts. Second, An uneven distribution of samples was noted in participants' demographic characteristics, such as school year and field of study, which may hinder the generalizability of the study's findings. Therefore, future research should aim for a more balanced sample selection. Third, as a cross-sectional study, it is based on short-term data. Previous research indicates that the conditions influencing technology acceptance can change in importance and roles over time (Venkatesh & Bala, 2008). Hence, future research should further investigate the temporal changes in the roles and significance of the CAM variables, and examine the specific characteristics of each variable in detail. Finally, it did not consider learner variables. However, the pattern of learners' ChatGPT adoption may vary based on individual characteristics such as gender, academic year, and language proficiency. Considering the primary goals of integrating ChatGPT into language teaching and learning—such as enhancing learner autonomy, promoting self-regulated learning, and fostering learner-centeredness—it is essential for

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future research to examine the influence of diverse learner attributes on their adoption of ChatGPT.

Applicable levels: Tertiary

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APPENDIX

The Questionnaire Items

Intention to Continue Using a chatbot
1. I intend to use a chatbot when learning English.
2. I am more likely to use a chatbot than other methods to complete given tasks when learning English.
3. I am willing to recommend a chatbot to others as an English learning tool.

Perceived Usefulness
1. Using a chatbot for English learning is more effective in achieving my goals compared to other methods.
2. Using a chatbot for English learning requires less time and effort to achieve my goals compared to other methods.
3. I can achieve better results when using a chatbot for English learning compared to other methods.
4. Using a chatbot for English learning makes task completion easier compared to other methods.

Perceived Ease of Use
1. Using a chatbot for English learning is not difficult.
2. When learning English, I can easily obtain the information I want through the chatbot.
3. When I need information for English learning, using a chatbot is less effortful than other methods.
4. I feel no burden when using a chatbot for English learning.

Subjective Norm
1. People around me (friends, professors, etc.) encourage me to use a chatbot when learning English.
2. People around me (friends, professors, etc.) think that I should use a chatbot when learning English.
3. People around me use a chatbot when learning English.
4. People around me (friends, professors, etc.) support my use of a chatbot when learning English.

Result Demonstrability
1. I can explain the benefits of using a chatbot for learning English.
2. I can give examples of how a chatbot has helped me when learning English.
3. A chatbot provides specific feedback that is helpful in the English learning process.
4. I experienced better results on my English assignments when using a chatbot.

Playfulness
1. I am willing to try various approaches when using a chatbot for English learning.
2. I try different methods when using a chatbot to solve English assignments.
3. I think about effective ways to communicate with the chatbot when using it for English learning.
4. I consider how to use the chatbot creatively when learning English.

Objective Usability
1. The chatbot's response time to my questions is appropriate when I use it for English learning.
2. The chatbot's responses to my questions are reliable when I use it for English learning.
3. The chatbot operates without errors when I use it for English learning.
4. The chatbot accurately understands my questions when I use it for English learning.

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