The Impact of ChatGPT on the Learning Satisfaction of Foreign Language Learners: A Study

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Abstract. Nowadays, ChatGPT serves as a representative of generative pre-training models, promoting the application of artificial intelligence in the field of education. Language teaching is also facing changes and opportunities with the help of GPT. The purpose of this paper is to explore the impact of using ChatGPT to assist foreign language learning on learning satisfaction and analyze the role of usage duration and depth. Firstly, a systematic review of related research is carried out to summarize the application scenarios and positive effects of ChatGPT in foreign language learning. Secondly, an empirical study is designed to conduct questionnaire surveys among Chinese university students, using descriptive statistics and correlation analysis statistical methods to analyze data. Using multiple linear regression, it is proved that both GPT usage duration and depth have positive correlations with learning satisfaction in foreign language learning. The correlation between GPT usage duration and satisfaction is stronger than that between usage depth. Based on the research results, this paper analyzes the application status quo and reasons for GPT in foreign language learning and proposes suggestions for using GPT in foreign language learning.

Keywords: ChatGPT, foreign language learning, learning satisfaction.

1. Introduction

1.1. Background

In recent years, the application of artificial intelligence technology in the field of education has become more and more extensive. Natural language processing technology is also widely used in language teaching. Tools such as speech recognition, machine translation, and text analysis based on natural language processing can help students better understand and master the second language. Among them, the most important is natural language generation technology, which generates text similar to human language through computer programs. This technology can simulate human thinking processes and help students better understand and master the grammar, vocabulary, and expression of the second language. ChatGPT developed by OpenAI is a representative of generative pre-training models. It can communicate through understanding and learning human language and interact according to the context of the conversation, with broad application scenarios in language assistance teaching.

However, there is still controversy about the impact of AI-related technologies on second language learning effectiveness. Some studies indicate that ChatGPT can effectively provide language materials and teaching environments required for foreign language learning, thereby helping learners improve their second language usage level. Other studies suggest that ChatGPT may lead to learners' dependence on machine translation and generated answers, resulting in a decrease in foreign language learning interest and motivation [1]. Therefore, it is necessary to further study the specific impact mechanism and law of GPT's use on second language learning effectiveness.

1.2. Literature Review

One of the main tasks of artificial intelligence is natural language processing, which has provided many possibilities for its application in the field of education. Second language acquisition is an

important research area in educational psychology. The issue of how to enhance learners' feelings towards foreign language learning has always been widely concerned. ChatGPT, as a representative of AI language models, has many potential application scenarios and positive effects on foreign language teaching and learning.

In previous research, ChatGPT has shown specific positive effects and advantages in foreign language learning, including:

Personalized learning. Internal and external factors affect foreign language self-learning, and learning strategies and learning environments fall into these two categories [2]. In the research related to foreign language learning with ChatGPT, it can create individualized learning environments and customized learning plans for foreign language learners [3], indicating that ChatGPT can promote foreign language self-learning from both internal and external perspectives.

Simulating language environment. ChatGPT can provide a large amount of real language input in a short time, which can improve learners' language learning efficiency [4]. A real language environment can assist foreign language learners in better establishing a foreign language thinking process and promoting foreign language learning.

Enhancing interaction and cooperation. ChatGPT is a large-scale dialogue-based language model. Dialogue-based learning is an inclusive approach that promotes human-to-human and human-to-machine interaction. Through question-and-answer exchanges, the learning process can be smoother and more natural, thereby enhancing learners' motivation and interest in foreign language learning.

Inquiry-based learning. The answers provided by ChatGPT are generated based on reinforcement learning algorithms through training sets, so it has the ability to predict and analyze text based on the information provided [5]. Therefore, ChatGPT can guide students appropriately according to their current level of language mastery, promote inquiry-based learning, enhance inquiry spirit, and cultivate practical abilities.

There have been some studies on the application of ChatGPT in education, but there are few discussions on this topic in the field of foreign language learning. Most of these studies are simply analyzing or summarizing previous research and mainly studying the potential educational value. While these studies can reveal some impact of ChatGPT on foreign language learning to some extent, at present, there is still a lack of empirical research on this topic, making it difficult to determine the actual impact and effectiveness of ChatGPT.

1.3. Research Issues

The study of learning satisfaction refers to the degree of satisfaction that learners have with their learning process and outcomes. It is a comprehensive index that includes both the level of satisfaction with the learning process and the learning outcomes. Research has shown that two key factors are critical to learning satisfaction: the effectiveness of learning outcomes in terms of fulfilling learners' motivation, needs, and expectations; and whether the learning process provides learners with pleasure [6]. As a subjective feeling, learning satisfaction is influenced by multiple factors. With the development of technology and society, teaching-related factors are also constantly changing. McVeatta summarized five aspects that affect learning satisfaction: teaching process and content, textbook situation, teaching methods, teacher-student interaction, and teacher quality [7]. Now, as an emerging special teaching aid tool, GPT plays a role in providing a learning environment, learning content, teaching methods, and different original dimensions of teachers. Therefore, it is necessary to explore the specific mechanism of new influencing factors on learning satisfaction.

Using ChatGPT for second language learning is essentially a form of self-learning. The potential of ChatGPT as a teaching tool is related to learners' individual needs for foreign language learning, and the interactivity of ChatGPT teaching depends on learners' accuracy and diversity in giving instructions. The duration of ChatGPT use can reflect the frequency and duration of learners' interactions with ChatGPT for foreign language learning, thus affecting foreign language learning satisfaction. The depth of GPT use refers to the degree of participation and input level of foreign language learners when using ChatGPT. This can be measured by learners' choices and utilization of

foreign language learning resources provided by ChatGPT. Therefore, this study will explore the impact of two factors on learning satisfaction: the duration and depth of GPT use for foreign language learning, in order to provide reference experience and guidance for GPT in future foreign language teaching fields.

2. Methods

2.1. Subjects and Methods

In August 2023, this study used a quantitative research approach with an online questionnaire survey conducted through the Wenjuanxing platform. A total of 196 undergraduate students participated in the study anonymously after being informed and consenting to participate. Data from 91 participants who did not use ChatGPT for learning foreign languages were excluded, resulting in a final sample of 105 valid data, accounting for 53.6%. Among the valid data, 54 males (51.4%) and 47 females (44.8%) completed the survey, while 4 other genders accounted for 3.8%. The participants came from different majors, including the College of Arts, Sciences, Engineering, Business, Education, and other colleges. There were 8 first-year students (7.6%), 29 second-year students (27.6%), 24 third-year students (22.9%), and 44 fourth-year and above students (41.9%). The demographic information of the study subjects is presented in Table 1.

2.2. Questionnaire Design and Variable Description

The questionnaire consists of four sections, comprising a total of 16 questions. The first section includes three items regarding the basic information of the research subjects, such as their grade level, gender, and major. The second section is focused on surveying the current status and learning preferences for foreign language learning, with three items included. The third section aims to collect data on participants' cognitive and attitudes towards ChatGPT, which will be used to screen study subjects that meet the data analysis criteria. Finally, six items are included in the fourth section to assess participants' subjective satisfaction and sense of achievement with ChatGPT usage, including the duration of usage, depth of usage, and Likert scale scores for learning satisfaction. To facilitate data statistics and analysis, the independent variable is implemented using a five-point option method, while the dependent variable of learning satisfaction uses a Likert scale ranging from 1 to 5. The duration of ChatGPT usage is measured through its frequency of use. The depth of ChatGPT usage is categorized based on daily learning experiences, starting from text translation to article refinement, with increasing levels of resource richness. In this study, two questions about duration are set up in the questionnaire, and the sum of the scores of the two questions is used to describe the score of the duration when analyzing the data. The three variables in this study are considered continuous.

2.3. Data Analysis Methods

Organize the data collected from the questionnaire using an Excel spreadsheet, and conduct questionnaire reliability and validity tests, descriptive statistics, and correlation tests using SPSS26.0 software.

3. Results

3.1. Demographic Information of the Study Participants

The first part of the questionnaire is about the basic information of the participants. Descriptive statistics were applied to this section, resulting in Table 1 which presents the information obtained. According to Table 1, it can be observed that the gender ratio among the participants was well-controlled, and there was a balanced proportion of students from different grades and majors (arts and sciences).

Table 1. Descriptive statistical results of basic information of the research subject

Characteristic variables	Variable value	Number	Percentage（%）
Gender	Male	54	51.4
	Female	47	44.8
	Others	4	3.8
Grade	Freshman	8	7.6
	Sophomore	29	27.6
	Junior	24	22.9
	Senior and above	44	41.9
Major	Literature	38	36.2
	Science	9	8.6
	Engineering	38	36.2
	Business	6	5.7
	Pedagogy	5	4.8
	Others	9	8.6
	Total	105	100.0

3.2. Evaluation on Reliability and Validity

The overall test of the reliability and validity of the questionnaire yielded a Cronbach's alpha coefficient of 0.793, a KMO value of 0.781, and a Bartlett's spherical test significance less than 0.001, indicating that the data were reliable and the questionnaire had good reliability and validity.

3.3. Correlation Analysis

This study explores the correlation between two independent variables, ChatGPT usage duration and depth, and the dependent variable, learning satisfaction. The correlation coefficients and p-values for these variables are obtained. As shown in Table 2, the correlation coefficients r for ChatGPT usage duration and depth with learning satisfaction are all between 0.3 and 0.7, and there is a significant difference. Both ChatGPT usage duration and depth have a positive correlation with learning satisfaction, and the r value for ChatGPT usage duration is greater than that for depth. This indicates that there is a stronger correlation between usage duration and satisfaction.

Table 2. Correlation analysis results

Variable	Satisfaction	
	r	P
Duration	.477**	0.000
Depth	.383**	0.000

**. At level 0.01 (double-tailed), the correlation is significant.

3.4. Regressive Analysis

It has been established that there is a correlation between ChatGPT usage duration, depth, and learning satisfaction. In order to further explore the causal relationship between variables, this study continues to use learning satisfaction as the dependent variable and ChatGPT usage duration and depth as independent variables for multiple linear regression. The results are presented in Table 3.

Table 3. Multiple linear regression analysis results

Variable	Unstandardized coefficients	Standard error	Beta	t	p
Duration	0.147	0.036	0.232	2.469	0.015
Depth	0.105	0.043	0.386	4.115	0.000

The results of the regression analysis indicate that the adjusted R^2 value is 0.396, which means that ChatGPT usage duration and depth can explain 39.65% of the variance in learning satisfaction. According to Table 3, there is a significant difference between the regression model, indicating statistical significance with $p < 0.001$. This suggests that there is a linear correlation between the independent variables and dependent variable, with both ChatGPT usage duration and depth having an impact on learning satisfaction.

4. Discussion

4.1. Current Situation and Group Attitudes of ChatGPT Use in Foreign Language Learning

The survey data shows that only 53.6% of the participants have used ChatGPT for foreign language learning, and the average usage duration for this group is recorded as 2.85 on a 5-point scale, indicating that they have not used it for a long time. Similarly, the average usage depth is recorded as 2.86 on a 5-point scale, indicating a relatively shallow level of usage. Therefore, it can be concluded that ChatGPT is not widely used for foreign language learning in this study due to its limited usage duration and depth. In terms of attitudes towards ChatGPT, the average satisfaction with foreign language learning using ChatGPT is recorded as 3.3 on a 5-point scale, indicating a moderate level of neutrality. Through the survey, this study believes that there are two reasons for this phenomenon: firstly, because ChatGPT is a new product in the field of artificial intelligence, people's awareness of it is relatively limited, and its promotion in the field of foreign language learning is relatively low; secondly, because ChatGPT itself has certain technical defects such as inaccurate translation and long waiting times, these also affect people's understanding of the technology and lead to its limited application in the field of foreign language learning [8].

4.2. Correlation Analysis between the Duration of ChatGPT Use and Learning Satisfaction in Foreign Language Learning

The results of the survey indicate a significant positive correlation between ChatGPT usage duration and learning satisfaction in foreign language learning. The study suggests that longer usage time allows learners to become more familiar with ChatGPT's functions and operation methods, thereby better utilizing the resources and services provided by ChatGPT. As ChatGPT usage time increases, it is able to provide more personalized support for learners. In addition, longer usage time can help learners gradually develop good learning habits and behavioral patterns, enhancing their intrinsic motivation for foreign language learning and further improving their learning effectiveness and satisfaction. Based on these findings, the study recommends increasing the assistant duration of ChatGPT for foreign language learning and promoting regular usage time and overall duration.Moreover, personalized teaching plans and strategies should be developed based on effective learning schedules tailored to different types of foreign language learners to fully leverage the advantages of ChatGPT and address its limitations [9].

4.3. Correlation Analysis between the Depth of ChatGPT Use and Learning Satisfaction in Foreign Language Learning

This study suggests that a higher level of usage depth can significantly improve the satisfaction of foreign language learners. This may be due to the fact that a higher level of usage depth implies deeper participation in the foreign language learning process, providing a richer and more authentic language environment for learners, thus creating better conditions for learners in the external environment, promoting their progress in foreign language learning, and ultimately achieving more sense of accomplishment and satisfaction [10]. Therefore, it is suggested that learners become advanced users of ChatGPT, cultivate the ability and skills to output more accurate instructions, use ChatGPT comprehensively and deeply from beginning to end to assist foreign language learning, such as using ChatGPT as an overseas language instructor for exploratory learning interactions, through oral dialogues and writing guidance, among other forms of enhanced teaching, instead of

simply performing simple translations. Secondly, education developers should strengthen their research on the needs and characteristics of foreign language learners to better design and develop suitable ChatGPT applications and services. For example, they can break down different needs in foreign language learning into clear functional modules and combine speech recognition, virtual imagery, and other technologies to launch more user-friendly and professional foreign language teaching chatbots.

5. Conclusion

The study explored the impact of ChatGPT on foreign language learners' learning satisfaction and found that there is a significant positive correlation between both usage duration and usage depth, with the correlation being stronger for usage duration. Based on the survey results, the study analyzed the current usage situation of ChatGPT in foreign language learning and suggested that its promotion in this field is limited. The study also proposed that foreign language learners should increase their usage of ChatGPT to improve their learning satisfaction from both internal strategies and external environments. However, there are still some limitations and shortcomings in the study. On the one hand, the study only investigated the correlation between ChatGPT usage duration and usage depth and other variables that may have a larger impact on learning satisfaction were not explored through exploratory factor analysis or modeling. On the other hand, due to the limited sample size, individual differences may affect the study's conclusions. In future research, it is recommended to include negative effects of ChatGPT, such as its technical limitations and potential risks such as false information, plagiarism, and tool dependence, which should not be ignored.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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