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A Study on the Factors Influencing ChatGPT Users' Attitude

——Drawing upon the Technology Acceptance Model Theory

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ABSTRACT

The seeded of ChatGPT, OpenAI's latest innovation in 2022, has captured the public's attention due to the inactivated advancements in AI technology. This research, utilizing the Technology Acceptance Model (TAM), seeks to explore the impact of digital literacy on the perception of usefulness (PU), ease of use (PEOU), and the intention to use (IU). The results indicate that the perception of IU is positively influenced by both PU and PEOU. This research indicates that the enhancement of digital literacy among university students plays a significant role in shaping their PU and PEOU, subsequently leading to an increased intention to utilize this tool.

KEYWORDS

The model of technology acceptance; Influencing Factors; ChatGPT; Intention of Use

1. INTRODUCTION

Being a recent innovation in the field of AI technology, ChatGPT has attracted significant attention from both the general public and the academic community [1, 2].

TAM provides clear key variables: PEOU and PU. Is the electronic literacy inherent in users' knowledge structures a factor that extends beyond the core TAM variables and influences the intention to use ChatGPT?

University students, being part of the newer generation exposed to or currently undergoing higher education, act as a key group at the forefront of embracing the latest scientific and technological advancements [3]. This unique characteristic makes them particularly illustrative and characteristic when taking into account the aspect of digital skills. Due to the presence of the "Great Firewall," the network environment for using ChatGPT in mainland China differs from that in other regions. Additionally, since TAM research has primarily focused on the United States, examining its application in mainland China offers valuable research insights. Therefore, this study focuses on Chinese university students, considering the growing significance of ChatGPT usage as a current issue. By adopting a more micro-level perspective, this research aims to explore the possible factors influencing the usage behavior of ChatGPT among Chinese university students. This approach addresses the gaps in previous studies that have overlooked the unique characteristics of China's network and social environment. Additionally, it seeks to supplement the TAM by identifying other potential variables that may have been neglected, thereby enhancing our understanding of the theoretical model's applicability.

2. THEORETICAL ANALYSIS AND RESEARCH HYPOTHESES

2.1. Technology Acceptance Model (TAM)

American scholar Davis first proposed TAM in 1986[4]. It has evolved into a key model for understanding the predictors of human behavior in terms of technology acceptance or rejection [5]. Among all theories related to information systems usage, TAM is considered the most influential and widely used for explaining individual acceptance of information systems [6]. Since its inception in 1986, the model has frequently been reconsidered or used as a research framework in related studies [7]. For example, Goh utilized TAM to explore how ChatGPT's internal model comprehends the concepts of perceived usefulness (PU), perceived ease of use (PEOU), and behavioral intention (BI) in a generated student sample [8]. Other studies have applied TAM to evaluate the usability and acceptability of ChatGPT as an educational innovation [9,10].

Although TAM has been widely used in analyzing and explaining various factors [10,11], the incorporation of new variables into the model along with quantitative analysis to establish their relationships with the original dependent variables has been neglected by most studies. Historically, researchers have tended to neglect the impact of individuals' inherent cognitive structures. As a result, the present study incorporates electronic literacy into the analysis of ChatGPT usage within the wider TAM framework.

2.2. Variables and Hypotheses

Taking into consideration the points mentioned above, this research establishes the subsequent variables:

IV: PU, PEOU

DV: IU

Moderator: Electronic Literacy (EL)

The study proposes the following hypotheses based on the potential relationships among these variables:

H1: Electronic literacy positively affects perceived usefulness.

H2: Electronic literacy positively affects perceived ease of use.

H3: Electronic literacy positively affects intention to use.

H4: Perceived usefulness positively affects intention to use.

H5: Perceived ease of use positively affects intention to use.

To better illustrate the relationships among these variables, a theoretical framework has been constructed (as shown in the figure below):

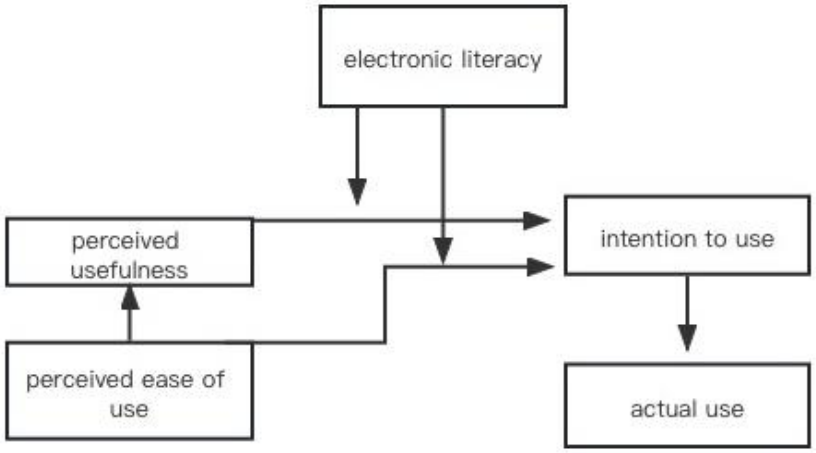

Figure 1. The Theoretical Hypothesis Model

3. METHODS

3.1. Survey Instrument

The questions are parted into two sections. The first section gathers demographic information, including gender, age, and education level. The second section comprises formal items covering four dimensions: 5 items of PU, 4 of PEOU/EL and 3 items of IU. A total of 20 items are covered in the complete questionnaire.

The scales for PU and PEOU are directly adapted from Davis's original scales [11]. Responses are measured by a self-report questionnaire with five-point Likert scale [12].

Assessing electronic literacy poses a challenge due to the predominantly descriptive nature of existing evaluations. However, reliable studies have suggested methods for quantitatively assessing this variable. This study references the measurement tools developed by previous literature [13]. Their report indicates a strong correlation between self-reported measures and actual performance in knowledge-based questions. Given the focus of this research, the study primarily uses their "objective competence" dimension, which includes questions on technical terminology, operations, and application knowledge.

For measuring the intention to use, this study considers the work of Davis and recent TAM research [11-15], formulating four items to assess this variable.

3.2. Study Paticipants

The participants of this study are university students from mainland China (excluding Hong Kong, Macau, and Taiwan), encompassing associate degree, undergraduate, and graduate students. Once all questionnaires are collected, a unified data analysis will be conducted.

4. STATISTICS ANALYSIS

4.1. Descriptive Analysis

Initially, due to the unique characteristics of the subjects in this study, the distribution of questionnaires was limited to individuals identified as "Chinese university students." All respondents in this survey were aged between 18 and 25: specifically, 176 participants held a "Bachelor's degree," accounted for 58.09%; "Associate degree" holders accounted for 23.43%; "Master's degree" and "Doctorate" holders represented 9.9% and 8.58% respectively. Among the 303 valid questionnaires

collected, male users constituted 45.21%, totaling 137 individuals, while female users comprised 54.79%, totaling 166 individuals. The responses to the fourth question in the questionnaire reflected the usage patterns of the respondents regarding ChatGPT, with 46.2% indicating "currently using and planning to continue using," 44.88% indicating "used in the past but not currently using," and only 8.91% indicating "currently using but not planning to continue using." Thus, all respondents had either used or were currently using ChatGPT, ensuring the authenticity and practical significance of subsequent formal questionnaire items.

The formal questionnaire items were categorized into four parts based on variables: EL, PEOU, PU and IU. The EL section employed self-reporting questions to assess respondents' awareness and competence in digital literacy, which adequately reflected users' media literacy and subjective agency when using technological tools. The results showed that the mean scores for relevant measurement items were all above 3.25, with the mean score for the item "You can use custom commands effectively" (EL3) reaching 3.356, indicating a relatively high level of electronic literacy among Chinese university students using ChatGPT.

In the assessment of ChatGPT's perceived ease of use using the Likert scale, it was found that apart from PEOU3 ("The operation of ChatGPT is too complex.") with a mean score of 2.554, the mean scores for other relevant measurement items were all above 3.2, and the median for PEOU4 was 4.0. This indicates that ChatGPT users generally perceive its usage as simple. The relatively low score for PEOU3 can be attributed to the network "firewall" set up in consideration of cybersecurity in China. In mainland China, access to ChatGPT services requires bypassing the "Great Firewall," which involves complex procedures, leading to operational challenges and hindrances in using ChatGPT to some extent.

4.2. Validity Analysis

The examination of validity is conducted to evaluate the reasonableness of the structure of quantitative data, particularly in the context of attitude scale inquiries. Comprising 16 items directly linked to the research query, the questionnaire’s structural validity can be evaluated using the Kaiser-Meyer-Olkin (KMO) measure. The KMO value for the relevant items in the scale was found to be 0.897, indicating that the collected research data is highly suitable for extracting information and exhibits good validity.

Each of the 16 items is aligned with one of the four factors, adhering to the questionnaire's design specifications. The factor loading coefficients for items correctly corresponding to their factors are all above 0.75, and the communalities for the analysis items are all higher than 0.6.

The outcomes of the validity assessment suggest that the arrangement of elements in this survey aligns effectively with the anticipated factor associations, showcasing strong validity.

4.3. Reliability Analysis

Questionnaire responses are evaluated for reliability through the use of Cronbach's α coefficient, which measures the consistency of the data.

With a pool of 303 participants and a set of 16 scale questions, this survey was conducted.

- **Digital Literacy (4 items) **: Cronbach's α = 0.860

- **Perceived Usefulness (5 items) **: Cronbach's α = 0.888

- **Perceived Ease of Use (4 items) **: Cronbach's α = 0.872

- **Intention to Use (3 items) **: Cronbach's α = 0.848

The scale demonstrates an overall value of 0.898. These results indicate high internal consistency and reliability of the questionnaire.

4.4. Correlation Analysis

Utilizing the Pearson correlation coefficient method, this section aims to assess the relationship between various variables and factors in the investigation, with the objective of conducting an initial evaluation of the proposed model. Utilizing the Pearson correlation coefficient, an assessment is made on the relationship between variables measured on an interval scale, where the values of r and sig are used as benchmarks to determine the strength of correlation and level of significance. An absolute value of r less than 0.3 indicates low correlation, while values greater than 0.7 signify high correlation; values between 0.3 and 0.7 indicate moderate correlation.

Table 1. Pearson Correlation Coefficient

		IU	PU	PEOU
EL	Correlation Coefficient	0.352**	0.416**	0.353**
	p-value	0.000	0.000	0.000
	Sample Size	303	303	303
PU	Correlation Coefficient	0.425**	1.000**	0.412**
	p-value	0.000	0.000	0.000
	Sample Size	303	303	303
PEOU	Correlation Coefficient	0.415**	0.412**	1.000**
	p-value	0.000	0.000	0.000
	Sample Size	303	303	303
* p<0.05 ** p<0.01				

The specific analysis indicates that:

- A strong positive relationship is evident between IU and EL, PU, and PEOU, with correlation coefficients reaching 0.352, 0.425, and 0.415, respectively.

- PU also exhibits a significant positive correlation with EL and PEOU, with correlation coefficients of 0.416 and 0.412, respectively.

- PEOU demonstrates a significant positive correlation with EL, with a correlation coefficient of 0.353.

The findings confirm the hypothesized positive connections between the variables examined.

4.5. Regression Analysis

Following the establishment of the predetermined relationships among the research variables, a deeper investigation was carried out using linear regression to analyze the impact relationships between these variables and to validate the research hypotheses.

The validation of H1

Table 2. Results of Linear Regression Analysis (n=303)

	Unstandardized Coefficients		Standardized Coefficients	t	p	Collinearity Statistics	
	B	Std. Error	Beta			VIF	Tolerance
Constant	1.975	0.179	-	11.039	0.000**	-	-
EL	0.411	0.052	0.416	7.946	0.000**	1.000	1.000
R^2	0.173						
Adjusted R^2	0.171						
F	F (1,301) =63.145, p=0.000						
D-W Value	1.939						
Dependent Variable: PU							
* p<0.05 ** p<0.01							

In order to examine Hypothesis 1, an analysis using linear regression was conducted, where EL was considered as the predictor variable and PU as the outcome variable. The model equation is PU = 1.975 + 0.411 * EL, with an R-squared of 0.173, meaning EL accounts for 17.3% of the variance in PU. The model passed the F-test ($F = 63.145$, $p < 0.05$), and the regression coefficient for EL was 0.411 ($t = 7.946$, $p < 0.01$), showing a significant positive impact of EL on PU.

The validation of H2

Table 3. Results of Linear Regression Analysis (n=303)

	Unstandardized Coefficients		Standardized Coefficients	t	p	Collinearity Statistics	
	B	Std. Error	Beta			VIF	Tolerance
Constant	2.238	0.189	-	11.847	0.000**	-	-
EL	0.358	0.055	0.353	6.555	0.000**	1.000	1.000
R^2	0.125						
Adjusted R^2	0.122						
F	F (1,301) =42.962, p=0.000						
D-W Value	1.911						
Dependent Variable: PEOU							
* p<0.05 ** p<0.01							

To verify hypothesis 2, linear regression was performed using EL as the acquisition and PEOU as the acquisition. The equation is PEOU = 2.238 + 0.358 * EL, with an R-squared of 0.125, meaning EL accounts for 12.5% of the variance in PEOU. The model passed the F-test ($F = 42.962$, $p < 0.05$), and the EL coefficient was 0.358 ($t = 6.555$, $p < 0.01$), showing a significant positive impact of EL on PEOU.

The validation of H3, H4, and H5

EL, PU, and PEOU were utilized as independent factors in a linear regression analysis, with IU being the outcome variable, to assess the validity of hypotheses 3, 4, and 5.

Table 4. Regression Analysis (n=303)

	Unstandardized Coefficients		Standardized Coefficients	t	p	Collinearity Statistics	
	B	Std. Error	Beta			VIF	Tolerance
Constant	1.034	0.229	-	4.518	0.000**	-	-
EL	0.161	0.058	0.155	2.783	0.006**	1.271	0.787
PU	0.269	0.060	0.256	4.470	0.000**	1.339	0.747
PEOU	0.261	0.057	0.255	4.589	0.000**	1.265	0.790
R^2	0.269						
Adjusted R^2	0.262						
F	F (3,299) =36.729, p=0.000						
D-W Value	1.916						
Dependent Variable: IU							
* p<0.05 ** p<0.01							

It can be observed that the model equation is: IU = 1.034 + 0.161 * EL + 0.269 * PU + 0.261 * PEOU, with an R-squared value of 0.269. This implies that EL, PU, and PEOU together explain 26.9% of the variance in IU. The F-test for the model yielded F = 36.729, with p = 0.000 < 0.05, indicating that at least one of EL, PU, or PEOU has a significant impact on IU. Additionally, a check for multicollinearity in the model showed that all Variance Inflation Factor (VIF) values were below 5, indicating no multicollinearity issues. Moreover, the Durbin-Watson (D-W) statistic near 2 suggests no autocorrelation in the model, indicating that the data points are independent and the model is well-specified.

The coefficient assigned to EL in the regression model was 0.161 (t = 2.783, p = 0.006 < 0.01), for PU it was 0.269 (t = 4.470, p = 0.000 < 0.01), and for PEOU it was 0.261 (t = 4.589, p = 0.000 < 0.01). This indicates that EL, PU, and PEOU have significant positive effects on IU.

5. CONCLUSION

This research explores potential novel elements in the utilization of ChatGPT among Chinese university students. It considers PU and PEOU as independent variables, IU as the dependent variable, and EL as a moderating variable. All the proposed hypotheses received validation. The study findings indicate that the utilization of ChatGPT by students is influenced positively by EL, leading to increased intention to use the platform.

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