Students' Adoption of ICT Tools for Learning English Based on Unified Theory of Acceptance and Use of Technology

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Information and communication technology (ICT) has advanced significantly over the past few decades, and students now frequently use ICT tools that enable them to learn anywhere and at any time. This study explored the influencing factors of the adoption of ICT tools among Chinese college students to learn English based on the unified theory of acceptance and use of technology (UTAUT). Structural equation modelling was applied to analyse sample data collected from 223 students in Zhaoqing University and Guangdong University of Finance in China. The results revealed that effort expectancy, performance expectancy and social influence exerted significant effect on behavioural intention. In addition, facilitating conditions and behavioural intention are positively and significantly related to use behaviour. The five variables, namely, effort expectancy, performance expectancy, social influence, facilitating conditions and behavioural intention explained 93.4% of the total variance in the ICT tools use behaviour to learn English by Chinese college students, confirming the validity of UTAUT in Chinese higher education context. Finally, some implications were provided to boost the adoption of ICT tools for promoting students' learning performance.

1. INTRODUCTION

Information and communication technology (ICT) has been boosting in recent decades, and is described as any technology that searches for, shares, and stores information on the computers, internet, mobile devices, and applications, as well as creates materials and engages in social interaction. The rapid advancement and adoption of ICT makes ICT tools more and more important in various aspects in human life. Some scholars proposed that ICT tools can also be adopted as a method of education that combines technology, efficiency, communication and self-motivation [1,2], and should be applied to enhance the educational quality [3]. Schools can utilize a broad range of ICT tools to communicate, generate, disseminate, save, and manage information [4]. In fact, the widespread use of ICT has transformed education and increased access for students [5]. Throughout the last several decades, their specialized usages have evolved at a rapid pace, and college students have been seen using various ICT tools in the educational setting [6].

Understanding how students accept ICT tools is crucial for the effective ICT tools adoption for studying and teaching [7], and therefore, there have been numerous studies on predicting user acceptance of ICT tools in the educational context. However, the number of studies that applied UTAUT to estimate Chinese students' ICT tools application for studying English is sparse and limited, which is the concern of this study. Accordingly, The study put forward three questions: What factors can influence Chinese students' adoption of ICT tools to learn English? What are the relationships between these factors? Can UTAUT be validated as a powerful model in this specific context? The research is to figure out the factors determining Chinese students' usage of ICT tools for learning English, the relationships between these factors and to evaluate the validity of UTAUT. This study gave data on a new educational situation and validated a suitable theoretical framework for future research on ICT tools adoption for the second language acquisition. The study also attempted to offer some practical suggestions for encouraging students to apply ICT tools to promote their English learning performance.

2. LITERATURE REVIEW

2.1 ICT Tools

Throughout the past few decades, the applications of ICT tools have expanded quickly, and it has been observed that college students employ a variety of ICT tools in an educational setting [6]. It should be highlighted that ICT tools can aid in the teaching and learning process regardless of the subject matter [8], and is conducive to students tremendously [9]. Currently, numerous Chinese college students have used ICT tools to facilitate the acquisition of the second language. The usage of ICT tools, which have their primary roots in the Audio-Visual Method, is advantageous for language learners' educational success [5], and these ICT tools, which are publicly accessible online, can make second language education effective [10].

Scholars classified ICT tools based on their different functions. Puentedura [11] proposed SAMR model, and the four functions of ICT tools were enumerated as follows: redefinition—Technology enables the creation of new, previously unachievable tasks; modification—Technology enables substantial task redesign; augmentation—With functional advancement, technology acts as a direct tool replacement; substitution—With no functional change, technology works as a direct tool substitution. The above four functions can be used to help with a variety of educational duties, including management, teaching, testing and learning. Alkamel and Chouthaiwale [10] categorized ICT tools into two types: non-web based learning tools, such as language lab, television and radio, films, and overhead projectors; web based learning tools, for example, Youtube, Skype, Blog, E-mail, and mobile phones etc. Dang [12] classified the functions of ICT tools in the following ways: Location and retrieval tools, for example, search engines (Google, Yahoo, Bing, Youtube) and the like; Material creation tools, for example, Word processors, presentation software, and audio and video editing tools etc.; Interaction tools, for example, Learning Management System (LMS), and social networks etc.; Teaching tools, for example, PowerPoint etc. The classification of ICT tools by Dang [12] is best suited to the needs of this research, so it was included in the questionnaire survey of this study.

2.2 UTAUT

UTAUT was created to explain how individuals embrace information technology usage. It is an integrated model deriving from eight theoretical models: innovation diffusion theory (IDT), the theory of reasoned action (TRA), the theory of planned behaviour (TPB), the technology acceptance model (TAM), combined TAM and TPB (C-TAM-TPB), the motivational model (MM), social cognitive theory (SCT), and model of personal computing utilisation (MPCU). Eight different models of the factors influencing information technology intention and use were analyzed, and UTAUT was created using conceptual and empirical similarities between these models [13,14]. In this synthesized model, the constructs of social influence (SI), effort expectancy (EE), performance expectancy (PE) can directly predict behavioral intention (BI), and facilitating conditions (FC) and BI can determine use behavior (UB) of information technology [14]. Besides, the variables of age, experience, gender, and voluntariness of usage moderate the effect of four important constructs of SI, PE, EE, and FC on BI and UB [14]. Fig. 1 shows the UTAUT model.

2.2.1 Performance expectancy

Performance expectancy is one of the significant constructs in UTAUT model, and similar to perceived usefulness in TAM [15,16], outcome expectations in SCT, and relative advantage in IDT [13]. It refers to "the degree to which an individual believes that using a system will enhance their job performance" [17]. This variable consistently stands as the best indicator of whether users will accept ICT technologies, regardless of whether ICT use is voluntary or required [14,18], and has been revealed to be the strongest predictor of behavioral intention [18-20]. In the context of learning, PE is described as learners' perceptions of how technology enhances their learning performance [16,21], and it is depicted as learners' perceptions of how ICT tools improve their English learning performance in this study.

2.2.2 Effort expectancy

Effort expectancy is one critical determinant in UTAUT, and similar to complexity in MPCU [13,22], perceived ease of use in TAM [13,23], and ease of use in IDT [13,22]. EE refers to "the degree of ease associated with the use of the system" [17]. The view of users of information technology innovations will inevitably call for ease of use [24]. Given that it is connected to the user's expectation of convenience, EE has been demonstrated empirically to be a powerful predictor of ICT use [7,25-28]. Thus, EE was considered in this present study, and depicted as learners' perceptions about the extent of convenience using ICT tools when learning English.

2.2.3 Social influence

Individuals tend to change their perceptions or actions to meet the requirements of a social group [29]. Social influence is one of the significant variables in UTAUT model [22], and affects behavioral intention and is influenced by all moderating variables, having a higher impact on older women, especially in early experience with mandated usage [14]. SI in UTAUT is similar to image in IDT, subjective norm in TPB, and social factors in MPCU [13]. SI refers to "an individual's perception that important others believe that he or she should use the new system" [17]. In extent literature applying UTAUT model, SI was revealed to correlate with behavioral intention [17,19,30,31]. In this research, SI is taken into consideration and described as the degree to which learners believe that important others believe that he/she should use ICT tools to learn English.
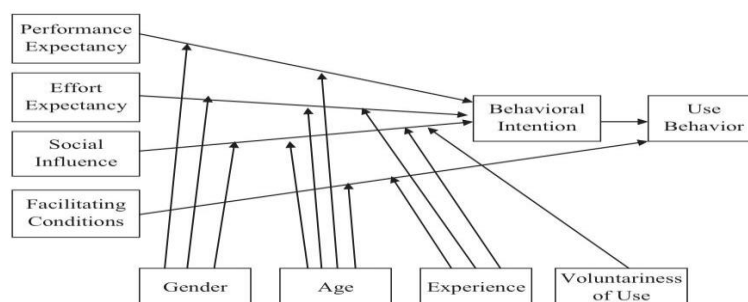

Fig. 1. UTAUT [14]

2.2.4 Facilitating conditions

Facilitating conditions is one important predictor in UTAUT. It has no effect on behavioral intention, but it does have an impact on use behavior, which is regulated by age and experience. Older workers, especially those with more experience, are more strongly affected by this concept [14]. FC in UTAUT is similar to perceived behavioral control in TPB [22,32] and compatibility in IDT [13,22], and depicted as "individual's belief that an organizational and technical infrastructure exists to support use of the system" [17]. Many existing empirical research have proved it to be positively and directly related to use behavior in a variety of context [23,32,33]. People use technology more frequently when they are given more favorable conditions for doing so [13]. Accordingly, it is supposed to be directly correlated with use behavior of students to adopt ICT tools to learn English in this current research. FC is depicted as the availability of resources, knowledge, and assistance supporting learners to use ICT tools for learning English in this study.

2.2.5 Behavioral intention and use behavior

Behavioral intention is supposed to capture the motivational elements behind a behavior. It was defined as the amount of effort people are willing to put into a specific behavior [28]. In UTAUT model, BI can be determined by PE, FC, and EE, and is positively and directly related to use behavior [14]. BI was depicted as the amount of effort a person will plan to exert in order to use ICT tools in English learning in the current study. Individual's willingness and readiness to engage in the behavior are reflected in behavioral intention, which confirms the relationship between an individual's intention and actual behavior [17,23,34,35].

UTAUT is vastly used to explain individual-level adoption intention and application of technology [17,36,37], and used as a theoretical foundation in various contexts, such as e-government [18,38,39], business and entrepreneurship [23,40,41], healthcare [42-44], and agriculture [45,46]. In addition, it was also applied as a theoretical framework in educational area in different setting, for example, early warning system [47], MOOCs [48], mobile technology [49,50], online-learning [25].

This current study aims to figure out the influencing factors of the usage of ICT tools for learning English by college students, therefore, it is reasonable to use UTAUT as the foundation. The participants are all Chinese college students who may have similar experience, age and voluntariness, thus, the moderating effect of age, gender, voluntariness and gender were not taken into consideration in this study, which was also supported by previous literature. For example, UTAUT was created to study subjects in organizations with highly diverse origins, but the college students have comparable ages and backgrounds, so the four moderators were not taken into account in the study [25]. Likewise, due to the similarities of age, gender, experience, and voluntariness of the students, the moderating variables from the original UTAUT have been eliminated in the study of Nguyen &Chu [5] and Tan [13]. Consequently, the following hypotheses were proposed and some alterations were made to the original UTAUT model (Fig. 2).
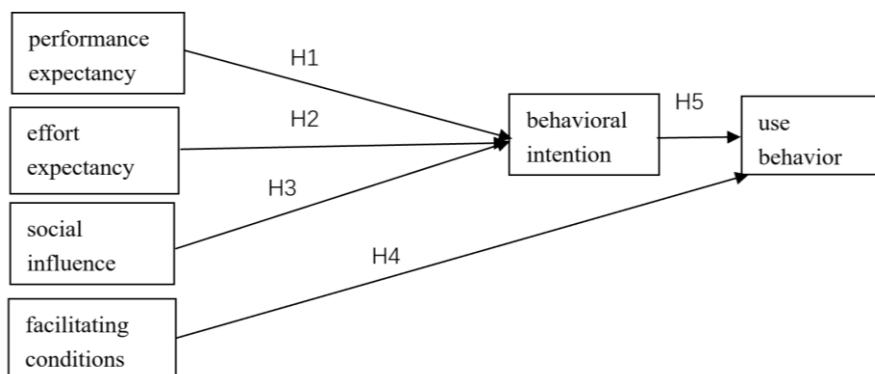

Fig. 2. Conceptual framework

H1: PE is positively related to behavioural intention to use ICT tools for learning English.
H2: EE is positively related to behavioural intention to use ICT tools for learning English.
H3: SI is positively related to behavioural intention to use ICT tools for learning English.
H4: FC is positively related to use behavior of ICT tools for learning English.
H5: BI is positively related to use behavior of ICT tools for learning English.

3. METHODOLOGY

3.1 Participants and Data Collection

A survey was performed to collect self-reported data from students who have various majors in Zhaoqing University and Guangdong University of Finance in Guangdong Province in China. The surveyors adopted convenience sampling method, which means selecting sample based on the convenience and availability of the population. Because the surveyors cannot make sure every student will take part in the survey, convenience sampling method is a feasible sampling method. In addition, it's faster and less costly. Furthermore, over 200 respondents can also be very representative. The surveyors invited 320 students to take part in the study. Before handing out the questionnaire, the surveyors first stated the purpose of the study and then explained what ICT tools are objectively. Of 320 students, 223 students would like to participate and fill in the questionnaire given to them. The response rate was 69.7%. According to the guideline in this study area, a sample size of at least 200 observations is needed when using SEM [51]. In line with this, 223 observations met the requirement.

Table 1. Items of the scale

Constructs	Items of the scale	Source
Performance expectancy	PE1: I am strongly motivated by the recognition from peers. PE2: Using ICT tools is helpful for my study. PE3: ICT tools help me complete tasks more quickly. PE4: ICT tools help me improve learning performance.	Venkatesh et al. [14]
Effort expectancy	EE1: I can use ICT tools. EE2: My interaction with ICT tools would be clear and understandable. EE3: Learning to use ICT tools is easy for me. EE4: It would be easy for me to become skilled at ICT tools.	Venkatesh et al. [14]
Social influence	SI1: Those important to me think that I should know how to use ICT tools. SI2: Those influencing me think that I should use ICT tools. SI3 : The university encourages me to use ICT tools for studying. SI4 : The university supports students' use of ICT tools.	Venkatesh et al. [14]
Facilitating conditions	FC1 : I have the resources necessary to use ICT tools. FC2 : I have the knowledge necessary to use ICT tools. FC3 : ICT tools is compatible with my learning needs. FC4 : Technical assistance is always available.	Venkatesh et al. [14]
Behavioral intention	BI1 : It is a good idea to use ICT tools to study English. BI2 : ICT tools make studying English more interesting. BI3 : I expect to experience studying English with ICT tools. BI4 : I like using ICT tools for studying English.	Venkatesh et al.[14]
Use behavior	UB1 : I will use ICT tools in my daily life. UB2 : I will use ICT tools in studying English. UB3 : I will use ICT tools in studying.	Venkatesh et al. [14]

3.2 Instrument

The instrument used in this study derived from Venkatesh et al. [14] with slight modifications to suit the context of the adoption of ICT tools for learning English (Table 1). 23 items were applied to measure the six constructs of EE, SI, FC, PE, BI and UB altogether. The constructs of FC, SI, PE, EE, and BI were measured by 4 items respectively. Three items were used to measure UB. The questionnaire of English version was translated into Chinese and back translated into English again with the help of two professors who are good at both English and Chinese. The instrument adopted a 7-point Likert scale which ranges from 1 for 'strongly disagree' to 7 for 'strongly agree'.

3.3 Data Analysis

The respondents' age, major and choice of ICT tools for learning English by participants were analysed by the software SPSS27. Besides, Cronbach's alpha value of each construct was also assessed by SPSS27. Next, the validity and reliability of the instrument and the fitness of the measurement model were evaluated by confirmatory factor analysis (CFA). Finally, structural equation modelling (SEM) was conducted to assess whether all the hypotheses proposed were supported and whether the sample data fit the structural model based on the theoretical framework UTAUT through the software Amos24. SEM is currently the newest statistical technique which combines measurement theory, simultaneous equations, regression analysis, path analysis, and factor analysis together, and an appropriate statistical technique when studying the complex variables and systems of causal relationships. Accordingly, SEM was applied to analyse the relationships between the six constructs of PE, SI, EE, FC, BI and UB in the current study.

4. RESULTS

4.1 Descriptive Data Analysis

Frequency distribution was performed to analyse the demographic information of the participants in terms of gender, major and choice of ICT tools frequently used via SPSS 27. Among the 223 respondents, male accounted for 35% and female accounted for 65%. Students who major in Art, Education and Biology made up 47.1%, 19.3% and 6.3% of the total participants

respectively, and the rest of the participants have other majors, for example, English, Computer, Mechanics, and others. As to the ICT tools students chose to use for learning English, the top three ICT tools are smartphones, computers and social networks, occupying 90.1%, 65.9% and 65.9% respectively, which reveals that smartphones are the most popular tools for university students to learn in China. The detailed percentage of ICT tools chosen by students to help them with English learning in their daily life was shown in Table 2.

4.2 Measurement Model Analysis

CFA with the maximum likelihood estimation was used to evaluate the fitness of the measurement model, and the validity and reliability of the instrument. The composite reliability (CR) and Cronbach's alpha are commonly used to test the reliability of the measurement. The Cronbach's alpha values of PE, EE, SI, FC, BI and UB were 0.868, 0.917, 0.850, 0.869, 0.934 and 0.866 respectively (Table 3), above the cut-off value of 0.7 [52]. Moreover, the CR values of all the variables (Table 3) exceeded the cut-off value of 0.7 [53]: EE, 0.918; SI, 0.854; PE, 0.883; FC, 0.870, BI, 0.934 and UB, 0.870, which further confirmed the constructs' reliability. Factor loading is usually applied to evaluate convergent validity. The factor loading of 0.5 is acceptable [54]. The loadings of all the variables were found to exceed 0.5, thus confirming the validity of each variable. In addition to the factor loadings, the average variance extracted (AVE) was also adopted to assess the validity of the instruments. The AVE value of each construct is 0.736 (EE), 0.596 (SI), 0.657 (PE), 0.627 (FC), 0.781(BI) and 0.690 (UB), which revealed that the AVE of all the unobserved variables surpassed the recommended criterion of 0.5 [55], further confirming the good validity of the measurement scale.

The study findings showed the fitness of the measurement model was acceptable but not satisfactory: X^2/df: 2.804; NFI: 0.880; IFI: 0.919; TLI: 0.904; CFI: 0.918; RMSEA: 0.090. Therefore, the items of SI1 and FC2 were removed. As a result, the fitness of the measurement model was much improved (Table 4). The chi-square value of the model was 401.541 ($p < 0.001$) and the degrees of freedom was 174. The normed chi-square value was 2.308, lower than the suggested value of 5.0 [56]. The comparative fit index (CFI) was 0.947;

The incremental fit index (IFI) was 0.948; The normed fit index (NFI) was 0.911; The Tucker–Lewis index (TLI) was 0.936. All the above values were greater than the recommended criterion of 0.90 [56]. The mean square error of approximation (RMSEA) was 0.077, smaller than the suggested value of 0.08 [56].

4.3 Structural Model Analysis

The statistical results revealed the data didn't fit the structural model satisfactorily. Therefore, PE1 and SI2 were deleted. Then the structural model was satisfactory (Table 5). The chi-square value was 338.502 and the degrees of freedom was 141 ($p < 0.001$). The X^2/df ratio was 2.401, within the suggested range (< 5.0) [56]. Moreover, the other fit indices were higher than the recommended criterion of 0.90 [56]: 0.919 (NFI); 0.951 (IFI); 0.940 (TLI) and 0.951 (CFI). The RMSEA was 0.079, lower than the threshold of 0.08 [56]. The data fit the structural model very well.

Table 2. The participants' demographic profile (number=223)

Measure	Category	Frequency	Percent
Gender	Male	78	35
	Female	145	65
Major	Art	105	47.1
	Chinese	8	3.6
	English	12	5.4
	Biology	14	6.3
	Music	5	2.2
	Computer	9	4.0
	Chemistry	5	2.2
	Mechanics	9	4.0
	Physics	2	0.9
	Education	43	19.3
	Tourism	1	0.4
	Economical Management	3	1.3
	Others	7	3.1
ICT tools	Computers	147	65.9
	Smartphones	201	90.1
	Social networks	147	65.9
	PowerPoint	53	23.8
	Word processors	40	17.9
	360	58	26.0
	Baidu	115	51.6
	Google	68	30.5
	Bing	26	11.7
	Teachertube	6	2.7
	Youtube	31	13.9
	TV	46	20.6
	Radio	19	8.5
	audio and video editing tools	38	17
	authoring programs	12	5.4
	e-lecture tools to merge movies into slides	12	5.4
	make movies and mind maps	22	9.9
	Learning Management Systems	32	14.3

**Table 3. The validity and reliability of the constructs**

Constructs	Items	Factor loading	Average Variance Extracted	Composite Reliability	Cronbach's alpha
Performance expectancy	PE1	0.643	0.657	0.883	0.868
	PE2	0.837			
	PE3	0.826			
	PE4	0.911			
Effort expectancy	EE1	0.824	0.736	0.918	0.917
	EE2	0.868			
	EE3	0.871			
	EE4	0.868			
Social influence	SI1	0.658	0.596	0.854	0.850
	SI2	0.697			
	SI3	0.856			
	SI4	0.857			
Facilitating conditions	FC1	0.823	0.627	0.870	0.869
	FC2	0.792			
	FC3	0.851			
	FC4	0.692			
Behavioral intention	BI1	0.868	0.781	0.934	0.934
	BI2	0.898			
	BI3	0.868			
	BI4	0.901			
Use behavior	UB1	0.803	0.690	0.870	0.866
	UB2	0.814			
	UB3	0.874			

Table 4. Measurement model fit indices

	X^2	df	X^2/df	NFI	IFI	TLI	CFI	RMSEA
Indices of the measurement model	401.541	174	2.308	0.911	0.948	0.936	0.947	0.077
Suggested value			<5	≥0.90	≥0.90	≥0.90	≥0.90	≤0.08

Table 5. Structural model fit indices

	X^2	df	X^2/df	NFI	IFI	TLI	CFI	RMSEA
Indices of the structural model	338.502	141	2.401	0.919	0.951	0.940	0.951	0.079
Suggested value			<5	≥0.90	≥0.90	≥0.90	≥0.90	≤0.08
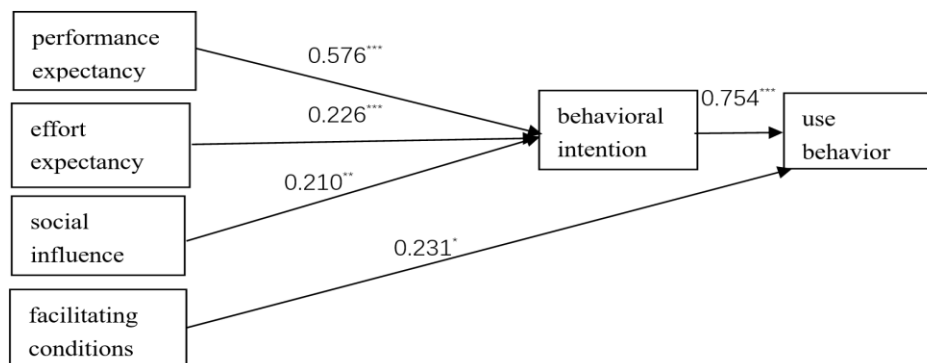
Fig. 3. SEM analysis of the conceptual framework

Table 6. Test results of hypotheses

Hypothesis	Result
H1: PE is positively related to behavioural intention to use ICT tools for learning English.	Supported
H2: EE is positively related to behavioural intention to use ICT tools for learning English.	Supported
H3: SI is positively related to behavioural intention to use ICT tools for learning English.	Supported
H4: FC is positively related to use behaviour of ICT tools for learning English.	Supported
H5: BI is positively related to use behaviour of ICT tools for learning English.	Supported

The findings showed that all the five hypotheses were confirmed, which was shown in Table 6. It was found that PE was positively and significantly related to BI ($\beta_{PE \to BI}$ = 0.576, t = 7.519, p < .001); EE positively correlated with BI ($\beta_{EE \to BI}$ = 0.226, t = 4.060, p < .001) ; SI was positively and directly related to BI ($\beta_{SI \to BI}$ = 0.210, t = 2.729, p < .01). In addition, FC exerted a positive effect on BU ($\beta_{FC \to BU}$ = 0.231, t =2.178, p < .05) and BI had a strong and significant impact on UB for learning English ($\beta_{BI \to UB}$ = 0.754, t = 6.614, p < .001). Therefore, all the hypotheses in this model were verified. Furthermore, the findings presented that the variables of EE, SI, and PE accounted for 86.2% of the total variance in the behavioural intention to implement ICT tools, and the constructs of EE, SI, PE, FC and BI explained 93.4% of the total variance in the ICT tools use behaviour to learn English by Chinese college students. Consequently, these statistical results confirmed the relationships between the six constructs in UTAUT, depicted in Fig. 3.

5. DISCUSSION

PE was revealed to be the strongest determiner of BI, consistent with the current studies [17,18,19]. This indicates that college students will have strong intention to adopt ICT tools to facilitate them in learning English if they believe ICT tools are able to improve their English learning performance. EE was positively and directly related to BI, in line with the extent literature [7,25,27,28] which empirically proved EE to be a significant predictor of BI. It suggests that students are apt to apply ICT tools if they perceive applying ICT tools in English learning are convenient and easy. Besides, SI was found to be positively and directly related to BI, which concurs with the findings of other studies [17,19,30,31]. This indicates that a student tends to use ICT tools for English studying if important others think that he/she should use ICT tools to learn English.

In addition, FC exerted a positive and significant effect on BU, which conforms with the prior studies [17,23,32,57]. This finding reveals that students will use ICT tools if resources, knowledge, and assistance supporting are available for them to use ICT tools to study English. Moreover, BI had a strong and significant impact on UB for learning English, which was confirmed by many existing empirical studies in educational setting [25,47-49]. It reveals that students will apply the ICT tools in English learning if they have strong intention to do so.

6. CONCLUSION

The purposes of this current study are to figure out the factors affecting Chinese students' acceptance of ICT tools for learning English, the relationships between these factors and to assess the validity of UTAUT. The results revealed that social influence, effort expectancy, and performance expectancy accounted for 86.2% of the total variance in the behavioural intention to adopt ICT tools. In addition, behavioural intention and facilitating conditions positively and significantly correlated with use behaviour. The five variables, namely, SI, EE, PE and BI explained 93.4% of the total variance in the ICT tools use behaviour to learn English by Chinese college students, confirming the validity of UTAUT in Chinese higher education context. Accordingly, the theoretical framework of the UTAUT model can be applied to better comprehend college students use behavior within the context of ICT tools adoption for the second language acquisition.

In terms of theoretical implications, this study gave data on a new educational situation and validated a suitable theoretical framework for future research on ICT tools implementation in second language acquisition in higher education context. Besides, the study is beneficial for understanding the factors that determine ICT

tools application for learning English and enriches the literature in this field. In addition, when the literature is examined, there are few studies which empirically explored the use of ICT tools for learning English on the part of Chinese college students based on the UTAUT model. In this regard, the study is anticipated to be a trailblazer in this area and to fill a significant gap.

There are some practical implications as well. The statistical results revealed that performance expectancy played a critical role in behavioral intention, and therefore, teachers should give students frequent feedback and a positive evaluation of their performance to help students understand their progress in learning English and the advantages of utilizing ICT tools for learning. Besides, it's important that the ICT tools using for English learning are easy for students to use in order to reduce their effort. Thus, university managements and teachers should provide some user-friendly English learning ICT tools for students to use without difficulties, and invite some professional staffs to teach students how to use these ICT tools. Moreover, teachers and university administrations should collaborate to assist students in handling technical issues with ICT tools for English study in a timely manner, and afford enough resources and knowledge necessary to adopt ICT tools for students. In addition, because social influence exerted significant impact on behavioral intention, teachers can talk to students about their positive experiences using ICT tools for learning, or they can ask a few students who have excelled at learning English using ICT tools to share their knowledge, ideas, experiences with other students.

The sample data were only collected from two universities in China, and thus the findings may have limited generalisability. It is recommended that future research should use broader samples from more institutions in different part of China to improve the level of generalisation. Learners' use of ICT tools is a dynamic and complex process, so future research might take some other influencing factors into consideration, such as attitude, experience, habit etc, which can extend the UTAUT model. Furthermore, because the current research only included students in higher education in China, a study of students from different levels could yield more useful and valuable findings. If conditions are met, future research can aim for longitudinal SEM design to assess the cause-and-effect relationships between the influencing factors in UTAUT.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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