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Undergraduates' behavioral intention to use indigenous Chinese Web 2.0 tools in informal English learning: Combining language learning motivation with technology acceptance model

Cunying Fan[1] & Juan Wang[1]✉

Studies concerning the utilization of Web 2.0 tools by language learners in higher education have predominately concentrated on the adoption of English-medium Web 2.0 tools in formal learning; while the use of indigenous Chinese Web 2.0 tools in informal English learning has not been adequately examined. This study aims to investigate factors that impact undergraduates' behavioral intention to use indigenous Chinese Web 2.0 tools for informal English learning. It was conducted to verify a hypothesized mediation model with five factors, which were based on the technology acceptance model and language learning motivation. Structural equation modeling was employed with data from 834 undergraduates at a Chinese university. The findings revealed that undergraduates' behavioral intention to adopt Chinese Web 2.0 tools was positively impacted by perceived usefulness, perceived enjoyment, and intrinsic motivation in English learning, rather than by perceived ease of use. Perceived usefulness acted as a mediator between perceived enjoyment and behavioral intention to use the tools, and perceived enjoyment mediated the relationship between intrinsic motivation in English learning and the intention to utilize the tools. Two mediators (perceived enjoyment and perceived usefulness) together mediated the relationship between intrinsic motivation in English learning and behavioral intention to adopt the tools. Implications were discussed when integrating indigenous Chinese Web 2.0 tools into informal English learning.

[1] Department of College English Teaching, Qufu Normal University, Qufu, China. ✉email: wangjuan2003@qfnu.edu.cn

Introduction

Web 2.0 tools encompass a variety of web-based technologies or applications developed under the notion of the social construction of knowledge (Mei et al., 2018). Educators have embraced these tools in English as a foreign language learning (EFL), recognizing their potential to diversify language learning processes (Thomas, 2009), provide access to authentic language resources (Hsu et al., 2008), promote communication and collaboration (Faizi, 2018), and improve language learning quality (Arslan and Şahin-Kizil, 2010).

Web 2.0 tools provide learners with an affordable and convenient way to learn English, but these advantages can only be realized if learners have positive perceptions and active involvement (Mei et al., 2018). However, research has revealed that students are often hesitant to implement these tools in EFL (Toffoli and Sockett, 2015). Further research is required to explore students' behavioral intention to use Web 2.0 tools in EFL. Behavioral intention to use refers to students' intention to incorporate technology into their learning (Huang et al., 2021). The more powerful the behavioral intention becomes, the more likely the behavior occurs (Venkatesh and Davis, 2000).

It is essential to conduct empirical research with regard to Chinese undergraduates, who account for a substantial portion of the 1.011 billion netizens. Although English-medium Web 2.0 tools are inaccessible to them, they utilize indigenous Chinese Web 2.0 tools (ICWTs) like Microblog and WeChat. Such ICWTs provide Chinese EFL learners with convenient and flexible interactions between learners and instructors, as well as a wide array of EFL resources and experiences. However, most existing studies have focused on factors influencing the adoption of English-medium Web 2.0 tools in EFL (Manca, 2020). There is limited research on factors impacting students' behavioral intention to use ICWTs for EFL. discovered that those who regularly use Microblog in the target language experience a variety of beneficial effects on their language learning. Lin et al. (2016) observed that WeChat-based EFL augmented the self-efficacy of minority preppies in Northwest China. These studies, however, are limited as they only paid attention to the effectiveness of ICWTs in EFL and do not take into account factors that impact students' behavioral intention to use these tools in EFL.

Frequently used in informal learning outside the classroom, Web 2.0 tools have become an integral part of students' day-to-day and academic lives (Firat and Köksal, 2019). However, previous research has primarily concentrated on formal learning (Lee, 2019; Balouchi and Samad, 2021), which refers to formal classroom and blended learning or extracurricular online interaction settings (Lee and Dressman, 2018; Rogers, 2009) in which students' L2 activities are mainly structured and regulated by instructors (Lee, 2019). The use of Web 2.0 tools in informal learning, where students learn autonomously without instructors' intervention, has not been adequately studied. Therefore, it is beneficial to explore factors influencing learners who can only access ICWTs in their informal English learning. Informal learning happens outside of the classroom and renders the learner complete control over the content they choose to learn (Comas-Quinn et al., 2009). In this study, informal English learning, refers to exposure to English outside the classroom, in learners' free time, involving in internet-based and computer-mediated learning activities. The learning process is learner self-initiated, unrestricted by objectives and most flexibly takes place anywhere desired by the learner regardless of the topic of interest . Informal learning facilitates meeting the learners' needs in a rapid and personalized way using the data that results from incidental learning (Kukulska-Hulme et al., 2015). The users' intention is to enjoy themselves, communicate with others, and engage in personally or professionally relevant content (Sockett, 2013). Language development becomes a by-product and has many tenets in common with naturalistic language development (Kusyk, 2017; Kusyk and Sockett, 2012). Informal learning of English is thus significantly different from formal English learning. A growing body of empirical studies into informal learning of English underlines the importance of understanding the education potential of informal learning beyond the language classroom.

This study, therefore, aims to investigate factors affecting Chinese undergraduates' behavioral intention to adopt ICWTs for informal English learning. By examining the factors, this study will be beneficial to stakeholders in China in formulating more effective approaches to increase the utilization of existing and upcoming technologies in EFL.

Theoretical framework and hypotheses development

Technology acceptance model. Technology acceptance is the voluntary adoption of certain technologies by individuals (Kamal and Ahuja, 2019). To identify factors that influence technology acceptance, various models have been developed (Huang and Liu, 2022; Lee and Lehto, 2013). Among these, the technology acceptance model (TAM) is the most widely used (Chahal and Rani, 2022; Tarhini et al., 2016). TAM is based on the Theory of Reasoned Action and is used to predict user acceptance of new technologies (Davis, 1989; Leong and Chaichi, 2021). It has been validated among different participants in various educational contexts: university teachers' intentions to use e-learning (Mahdizadeh et al., 2008) and Web 2.0 technologies (Faizi, 2018); preservice teachers' adoption of computer-assisted language learning (Mei et al., 2018); undergraduates' acceptance of technology enhanced learning (Rosli and Saleh, 2022); students' utilization of digital media (Pumptow and Brahm, 2020) and VR (Fussell and Truong, 2022).

Perceived ease of use and perceived usefulness. TAM is a theory that models how users come to accept and adopt a certain technology. It consists of four constructs: perceived ease of use (PEU), perceived usefulness (PU), attitude towards use (AU), and behavioral intention (BI) to use (Davis, 1989). PEU refers to the extent to which an individual believes that using technology will be effortless. PU is the degree to which an individual believes that utilizing technology will improve his/her performance. BI evaluates the user's intention to incorporate certain technology into their work/study and is the direct antecedent of the actual use of technology. AU assesses whether an individual has a (un)favorable attitude towards using technology. Attitude is a mediating variable in the original TAM (Davis, 1989). However, Venkatesh and Davis (2000) and Venkatesh and Bala (2008) removed it from their studies because it only partially mediates the effects of PEU and PU on BI. Therefore, this study mainly focused on the relationship between PEU and PU, and BI.

In TAM, an individual's behavioral intention to use technology is determined by PEU and PU. Many studies have verified that PEU and PU have a fundamental influence on students' attitudes and intentions to use technology (Al-Emran et al., 2018; Lazar et al., 2020). For example, Teo et al. (2018) found that PEU and PU were the triggers for English teachers to use technology in teaching. Walker et al. (2020) also found similar results among practicum teachers' use of mobile technology. Mou et al. (2022) revealed that PEU and PU had direct effects on students' behavioral intention to use the digital platform in science service learning. In the context of integrating ICWTs into EFL, PEU is about exerting minimal effort for EFL supported by ICWTs. PU

refers to the instrumental value of the tools, which may provide useful functions to enhance EFL. If undergraduates believe that ICWTs enhance EFL, they will be more likely to use them. Based on TAM and previous studies, the following hypotheses are proposed:

Hypothesis 1: PEU positively predicts behavioral intention to use.

Hypothesis 2: PU positively predicts behavioral intention to use.

Perceived enjoyment. The original TAM has largely neglected the role of enjoyment in the utilization of technologies. However, Venkatesh et al. (2012) identified perceived enjoyment (PE) as a significant determinant of intentional use of new technologies. Teo and Noyes (2011) highlighted the importance of PE in pre-service teachers' technology adoption in their teaching. Tamilmani et al. (2022), by exploring customers' perceived pleasure brought by a new system, demonstrated that PE is an intrinsic driver of new technology adoption. As ICWTs are designed to interact pleasantly and amuse users, this study considers PE as one determinant of ICWTs' use in informal English learning.

Undergraduates who perceive ICWTs as an enjoyable way to learn English are more likely to incorporate them into their learning. Research has shown that PE has a positive effect on PEU due to the fact that it reduces the perceived difficulty of using technology (Venkatesh, 2000). Undergraduates enjoying the process of using ICWTs in English learning do not view it as a burden. The pleasure derived from using ICWTs may serve as an intrinsic motivator, thus reinforcing the notion that these tools are useful and can lead to improved English language skills. Based on these, three hypotheses are suggested:

Hypothesis 3: PE positively predicts behavioral intention to use.

Hypothesis 4: PE positively predicts perceived ease of use.

Hypothesis 5: PE positively predicts perceived usefulness.

Language learning motivation. Motivation is a critical factor that can significantly affect language learning (Cheng and Chen, 2019; Dörnyei, 2019). Gardner (2006) defined language learning motivation as the attitudes of learners towards language learning and the factors that stimulate them to participate in language learning activities. Those with higher motivation are more likely to exert more effort than those with lower motivation (Ushioda, 2003). Additionally, those who are strongly and autonomously motivated are more likely to learn a language through the use of technologies or tools (Sandberg et al., 2011).

Stockwell and Hubbard (2013) argue that two distinct motivations may be responsible for learners' acceptance of technology in language learning. The first is the motivation in the technology itself, which encourages learners to investigate the potential advantages of technology in language learning. The second is the motivation to learn a foreign language, which encourages learners to make use of technology to facilitate language learning (Ushida, 2013). As this study is concentrated on EFL with the help of ICWTs rather than the technology itself, the focus is on the second motivation. Therefore, this study investigates how undergraduates' language learning motivation affects their behavioral intention to utilize ICWTs for informal English learning.

Intrinsic motivation in English learning. The self-determination theory suggests two types of motivations: intrinsic and extrinsic (Deci and Ryan, 1985). Intrinsic motivation is the internal drive to engage in activities for inherent pleasure, enjoyment, and satisfaction (Ryan and Deci, 2000; Nikou and Economides, 2017). Extrinsic motivation is the need to perform a behavior to obtain external rewards (Vansteenkiste et al., 2006). Intrinsic motivation has been linked to positive self-regulated learning (Van Seters et al., 2012), lower learning stress (Baker, 2003), increased learning interests (Butz and Stupnisky, 2016), genuine enjoyment for learning (Kramer and Kusurkar, 2017), and active and volitional behavior (Ryan and Deci, 2000). Extrinsic motivation is associated with external regulation, introjection, identification, and integration (Ryan and Deci, 2000) and had no association with self-regulated learning (Baker, 2003). This study aims to explore undergraduates' intention to voluntarily use ICWTs for English learning in an autonomous, self-determined learning environment. Therefore, intrinsic motivation in English learning (IMEL) was chosen as a possible factor that may influence learners' BI to use ICWTs.

Previous studies on technology acceptance predominately prioritize users' adoption of different types of technology but little is revealed about users' study-related motivation. Sun and Gao (2020) found that IMLE had a positive influence on students' BI indirectly. In this study, we proposed that if undergraduates are highly motivated to learn English, they are more willing to use ICWTs to support their English Learning and are more inclined to perceive ICWTs as being enjoyable tools to learn English. Therefore, two hypotheses are proposed:

Hypothesis 6: IMLE positively predicts behavioral intention to use.

Hypothesis 7: IMLE positively predicts perceived enjoyment.

Mediating effects of PEU, PU, and PE. This study also includes variables related to TAM that are expected to have mediating effects. The following hypotheses are suggested in the context of using ICWTs in informal English learning:

Hypothesis 8: PEU mediates the relationship between PE and BI.

Hypothesis 9: PU mediates the relationship between PE and BI.

Hypothesis 10: PE mediates the relationship between IMEL and BI.

Hypothesis 11: PE and PEU mediate the relationship between IMEL and BI.

Hypothesis 12: PE and PU mediate the relationship between IMEL and BI.

The conceptual model of this study was shown in Fig. 1.

Method

Participants. 849 undergraduates from different majors were randomly chosen from a university in eastern China, where English is a compulsory subject for the first two years. Among them,15 cases were excluded due to missing data, resulting in a sample size of 834. The mean age was 19.37 (SD = 1.00). Demographic information was presented in Table 1.

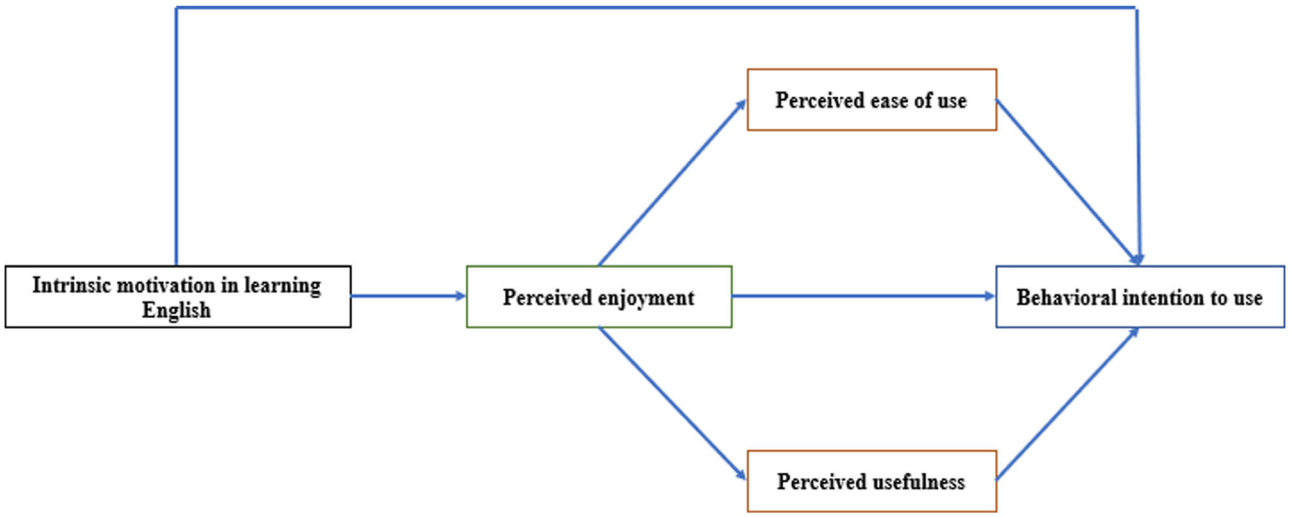

Fig. 1 Research model. A hypothesized conceptual model.

Table 1 Participants' demographic information.

Category	Items	Participants	Percentage (%)
Gender	Female	614	73.60
	Male	220	26.40
Academic year	1st Year	453	54.30
	2nd Year	381	45.70
Years of learning English	<9 years	90	10.60
	9 years	95	11.17
	10 years	160	18.85
	11 years	180	21.20
	12 years	98	11.54
	More than 12 years	226	26.62
Total		834	100.00

Survey instrument. The survey instrument was divided into two sections. The first section collected demographic information such as gender, academic year, years of learning English, familiarity with ICWTs, and frequency of ICWTs uses in everyday life and informal English learning. The second section comprised 23 Likert-type items, which were rated on a scale from 1 to 5 (1 = completely disagree, 5 = completely agree). These items were developed to measure five dimensions of existing literature and were tailored to ICWTs in informal English learning: PEU (4 items) (Davis, 1989; Tarhini et al., 2016), PU (6 items) (Davis, 1989; Balouchi and Samad, 2021), PE (4 items) (Davis et al., 1992; Ali, 2020), IMEL (5 items) (Sun and Gao, 2020), and BI (4 items) (Venkatesh and Bala, 2008; Balouchi et al., 2021) (see Table 6 in Appendix).

Data collection and analysis. Prior to data collection, ethical approval was obtained. Data from an online anonymous survey was collected from a random sample of 849 Chinese undergraduates. A link to the questionnaire hosted on https://www.wjx.cn was sent to participants and was open for 2 weeks. After eliminating incomplete and unqualified responses, 834 valid responses were obtained for data analysis.

Data analysis was conducted using SPSS 26.0 and Mplus 8.3. Descriptive statistics were first calculated in SPSS 26.0. The structural equation approach was then employed in Mplus 8.3 with confirmative factor analysis used to assess the reliability and validity of the measurement model, Path analysis was employed to verify the hypotheses in the structural model. Mediating effects were identified through the bootstrap method (Hayes, 2009), a reliable test for determining the statistical significance of these effects. A non-zero confidence interval implies the existence of mediating effects (Preacher and Hayes, 2008). In this study, 2000 iterations were used to obtain confidence intervals.

Results

Descriptive statistics. Participants reported a high level of familiarity and frequent usage of ICWTs in their everyday life ($M = 3.05$, SD = 1.234; $M = 3.85$, SD = 1.355). Nevertheless, the frequency of using ICWTs for informal English learning was much lower ($M = 2.20$, SD = 1.154). A statistically significant difference was observed between using ICWTs in informal English learning and in everyday life ($t_{(834)} = -13.477$, $p < 0.001$, $d = 0.465$, 95% CI [0.522; 0.741]). No significant differences were observed in participants' use of ICWTs with respect to gender, academic year, and years of English learning.

Reliability and validity. Prior to hypothesis testing, confirmatory factor analysis was utilized to assess the reliability and validity of the measurement model. Cronbach's alpha coefficients were higher than the cut-off of 0.7 (Hair et al., 2009), indicating that all items had satisfactory internal consistency. Factor loadings of the items were all >0.5 (Bagozzi and Yi, 2012), demonstrating that the items of each construct are suitable for measuring the construct. Composite reliability (CR) scores were above the threshold of 0.70 (Hair et al., 2009), indicating good scale reliability. Average variance extracted (AVE) values were higher than 0.5 (Fornell and Larcker, 1981), verifying the convergent validity of the survey instruments. The quality criteria of the survey instrument are presented in Table 2.

Discriminant validity evaluates to what extent a particular construct in the model is uniquely different from the other constructs (Hair et al., 2013). Discriminant validity was tested by comparing the square root of AVE for individual constructs with the correlations among the latent variables. Comparing all correlations with the square root of AVE in Table 3, the results indicate that discriminant validity was established as diagonal elements exceeded those of the off-diagonal elements (Fornell and Larcker, 1981).

The discriminant validity of the five constructs was evaluated by the Fornell and Larcker (1981) criterion. Discriminant validity implies that items belonging to different constructs are not correlated. According to Fornell and Larcker (1981), discriminant

Table 2 Quality criteria of the survey instrument.

Items	Factor loading	AVE	CR	Cronbach's alpha
PEU		0.669	0.889	0.830
PEU1	0.884			
PEU2	0.867			
PEU3	0.815			
PEU4	0.693			
PU		0.790	0.958	0.956
PU1	0.918			
PU2	0.905			
PU3	0.915			
PU4	0.890			
PU5	0.804			
PU6	0.896			
PE		0.634	0.871	0.798
PE1	0.868			
PE2	0.867			
PE3	0.826			
PE4	0.590			
BI		0.849	0.958	0.941
BI1	0.946			
BI2	0.913			
BI3	0.920			
BI4	0.907			
IMEL		0.762	0.941	0.920
IMEL1	0.932			
IMEL2	0.931			
IMEL3	0.918			
IMEL4	0.848			
IMEL5	0.717			

PEU perceived ease of use, *PU* perceived usefulness, *PE* perceived enjoyment, *BI* behavioral intention, *IMEL* intrinsic motivation in English learning.

Table 3 Discriminant validity of the survey instrument.

		PEU	PU	PE	IMEL	BI
Discriminant validity	PEU	**0.818**				
	PU	0.599	**0.889**			
	PE	0.516	0.785	**0.7964**		
	IMEL	0.271	0.395	0.360	**0.873**	
	BI	0.515	0.753	0.674	0.466	**0.921**

PEU perceived ease of use, *PU* perceived usefulness, *PE* perceived enjoyment, *BI* behavioral intention, *IMEL* intrinsic motivation in English learning.
The diagonal elements in bold are the square root of AVE values, while the Non-diagonal elements are the correlation coefficient between dimensions.

validity is satisfied when the correlation between the two constructs is smaller than the square root of the AVE.

The results presented in Table 3 demonstrate that the construct of PEU has adequate discriminant validity, as indicated by its square root of AVE value of 0.818, which is higher than its correlation coefficients with other constructs, namely 0.599 (PEU and PU), 0.516 (PEU and PE), 0.271 (PEU and IMEL), and 0.515 (PEU and BI). Similarly, the construct of PU also exhibits acceptable discriminant validity, with a square root of AVE value of 0.889, which is higher than its correlation coefficients with other constructs, namely 0.599 (PU and PEU), 0.785 (PU and PE), 0.395 (PU and IMEL), and 0.753 (PU and BI). The construct of PE also demonstrates acceptable discriminant power, with a square root of AVE value of 0.796, which is higher than its correlation coefficients with other constructs, namely 0.516 (PE and PEU), 0.785 (PE and PU), 0.360 (PE and IMEL), and 0.674 (PE and BI). Moreover, the construct of IMEL exhibits acceptable discriminant power, with a square root of AVE value of 0.792, which is higher than its correlation coefficients with other constructs, namely 0.271 (IMEL and PEU), 0.395 (IMEL and PU), 0.360 (IMEL and PE), and 0.446 (IMEL and BI). Finally, the construct of BI also demonstrates acceptable discriminant power, with a square root of AVE value of 0.921, which is higher than its correlation coefficients with other constructs, namely 0.515 (BI and PEU), 0.753 (BI and PU), 0.674 (BI and PE), and 0.466 (BI and IMEL). In conclusion, the constructs of PEU, PU, PE, IMEL, and BI exhibit sufficient discriminant validity, indicating that the measure model's constructs possess adequate discriminant power.

The reliability and validity of the survey instrument were verified, thus providing a basis for further analysis to be conducted.

Hypotheses testing. The traditional x^2 was used to evaluate overall model fit. Chi-Square of the model is $x^2 = 737.809$, the degrees of freedom are $df = 160$, the ratio of $x^2/df = 4.611$. The good fit is with the ratio of $x^2/df < 3$ and the acceptable fit is with the ration of $x^2/df < 5$ (Hu and Bentler, 1999). As Brown (2015) indicates, chi-square is very sensitive to sample size and a range of other fit indices should be utilized to evaluate the overall fit of a CFA solution, such as the Tucker–Lewis Index (TLI), the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR).

The proposed model achieved an excellent model fit, with CFI and TLI scores of 0.958 and 0.952 respectively, and RMSEA and SRMR scores of 0.066 and 0.037. These results surpass the benchmark of Hu and Bentler (1999), and Schreiber et al. (2006) which sets acceptable fits of 0.90 for CFI and TLI, and 0.08 for RMSEA and SRMR, and excellent fits of 0.95 for CFI and TLI, and 0.06 for RMSEA and SRMR, respectively.

The hypothesized relationships were evaluated through the utilization of standardized path coefficients. Figure 2 shows relationships among PEU, PU, PE, IMEL, and BI to adopt ICWTs for informal English learning.

The results showed that PEU had no significant influence on BI ($\beta = 0.054$, $p = 0.165$ ($p > 0.05$)), thus failing to support Hypothesis 1. However, PU ($\beta = 0.299$, $p = 0.019$ ($p < 0.05$)) and PE ($\beta = 0.414$, $p = 0.003$ ($p < 0.05$)) both had a significant positive impact on BI, thus confirming Hypotheses 2 and 3, respectively. Additionally, PE had a significant positive influence on both PEU ($\beta = 0.678$, $p = 0.000$ ($p < 0.001$)) and PU ($\beta = 0.925$, $p = 0.000$ ($p < 0.001$)), thus verifying Hypotheses 4 and 5. IMEL was also found to have a significant positive impact on both BI ($\beta = 0.173$, $p = 0.000$ ($p < 0.001$)) and PE ($\beta = 0.437$, $p = 0.000$ ($p < 0.001$)), thus confirming Hypotheses 6 and 7 (see Table 4).

The bootstrap analysis was used to examine the mediating effects, which were deemed significant if the 95% confidence interval did not include zero (Hayes, 2009). The results of the bias-corrected bootstrap 95% confidence interval indicated that the mediating effect of PEU on the relationship between PE and BI was not statistically significant ($\beta = 0.037$, 95% CI: [−0.014, 0.091]), thus failing to support Hypothesis 8. Conversely, the mediating effect of PU on the relationship between PE and BI was found to be significant ($\beta = 0.277$, 95% CI: [0.008, 0.481]), thus supporting Hypothesis 9. Similarly, PE was found to mediate the relationship between IMEL and BI to use ICWTs for English learning ($\beta = 0.181$, 95% CI: [0.079, 0.340]), thus supporting Hypothesis 10. The results showed that the mediating effect of PE and PEU on the relationship between IMEL and BI was not significant ($\beta = 0.016$, 95% CI: [−0.005, 0.040]), thus failing to support Hypothesis 11. On the other hand, the mediating effect of PE and PU on the connection between IMEL and BI to use

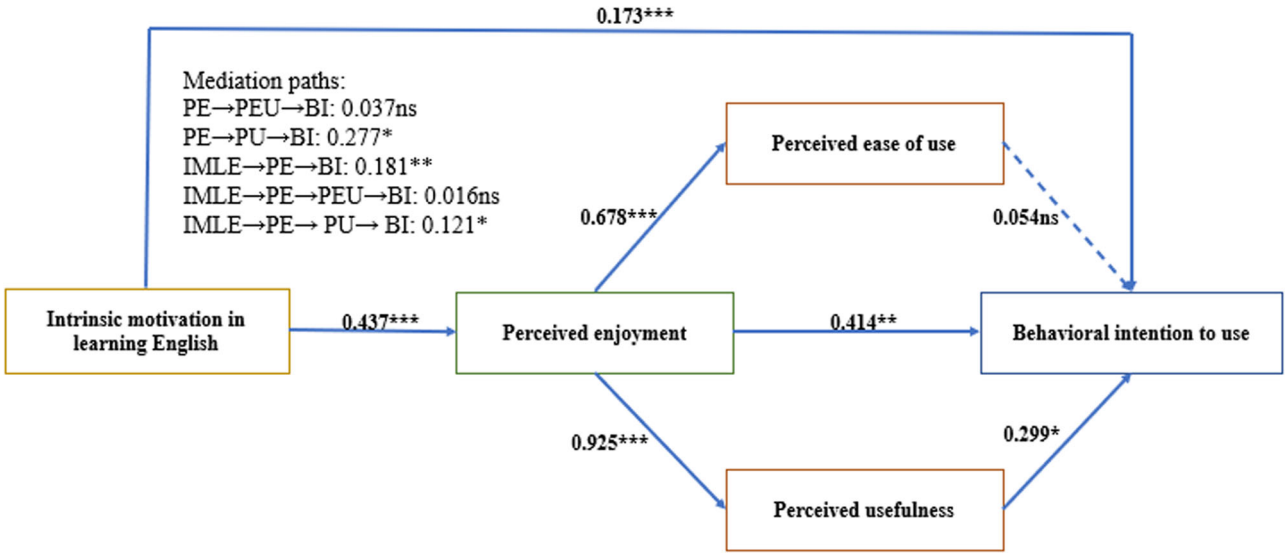

Fig. 2 Structural model with standardized estimates. PEU perceived ease of use, PU perceived usefulness, PE perceived enjoyment, IMLE intrinsic motivation in learning English, BI behavioral intention to use. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Table 4 Direct relationships among PEU, PU, PE, IMEL, and BI.

	Hypotheses	Estimate	SE	Est./SE	Two-Tailed *p*-value	Results
Direct relationship	PEU → BI (H1)	0.054	0.039	1.390	0.165	Not supported
	PU → BI (H2)	0.299	0.128	2.344	0.019	Supported
	PE → BI (H3)	0.414	0.139	2.974	0.003	Supported
	PE → PEU (H4)	0.678	0.032	21.497	0.000	Supported
	PE → PU (H5)	0.925	0.016	56.152	0.000	Supported
	IMEL → BI (H6)	0.173	0.044	3.886	0.000	Supported
	IMEL → PE (H7)	0.437	0.046	9.412	0.000	Supported

PEU perceived ease of use, *PU* perceived usefulness, *PE* perceived enjoyment, *BI* behavioral intention, *IMEL* intrinsic motivation in English learning.

Table 5 Mediating effects of PEU, PU, and PE.

Hypotheses	Product of coefficients				Bootstrapping 2000 times 95% CI		Results
	Estimate	SE	Est./SE	Two-tailed *P*-value	Lower 2.5%	Upper 2.5%	
PE → PEU → BI (H8)	0.037	0.026	1.382	0.167	−0.014	0.091	Not supported
PE → PU → BI (H9)	0.277	0.118	2.350	0.019	0.008	0.481	Supported
IMEL → PE → BI (H10)	0.181	0.064	2.828	0.005	0.079	0.340	Supported
IMEL → PE → PEU → BI (H11)	0.016	0.012	1.383	0.167	−0.005	0.040	Not supported
IMEL → PE → PU → BI (H12)	0.121	0.053	2.280	0.023	0.011	0.218	Supported

PEU perceived ease of use, *PU* perceived usefulness, *PE* perceived enjoyment, *BI* behavioral intention, *IMEL* intrinsic motivation in English learning.

ICWTs for English learning was found to be significant ($\beta = 0.121$, 95% CI: [0.011, 0.218]), thus confirming Hypothesis 12. The mediating effects are presented in Table 5.

The results in Tables 4 and 5 showed that six of the seven hypotheses concerning the direct effects were validated, and three of the five hypotheses regarding the mediating effects were confirmed. In total, nine of the twelve hypotheses were verified.

Discussion

This research explored factors influencing undergraduates' behavioral intention (BI) to use indigenous Chinese Web 2.0 tools (ICWTs) for informal English learning, combining language learning motivation with TAM. Despite the widespread use of ICWTs, undergraduates do not often adopt them for English learning. Therefore, it is essential to take action to facilitate the adoption of these tools for English learning. Educators should be proactive in guiding students to use these tools effectively in language learning and cultivate students' habits of self-directed, autonomous, and lifelong learning with the assistance of technology.

This study found that perceived ease of use (PEU) had no significant impact on undergraduates' BI to use ICWTs in informal English learning, which is in contrast to the findings of

Davis (1989) which suggested that PEU was a key factor in the acceptance of new technologies. This result is also at odds with the results of Baker et al. (2010), Balouchi and Samad (2021), which indicated that PEU was a major predictor influencing learners' technology acceptance for online English learning. But in another study carried out in China (Guo et al., 2020) the influence of perceived ease of use (PEU) on behavioral intention did not achieve a significant level either. This was also in line with Teo et al. (2018) study in which Chinese teachers were suggested as diligent and dedicated to teaching so that they would not accept technologies just because of their effortlessness. This discrepancy may be attributed to the advancement of technology and the enhancement of students' digital literacy, implying students would not consider effortlessness as an important factor when thinking about using mobile technologies in learning. In our study, the participants were college students who are digital natives born after 2000. They grew up and were familiar with mobile devices and thus, were not really bothered to make efforts in using mobile devices (Prensky, 2001). Therefore, PEU had no significant influence on BI. This inconsistency also serves as a reminder that technological progress may lead to changes in users' perceptions of technology. Additionally, the disparity between the findings of this study and those of prior studies could also be attributed to variations in student preferences as well as cultural differences.

It was observed that perceived usefulness (PU) had a positive influence on undergraduates' BI to use ICWTs in informal English learning, which is in line with previous research (Yang et al., 2017; Balouchi and Samad, 2021). Additionally, PU was found to mediate the correlation between PE and BI, which is consistent with Balog and Pribeanu (2010) demonstrating PU's mediating effect between PE and BI to use AR teaching platforms. It is believed that the perception of the usefulness of Web 2.0 tools in improving performance, efficiency, or productivity affects a learner's intention to use them. Furthermore, PU was found to be directly impacted by PE and indirectly by intrinsic motivation in English learning (IMEL). From a practical standpoint, undergraduates are likely to view Web 2.0 tools as beneficial for English learning if they are motivated and find the tools enjoyable.

It has been found that perceived enjoyment (PE) has a positive influence on undergraduates' BI to use ICWTs in informal English learning, which is in line with the findings of Balog and Pribeau (2010) and Mubuke et al. (2017). Furthermore, PE has been discovered to mediate the association between IMEL and BI. Therefore, educators should strive to make learning English with ICWTs more enjoyable in order to heighten students' willingness to utilize ICWTs. When designing or upgrading Web 2.0 tools, developers should ensure to include enjoyable attributes and content to attract more users. Adding stimulating design and content of English resources to the existing functions of ICWTs may make Chinese undergraduates more likely to incorporate these tools into their English learning.

This study highlighted that IMEL was an important predictor for the adoption of ICWTs in informal English learning, which echoes Yu et al. (2022) who revealed that with intrinsic motivation in language learning, students might be encouraged to reach for available mobile technologies. However, this is inconsistent with Sun and Gao (2020). They found that IMEL did not have a direct effect on undergraduates' BI to use mobile-assisted language learning. This may be due to the small sample size of 169 participants in Sun and Gao (2020), which may have led to a limited result (Hair et al., 2013). Furthermore, the results of this study showed that IMEL had an indirect effect on undergraduates' BI to adopt ICWTs for informal English learning through PE. This suggests that those who are motivated in learning English are more likely to experience pleasure, satisfaction, and enjoyment from using Web 2.0 tools to facilitate their learning tasks. Thus, enhancing students' motivation in language learning is an important responsibility of educators.

This study has yielded valuable insights into the utilization of ICWTs for informal English learning. However, its generalizability is limited due to the narrow scope of the research. To further explore the topic, future studies should consider expanding the scope to other universities and countries, as well as employing a qualitative or mixed-method approach. Additionally, TAM should be expanded to include more affective factors that may impact English learning, in order to gain a more comprehensive understanding of the usage intention of Web 2.0 tools for English learning.

Conclusion

This study contributes to the expansion of TAM to assess undergraduates' BI to use ICWTs for informal English learning. It provides a novel perspective to TAM by incorporating a new construct that evaluates intrinsic motivation in English learning, which was demonstrated to be a significant factor in influencing undergraduates' BI to use ICWTs in informal English learning. Additionally, constructs such as PU and PE were also found to be influential in determining undergraduates' intention to adopt ICWTs for informal English learning.

The results indicated that PU, PE, and IMEL positively predicted undergraduates' BI to use ICWTs for informal English learning. PEU was not significantly related to the intentional use of the tools. PU mediated the relationship between PE and BI, PE mediated the relationship between IMEL and BI, and PU and PE together mediated the association between IMEL and BI.

Despite the less frequent utilization of ICWTs by undergraduates for informal English learning, we believe that the effective implementation of indigenous Chinese Web 2.0 tools will lead to novel modes of English learning. Undergraduates should take advantage of these tools in their English learning, teachers should suggest appropriate Web 2.0 tools and improve students' motivation to learn English, and developers of Web 2.0 tools or other emerging technologies should consider usefulness and pleasure while designing these tools.

Data availability

The datasets are available by contacting the corresponding author on reasonable request.

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Author contributions

Both authors contributed to the study's conception and design. Material preparation, data collection, and analysis were performed by Cunying Fan and Juan Wang together. The first draft of the manuscript was written by Cunying Fan and both authors commented on previous versions of the manuscript. Both authors read and approved the final manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

This study was designed in accordance with the Research Ethics Policy and Code of Research Conduct established by the Qufu Normal University. The study was approved by Qufu Normal University Research Ethics Committee (reference: 2023036).

Informed consent

Informed consent was obtained from all the participants prior to their participation in the survey.

Additional information

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Correspondence and requests for materials should be addressed to Juan Wang.

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