Estimating University Students' Acceptance of Technological Tools for Studying English through the UTAUT Model

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ABSTRACT

This paper is based on the results of a questionnaire survey on 289 medical students to predict their acceptance of or resistance to information and communication technology (ICT) tools for learning English through Venkatesh, Morris, Davis, and Davis's UTAUT model. The measurement scale used to estimate their behavioral intention of ICT use for learning English includes six determinants of the UTAUT, namely, *performance expectancy* (PE), *effort expectancy* (EE), *social influence* (SI), *facilitating conditions* (FC), *self-efficacy* (SE) and *perceived anxiety* (PANX) and two dependent factors, namely *behavioral intention* (BI) and *use behavior* (UB). First, the descriptive statistics indicate that the student subjects have sufficient conditions to use ICT for studying English online. Second, the exploratory factor analysis drops PANX from the hypothesized measurement model and reduces the eight original constructs to four by grouping EE and SE, PE and SI, and BI and UB. Second, the confirmatory factor analysis explains the satisfactory model fit indexes with the support of the structural equation model and locates the positive correlations among the variable constructs. After that, the tested hypotheses show that UB is influenced by BI and FC, and BI itself is affected by PE, EE, SI, and SE. Finally, the authors provide the grounded implications on what should be done to effectively increase the students' use of ICT for their learning needs in higher education.

Keywords: *expectancy, performance, behavioral intention, actual use*

1. Introduction

The appearance and availability of mobile devices such as smartphones, personal digital assistants or PDAs, and tablet computers make education ubiquitous and contribute much to improved learning (Abbad, 2021). Moreover, the proliferation of ICT use has been transforming education and making it more available for learners, and it has profoundly changed how

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knowledge is transmitted and acquired, from exclusively classroom-based instruction to the hybrid of in-class interaction and online learning (Truong, 2021) or full e-learning (Al-Busaidi, 2013). Since the Covid-19 pandemic began in early 2020, universities and schools have switched to home-based e-learning in place of on-campus classes (Blake, 2021; Pham & Vo, 2021; Teh, 2021), which requires more effort (Le, 2021) and ICT literacy (Tran, 2021) from both the teacher and the learners in the new mode of presentation and interaction.

E-learning is defined as the use of computer technology to deliver education or training courses to learners; such courses may be studied online, offline, or by any mixture of these modes (Al-Busaidi, 2013). It is evident that ICT makes the prerequisite for the advent and development of e-learning around the world, as well as the growth of online learning, hybrid learning, and blended learning now. ICT actually enables education to be accessible to students anytime and anywhere (Abu-Al-Aish & Love, 2013), and learning technology researchers always view the Internet both as a means of delivery and as a tool to increase the quality of learning experiences and learning outcomes (Means et al., 2013). In fact, the implementation of e-learning is not simply a technological solution but a process of many different factors such as social and behavioral contexts (Tarhini et al., 2013); therefore, ICT use plays a key role in the success in e-learning implementation.

The literature of ICT use in the educational context exhibits that ICT use could offer students multiple benefits. First of all, the ICT-rich environment has created a good atmosphere for learners (Phan & Huynh, 2021) as it not only helps deliver the lesson well but also contributes to increasing learner engagement and making learning experiences more interesting (Callum, 2011). The prior research also found out that ICT use in the blended learning model could lead to improved learning outcomes (Alamr, 2019; Miyazoe & Anderson, 2010; So & Lee, 2013) or improve students' skills (Adas & Bakir, 2013; Baniyassen, 2020). Furthermore, multiple studies indicate that students undergo a positive change in their attitude towards ICT use (Alqasham, 2018), and the students become more autonomous in their learning after being exposed to the blended environment (Challob et al., 2016) or the entire online one (Teh, 2021). In addition to that, some researchers have suggested that ICT tools should be incorporated to boost educational quality (Al-Busaidi, 2013; Callum, 2011; Grgurovic, 2010). Finally, ICT tools can also be employed as a means of education that incorporates self-motivation, communication, efficiency, and technology (Chau, 2021; Tarhini et al., 2016; Tran & Nguyen, 2021).

E-learning implementation is surely a complex process, and the successful use of ICT tools for teaching and learning depends much on understanding how students accept ICT tools (Abbad, 2021). Although there has existed a plethora of researches on predicting user acceptance of ICT tools in the educational context, the number of studies drawing on the UTAUT to estimate medical students’ use of ICT for studying English through the learning management system (LMS) is very limited. As a result, the aims of this paper are to figure out the real situation of ICT use to learn English among medical students and locate the factors that influence their acceptance of or resistance to ICT use for learning English online. Also, the findings of this paper are expected to seek the answers to the following research questions.

1. What ICT tools do the student subjects use to study English online?
2. What factors affect their acceptance of ICT tools for learning English?
3. What are the correlations among the constructs of the UTAUT model?

2. Literature review

2.1. ICT tools

ICT refers to any technology that uses the Internet, computers, mobile devices, and applications to search for, share and store information as well as create materials and communicate with other people (Nguyen, 2017). The literature review indicates that the use of ICT tools has its salient root in the Audio-visual Method, and these tools are educationally beneficial to language learners. Their specific applications have grown at a rapid speed for the past decades, and college students have been found to use different ICT tools in the educational context (Chu, 2016).

Before the boom of the web, audio-visual aids such as tapes, radios, cassettes, CD players, overhead projectors, TVs, videotapes, and recorders had been used to assist teaching and learning (Le, 2016). Then, around the 2000s, Web 1.0 such as blogs, Wikipedia or Google was widely used, and people could resort to this static source to search for necessary materials (Ho, 2016; Le, 2016). Since 2004, Web 2.0 has been employed as an interactive source where people can do more active jobs. Presently, Web 2.0 tools are very popular in language classes (Ho, 2016; Le, 2016).

Another classification of ICT tools was suggested by Puentedura (2006). He introduced the SAMR model, which categorizes ICT tools in four major functions, namely *substitution* (Technology acts as a direct tool substitute, with no functional change), *augmentation* (Technology acts as a direct tool substitute, with functional improvement), *modification* (Technology allows for significant task redesign), and *redefinition* (Technology allows for the creation of new tasks, previously unconceivable) (Puentedura, 2006). These four functions can be adopted to facilitate various educational tasks such as teaching, learning, testing and management (Nguyen, 2017).

The final clear-cut grouping of ICT tools was also based on their different functions and applications, and the result is that ICT was placed into four categories (Dang, 2013). This way of categorizing ICT tools is most appropriate for the authors' research needs; thus, they will include this classification in the questionnaire survey.

Table 1. Types of ICT tools for use in education (Dang, 2013)

Tool categories	Examples
Location and retrieval tools	Search engines: Google, Yahoo, Bing, Youtube, Teachertube, TV, Radio and the like
Material creation tools	Word processors, presentation software (PowerPoint, Prezzi), authoring programs (hot potatoes, task magic, and fun with texts), audio and video editing tools, e-lecture tools to merge movies into slides, make movies and mind maps, and the like
Interaction tools	Students' computers and smartphones connected with teachers' computers, Learning Management Systems, or social networks
Teaching tools	PowerPoint or Keynote presentation Prezzi used with projectors.

To summarize, using ICT tools for teaching and learning has been a trend, especially when college students are very ITC-inclined and they like doing things with ICT tools (Chu, 2016). The literature review also indicates that the present-day classrooms of English are concerned with what ICT tools are employed and when and how they are exploited to make teaching and learning more interesting and effective. Thus, the authors of this paper will attempt to explore the various factors that affect the students' attitude and intention to use ICT in the e-learning environment in order to understand and estimate their actual use of ICT.

2.2 Technology acceptance models

There have been several competing models explaining the relationships between the determinants that would affect an individual's technology acceptance, and the widely-adopted ones are Davis's Technology Acceptance Model (1989), Azjen's Theory of Planned Behavior (1991) and Venkatesh et al.'s Unified Theory of Acceptance and Use of Technology (2003).

Davis (1989) explored how perceived usefulness (PU) and perceived ease of use (PEU) affected user acceptance of technology which was explained through the two dependent factors: attitude to use (ATU) and intention to use (ITU). In his Technology Acceptance Model (TAM), the two principal factors are PU and PEU, which are defined as the user's belief that the technology will improve their performance or help them perform their job better (Davis, 1989) and as to how easy the user perceives the new technology is to use respectively (ibid). In the TAM, PEU and PU are the predictors of ATU. Then, ATU results in the behavioral intention of whether to use or not use the technology (ITU). This model has gained support for being powerful in predicting the early adoption of new technologies in numerous contexts and different situations, including education (Callum, 2011; Tarhini et al., 2013). After that, the TAM was extended with the addition of external variables such as job relevance and ICT experience, which are believed to positively influence PU and PEU (Davis et al., 1992). Although used widely in educational settings, Davis' TAM (1989) was criticized for not generating consistent and conclusive results, and the model is too simple in its nature (Shachak et al., 2019).

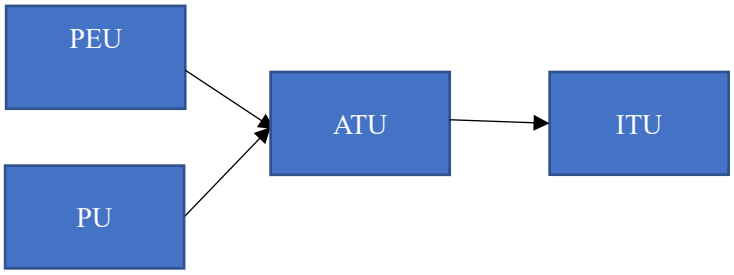

Figure 1. Davis's TAM (Davis, 1989)

Another popular model is the Theory of Planned Behavior (TPB), which was proposed by Ajzen (1991). It was extended from his earlier co-authored model named the Theory of Reasoned Action (TRA) (Ajzen, 1991). He kept the TRA's attitude towards act or behavior (ATA) and subject norm (SN), and added the perceived behavioral control (PBC) (Ajzen, 1991; Callum, 2011; Venkatesh et al., 2003). In more detail, ATA is perceived as an individual's positive or negative feelings of performing the behavior, and it is formed by his/her belief and evaluation of that target behavior (Ajzen, 1991). Then, SN refers to the social influence and is gauged by the normative belief of the ways others expect an individual should behave (Ajzen, 1991). Finally, the PBC relates to the perception and assessment by an individual of his/her ability and resources to perform a behavior (Ajzen, 1991). Overall, these three independent constructs are hypothesized to generate a great impact on users' behavioral intention to use (BIU), which is then theorized to affect individual behavior (IB) (Callum, 2011).

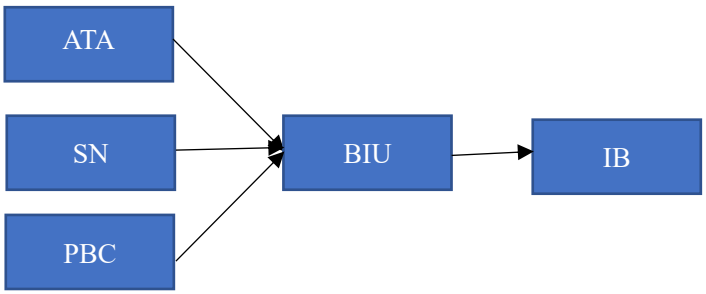

Figure 2. Ajzen's TPB (Ajzen, 1991)

Ajzen's TPB has been exploited to explore a wide range of human behaviors; however, the criticism is that the model is too simplistic in nature to truly determine the adoption, and the two original determinants are too similar (Callum, 2011). This model is also criticized for not putting external barriers into consideration (Taherdoost, 2017).

The most recently validated model adopted to estimate individual acceptance of ICT use is the Unified Theory of Acceptance and Use of Technology (UTAUT), which was introduced by Venkatesh et al. (2003). It was the unified model of eight earlier validated models, including the TPB and the TAM (Shachak et al., 2019; Venkatesh et al., 2003). In fact, all the elements from those eight previous models are incorporated to define their theorized determinants of

intention and/or usage (Shachak et al., 2019; Venkatesh et al., 2003). In the end, they produced a unified model in which user acceptance of ICT is influenced by four determinants: PE, EE, SI and FC and four key moderating variables: *age*, *gender*, *experience* and *voluntariness*.

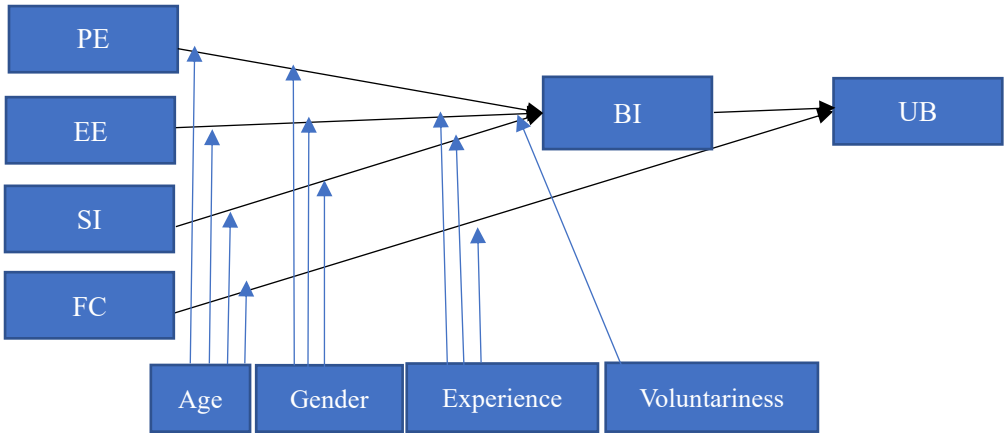

Figure 3. Venkatesh et al.'s UTAUT (2003)

In the measurement model above, PE gauges the degree to which an individual perceives that using the system could help improve job performance (Callum, 2011; Venkatesh et al., 2003). Whether ICT use is voluntary or mandated, this factor always remains the strongest predictor of user acceptance of ICT tools (Jaradat & Banikhaled, 2013; Lescevica et al., 2013; Puspitasari et al., 2019; Venkatesh et al., 2003; Zuiderwijk et al., 2015), and the strong influence of PE on BI is moderated by gender and age (Venkatesh et al., 2003). In its nature, PE has a lot of similarities to PU in the TAM and has its roots in extrinsic motivation (Callum, 2011).

EE refers to the degree to which an individual perceives that the system will be easy to use (Venkatesh et al., 2003). This construct has been empirically proven to be a strong predictor of ICT use (Abbad, 2021; Berlilana et al., 2017; Jaradat & Banikhaled, 2013; Lescevica et al., 2013; Zuiderwijk et al., 2015), and in its nature, it is very similar to PEU in Davis's TAM (1989). Furthermore, Venkatesh et al. (2003) claimed that EE is most salient for women, particularly those who are older and with relatively little experience with the system, indicating that the direct impact of EE on BI is moderated by age, gender and experience.

SI is defined as the degree to which the user believes that others about whom they care feel that they should use the system (Venkatesh et al., 2003). This factor is very similar to the TPB's SN (Callum, 2011; Shachak et al., 2019), and its influence on BI (Nordhoff et al., 2020) is moderated by age, gender, experience, and voluntariness (Venkatesh et al., 2003). Additionally, Venkatesh et al. (2003) posited that SI directly impacts user acceptance of ICT tools when ICT use is mandated, and that increasing experience provides a more instrumental basis for individual intention to use ICT. It is also found that women tend to be more sensitive to others' opinions than men, and ICT use is more salient for older people (Venkatesh et al., 2003).

FC measures the degree to which an individual perceives that support and assistance are available to them to use their system (Venkatesh et al., 2003). This has a close link to the TPB's PC (Callum, 2011; Shachak et al., 2019) and is the direct determinant of user behavior (Abbad, 2021); however, when both FC and EE are incorporated in the model, FC is not significant in predicting user intention to use or BI (Venkatesh et al., 2003). The effect is expected to increase with experience, and older people attach more importance to receiving technical help and assistance than young ones; thus, the effect of FC on UB is moderated by age and gender (Venkadesh et al., 2003; Zuiderwijk et al., 2015).

Besides the above-mentioned direct determinants, the UTAUT consists of two indirect ones. SE is the belief in one's capabilities to organize and execute the courses of action required to produce given attainments (Bandura, 1997). SE in ICT use then refers to their judgment of their own ability to use ICT tools (Venkatesh et al., 2003), and it has been hypothesized to affect user attitude to use ICT indirectly (Venkatesh et al., 2003; Callum, 2011; Tarhini et al., 2016; Abbad, 2021). Moreover, PANX of ICT use refers to the fear that some people have when using or being confronted with ICT use (Callum, 2011). Davis (1989) claimed that the easier the system, the less effort one needs to operate it and the more effort he or she can allocate to other activities. Prior research has found that PANX is conceptually and empirically distinct from PEU, and it is one of the factors that indirectly influence BI (Venkatesh et al., 2003).

The dependent constructs of the UTAUT are BI and UB. BI refers to the user attitude towards using technology and is usually defined as an individual's overall affective reaction to using a system (Venkatesh et al., 2003). It results in user behavior (UB) (Ajzen & Cote, 2008) of whether to use or not to use the technology (Venkadesh et al., 2003; Jaradat & Banikhaled, 2013). In nature, BI and UB are much similar to the TAM's ATU and ITU, respectively (Callum, 2011; Shachak et al., 2019).

In short, the UTAUT is the unification of the prior validated structural models for predicting user acceptance of ICT. It remains rather new in comparison with other models; nonetheless, it is able to account for 70 percent of the variance (adjusted R2) in usage intention (Venkatesh et al., 2003) and has been being used increasingly in studies assessing and estimating technology adoption (Callum, 2011; Taherdoost, 2017).

2.3 Modeling the technology acceptance model

The UTAUT has been employed in various fields to explore user belief, attitude and behaviors, and the research model has been adopted and modified to fit in the true situation and capture the complexity of the issues (Shachak et al., 2019; Tamilmani et al., 2021). The result is that some constructs can be added, removed, or adapted for a specific application in a certain situation. For example, Lescevica et al. (2013) adapted the UTAUT by excluding the indirect determinants of BI to explore market opportunities for FP7 CHOReOS products, Zuiderwijk et al. (2015) adopted the original moderating factor of voluntariness as a direct determinant of BI to predict user acceptance of open data technologies, or Berlilana et al. (2017) added information system quality as a predictor of BI to estimate user intention to use e-government

services in Indonesia. Therefore, the hypothesized research model of this paper has been adapted from the UTAUT with the support of the aforementioned discussion and literature.

In more detail, the need-to-be-validated research model has eight factors, namely four direct determinants (PE, EE, SI, FC), two indirect determinants (SE, PANX), and two dependent factors (BI, UB). These factors are realized by 31 indicators which are adapted from the scale suggested by Venkatesh et al. (2003). Except for UB, which is realized by three indicators, the remaining constructs are measured by four each. These candidate indicators have been adapted to fit in the new research context to predict user acceptance of ICT tools. Also, the moderating variables have been removed from the original UTAUT because of the homogeneity of the sample in terms of age, gender, experience, and voluntariness. This adaptation of the hypothesized model is necessary in its specific application in a new context (Shachak et al., 2019, Tamilmani et al., 2021).

In short, the scale includes eight constructs, as was discussed above. The theorized relations among them help develop the hypotheses with the support of the prior research findings concerning user acceptance of ICT tools, and their correlation coefficients and regression weights will be examined to understand how they affect the student subjects' ICT use for learning English.

2.4. Hypothesis development

In the need-to-be-validated measurement scale, three direct determinants of BI are PE, EE and SI, two indirect determinants of BI are SE and PANX, and two predictors of UB are BI and FC. Based on the varying impacts of the determinants and the dependent factors and the correlations among them, seven hypotheses are stated as the following.

H_1: BI is positively affected by PE.

H_2: BI is positively affected by EE.

H_3: BI is positively affected by SI

H_4: BI is positively affected by PANX indirectly.

H_5: BI is positively affected by SE indirectly.

H_6: UB is positively affected by FC.

H_7: UB is positively affected by BI.

After being tested via the correlation coefficients, the above-mentioned hypotheses are supposed to reveal the numeric relations between the determinants and the dependent constructs within the theorized measurement model.

3. Methodology

3.1. Research design and approach

This is ethnography research with the engagement of six randomly-picked classes of Communicative English of a university in Ho Chi Minh City. Their majors were in the field of health care in the academic year of 2021 and were studying Communicative English 3, one of the five courses for non-English majors at this university. They had been studying through the blended model or the online model for more than a year before the research. When invited to answer the survey questionnaire, the participants in this research were taking part in the online courses on English due to the on-going Covid-19 pandemic. As required to study online, the student subjects had to equip themselves with their own devices such as smartphones, tablets or personal computers. All these gadgets must come with the Internet to get connected to their university's LMS to study English. Due to the mandated use of ICT tools in studying, the moderating variables of voluntariness and experience have not been included in the hypothesized model.

The student subjects were expected to provide information on their acceptance of or resistance to ICT tools for learning English at university. Before administering the online questionnaire to collect data via the Google Form, the authors introduced the purpose of the research work and explained the specific items to the respondents to ensure that they really got the point and provided reliable data after that. Finally, the data was computed, analyzed and discussed to estimate their ICT use for learning English through several analytical models.

3.2. Participants

Involved in the research work were 289 student subjects, among whom the females outnumbered the males and accounted for 82.4%. Besides, Figure 4 indicates that the number of sophomores providing the information for the research formed 79.6%, and the rest of the sample was composed of more senior year students. The seniority of the students at university also helped them understand that they had some experience in studying English at tertiary level education and familiarized themselves with studying online as those of other universities due to the Covid-19 pandemic, which had stricken the Vietnamese education system since early 2020. It could also be inferred that they had been using certain types of ICT tools for their studying need in general and for studying English in particular when the research was conducted there. Because of the homogenous age groups and the gender bias of the sample, the two moderating variables of age and gender were removed from the hypothesized research model.

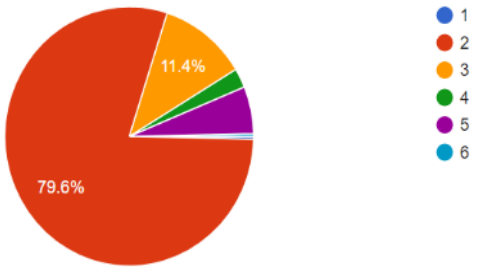

Figure 4. Student subjects' seniority at college

3.3. Instruments

The findings of this paper are solely based on the questionnaire delivered to a cohort of medical students in their second year or older. The questionnaire, which was adapted from the one suggested by Venkatesh et al. (2003) consists of two sections. The former one is contingent on seven questions designed for the students to check or to fill in, and it is designed to explore the student subjects' background information on ICT tool ownership and use. The latter one contains 31 question items whose responses are based on the five-point Likert scale for the students to click on. The questionnaire was sent to the students through the Google Form, and one big advantage of this mode of delivery is that when the question is marked as "required", the students have to answer all the marked question items before they can submit their responses successfully. This actually helps prevent missing data from occurring, and it is very easy for the analytical models to be performed later.

The questionnaire was written in English first, and then it was translated into Vietnamese in order that the students could fully understand every question item and provide their proper responses. After the data was downloaded, it was imported to the SPSS for further calculation.

3.4. Data analysis

After the data was imported into the SPSS, the data was run on some statistical analyses. The data analysis would go through several steps of statistical exploration to see the reliability of the measurement scale. First, the descriptive statistics helped understand the students' actual ownership and use of ICT tools in general. Next, the exploratory factor analysis (EFA) helped find out the factors that influence the students' use of ICT tools for learning English, and then the new model composed of the hypothesized factors was validated through the confirmatory factor analysis (CFA). Finally, the variance analysis was employed to calculate the correlations and test the hypothesized relations among the constructs of the hypothesized model. The analytical models above were expected to predict the determinants of the student subjects' use of ICT tools for learning English at tertiary education.

4. Data analysis and discussion

4.1 Answer to the first question

The first research question is what ICT tools the medical students actually own and use to study English online. The statistic figures indicate that 93.4% of the respondents claimed that they owned a certain type of gadget to study English online. The detail of the students' ICT use and ownership would be presented in the following charts.

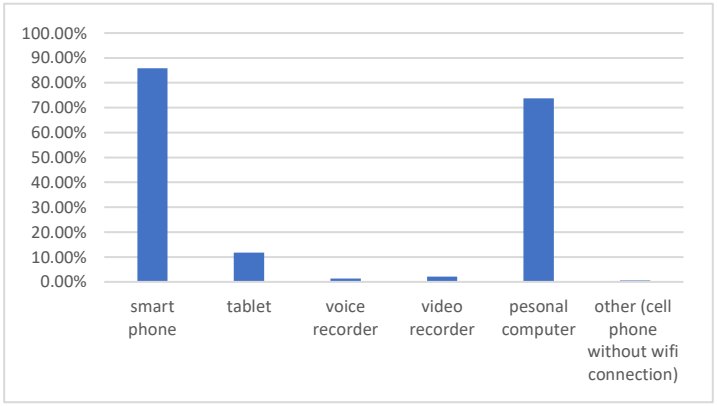

Figure 5. Student subjects' ownership of ICT tools

Figure 5 shows that 85.8% of the respondents possessed smartphones and 73.7% had personal computers. Then comes the number of tablets which forms 11.8 %, which is far lower than those of the smartphones and personal computers. In short, smartphones and personal computers are the two most popular gadgets that the student subjects own and use, and they are also very helpful ICT tools for them to study online now. This result stays concurrent with Pham and Vo's earlier findings (2021). For the remaining proportion of the respondents who indicated "no" to ICT ownership, they might have borrowed certain types of gadgets to serve their learning needs because e-learning or blended learning had been introduced for a year, and they could not have studied online without them.

Figure 6 indicates that the most favorite location and retrieval ICT tool for medical students is Google (89.6%). Next are the online dictionary and Youtube, which account for 48.8% and 41.5%, respectively. On the whole, the statistical figure explains that Google was most likely to be the tool with the highest percentage of use for getting information from the online resources to serve their study needs. Additionally, it is noteworthy that the students might have exploited the online dictionaries and online English courses for studying English. This helps infer that the students have already had some previous experience in using ICT for learning English online.

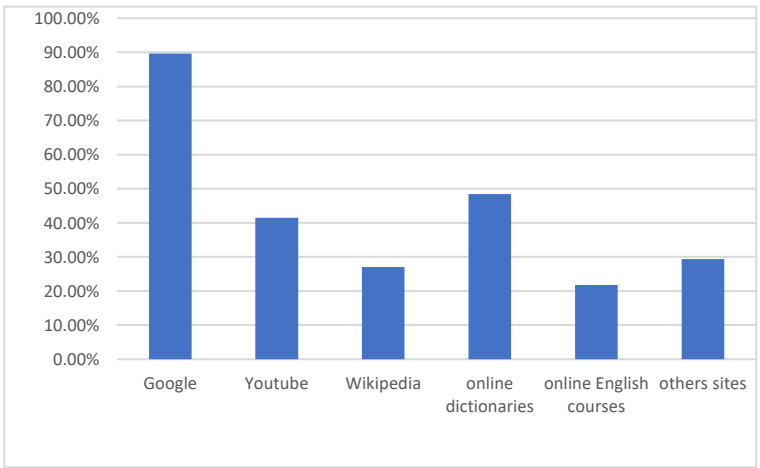

Figure 6. Student subjects' location and retrieval ICT tools

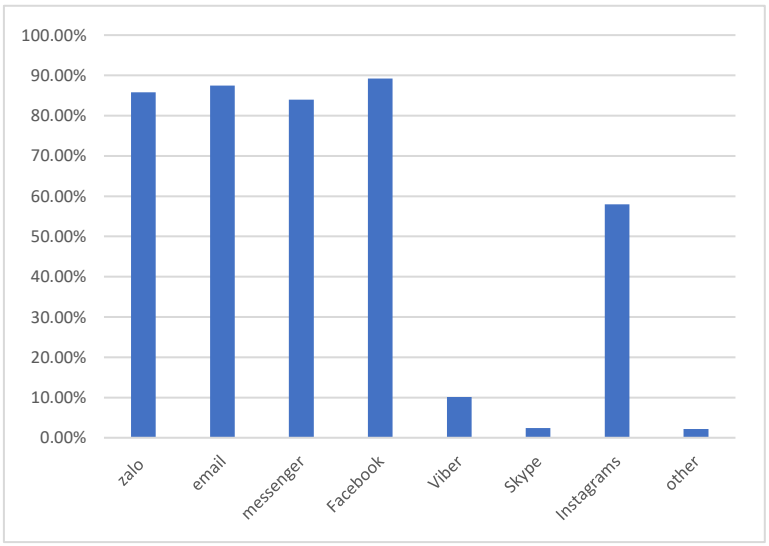

Figure 7. Student subjects' interaction ICT tools

Figure 7 illustrates that among the interaction ICT tools, Facebook (89.2%), Email (87.5%), Zalo (85.8%) and Messenger (84%) dominate the student subjects' use of ICT tools to communicate with other people. Then, the number of students using Instagrams comes forth with a percentage of 58%. Overall, the students were using Email, Messenger, Facebook, Zalo and Instagram, which are among the most popular ICT tools for social network communication in Vietnam. These tools are very good for them to share, discuss and seek entries with friends, teachers and other people. Furthermore, it is interesting to know that the number of students using Zalo is equivalent to that of those owning smartphones. This proves that interaction tools play an important role in their daily life.

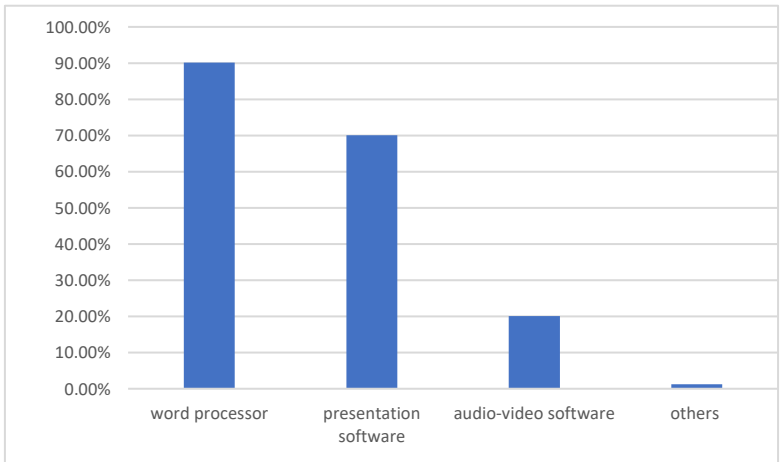

Figure 8. Student subjects' material creation ICT tools

Finally, Figure 8 shows the use of material creation ICT tools among the student subjects. The statistics demonstrate that the word processing software is the most preferred one, the percentage of which tops at 90.1%. Next is the presentation software with the use percentage

of 70.1%, and third is the audio-video software with 20.1%. In general, the students majoring in medication were accustomed to some popular software programs because they usually employed these tools to complete assignments, register for courses, make presentations, and interact with the lecturers over the Internet.

In conclusion, all the student subjects use technology to study English, and most of them (93.4%) possess certain types of ICT tools and have some previous experience in using these ICT tools for their learning needs.

4.2. Answer to the second research question

The collected data draws on 289 responses from the student subjects. Before carrying out the statistical calculation, the authors should really assess the reliability of the overall scale first. According to the reliability statistics, Cronbach's alpha index of the total scale reaches .955, which is very good for further exploration. However, when screening the factor loading of each variable, the authors found that PANX1, PANX2, PANX3 and PANX4 receive the corrected item-total correlations of .284, .150, .259 and .259 respectively, which are below the acceptable level of .30 (Hair et al., 2010); therefore, these independent variables will be dropped from the hypothesized scale.

Table 2. Reliability of the scale

	Number of Items	Cronbach's alpha	Valid cases	Excluded cases
EE	4	.881	289	0
SE	4	.961	289	0
SI	4	.928	289	0
PE	4	.879	289	0
FC	4	.920	289	0
BI	4	.928	289	0
UB	3	.933	289	0
Total Scale	**27**	**.971**	**289**	**0**

Then, the remaining variables went through the test of reliability again, and it can be seen in Table 2 that the reliability indexes of each component and the overall scale are much higher than the acceptable level of over .60 (Hair et al., 2010), indicating that the EFA could be performed.

The result of the EFA shows that the Kaier-Meyer-Olkin measure of sampling adequacy reaches .954, which is far higher than the very good level of .90, and Bartlett's test of sphericity is far lower the acceptable level of below .05 (Hair et al., 2010), indicating that the data is fit for the EFA to run the component reduction. After the first extraction of the principal components through the EFA, the total variance explains that the new model will be composed of four factors when the initial Eigenvalue total marks at 1.080, and the cumulative extraction sums of squared loadings form 75.789%. In other words, eight constructs of the hypothesized research model have been reduced to four by now.

Table 3 shows that although there are not any blends across the constructs, all construct variables have been grouped into four factors. Therefore, three out of them will have to be conceptualized again and relabeled.

Table 3. Rotated component matrix

	Component			
	1	2	3	4
EE2	.806			
SE3	.794			
SE1	.776			
EE4	.738			
EE3	.712			
SE4	.710			
SE2	.688			
EE1	.676			
PE2		.806		
PE1		.767		
SI1		.731		
SI4		.722		
PE3		.721		
SI3		.689		
PE4		.660		
SI2		.633		
UB1			.832	
UB3			.792	
UB2			.786	
BI4			.729	
BI2			.715	
BI1			.666	
BI3			.593	
FC2				.775
FC1				.729
FC3				.706
FC4				.622

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

The first factor includes SE and EE; thus, its new name should be ICT Proficiency (IP), which refers to the level of individual capability to use ICT free of effort. The grouping of SE and EE might have come from the fact that the student subjects have familiarized themselves with ICT use for online learning; they are very confident in ICT use and can use ICT tools free of effort. This leads to the fact SE and EE share a high proportion of covariance in common, and they have been statistically computed as one construct only. In the same way, the second new factor consists of SI and PE, and it should be renamed External Influence (EI). This might also have resulted from the truth that they have been utilizing ICT tools for studying for years, forming their belief that ICT tools are useful for them to study online and they use these tools because the people around them, namely the teacher, course administrators, parents and/or friends, expect them to use ICT tools to study. This influence has caused them to feel a close relation between PE and SI, and they are statistically measured by one-factor loading. Then, a similar case is true to the last new factor, which is composed of BI and UB. This new factor should be named Actual Use (AU). This convergence of the factor loadings is not uncommon in the TAM

and the UTAUT when the sample has experience using ICT tools, which blurs the distinction between ATU and ITU (Shachak et al., 2019). To put it another way, the experience in ICT use has led their intention to use ICT tools to move closer to behavioral use.

In short, the findings of the EFA explain that the factors that affect the students' acceptance of ICT use for learning English include IP, EI and FC. The exclusion of PANX might have come from the explanation that the students do not find ICT tools difficult anymore because they show very good skills at using ICT tools through FC; thus, PANX does not play a role in influencing the students' ICT use in learning English online. It is also worth noting that SE is parallel to SI, EE and PE, indicating that it is more direct than indirect to determine BI.

To examine the relations among all the constructs of the newly formed research model more clearly and to confirm the model fit, the structural equation model (SEM) is employed. The model fit can be explained in the Chi-square fit index divided by the degree of freedom (Chi-square/df), the goodness-of-fit index (GFI), the comparative fit index (CFI), the Tucker-Lewis index (TLI) and the root mean square error of approximation (RMSEA) (Hair et al., 2010).

Figure 9 illustrates that the newly validated model comes with some good indexes of the model fit. In fact, the indexes of CFI and TLI are higher than the good fit index of above .90, and Chi-square/df, GFI and RMSEA indexes are 3.214, .790, .88, respectively, all of which meet the adequate fit indexes of the scale measure. More particularly, Chi-square/df is 3.214, falling in the interval of the adequate fit index of between 2.0 and 5.0 (Hair et al., 2010). Then, the GFI index is .790, which is a little lower than the good fit index of .80, but it still falls in the adequate fit of the measurement. Finally, the RMSEA index is .088, which is actually in the adequate fit index of between .80 and .90 (Hair et al., 2010). On the whole, all the indexes in Figure 9 confirm that the newly validated model is fit for measurement.

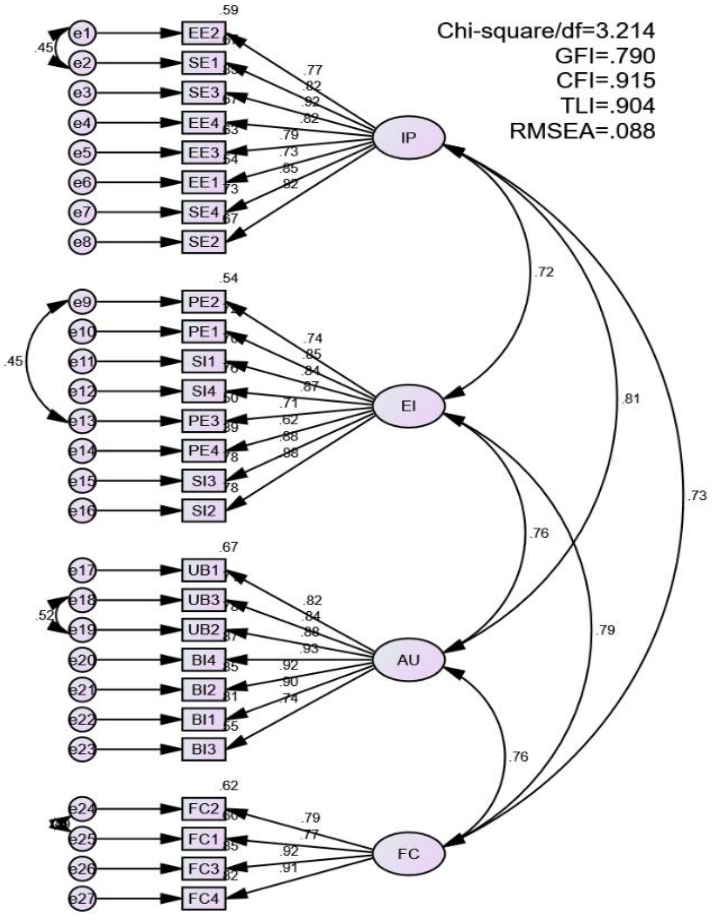

Figure 9. The student subjects' ICT use explained through the SEM

Besides, the regression weight paths bear great correlations among the constructs of the new model. This can help explain the linear relationships between the determinants and the dependent factors.

In conclusion, the EFA and the CFA have helped explore the factors that affect the student subjects' use of ICT for learning English online. Except for PANX, which has failed to function as a direct determinant, the rest of the candidate determinants have been the strong predictors of the student subjects' use of ICT tools in the newly validated model.

4.3. Answer to the third research question

Table 4 shows the correlation coefficients among the constructs of the hypothesized scale. Most of the relations bear the p-value, which is statistically significant at the .01 level (2-tailed) and shows the positive correlations among them. Those pairs of factors that hold the positive correlations entail the fact that the change of one factor will naturally lead to the change of the other. For example, SI and BI are positively correlated; if SI increases, it will lead BI to increase eventually.

It is, however, noteworthy that PANX is uncorrelated to nearly all the other factors because its p-value is much higher than the acceptable level of below .05. Except for its significant p-value at below .01 and the correlation coefficient of .779 in relation to PE, these statistical figures illustrate that PANX and PE are positively correlated, indicating that the change of PANX will most likely entail the change of PE in a positive way. Being correlated to PE but uncorrelated to the other direct determinants of SI, EE, SE, and FC, PANX is not treated as the indirect determinant of BI, and H_4 is negated as well. For the rest of the hypotheses, H_1, H_2, H_3, H_5, H_6

Table 4. Covariance correlations

		EE	SE	PANX	SI	PE	BI	FC	UB
EE	Pearson Correlation	1	.849**	-.028	.670**	.505**	.730**	.615**	.652**
	Sig. (2-tailed)		.000	.637	.000	.000	.000	.000	.000
	Sum of Squares and Cross-products	2223.522	1877.173	-95.221	1564.003	1200.294	1763.983	1482.464	1193.578
	Covariance	7.721	6.518	-.331	5.431	4.168	6.125	5.147	4.144
	N	289	289	289	289	289	289	289	289
SE	Pearson Correlation	.849**	1	.027	.658**	.550**	.726**	.648**	.679**
	Sig. (2-tailed)	.000		.650	.000	.000	.000	.000	.000
	Sum of Squares and Cross-products	1877.173	2199.792	91.066	1527.796	1300.647	1746.021	1552.644	1234.907
	Covariance	6.518	7.638	.316	5.305	4.516	6.063	5.391	4.288
	N	289	289	289	289	289	289	289	289
PANX	Pearson Correlation	-.028	.027	1	.115	.271**	.004	.142*	.010
	Sig. (2-tailed)	.637	.650		.052	.000	.941	.016	.861
	Sum of Squares and Cross-products	-95.221	91.066	5234.796	410.581	989.412	16.093	523.896	29.080
	Covariance	-.331	.316	18.176	1.426	3.435	.056	1.819	.101
	N	289	289	289	289	289	289	289	289
SI	Pearson Correlation	.670**	.658**	.115	1	.779**	.737**	.720**	.631**
	Sig. (2-tailed)	.000	.000	.052		.000	.000	.000	.000
	Sum of Squares and Cross-products	1564.003	1527.796	410.581	2452.616	1945.353	1871.920	1820.533	1211.858
	Covariance	5.431	5.305	1.426	8.516	6.755	6.500	6.321	4.208
	N	289	289	289	289	289	289	289	289
PE	Pearson Correlation	.505**	.550**	.271**	.779**	1	.637**	.691**	.521**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.000
	Sum of Squares and Cross-products	1200.294	1300.647	989.412	1945.353	2544.000	1646.235	1779.294	1018.941
	Covariance	4.168	4.516	3.435	6.755	8.833	5.716	6.178	3.538
	N	289	289	289	289	289	289	289	289
BI	Pearson Correlation	.730**	.726**	.004	.737**	.637**	1	.701**	.851**
	Sig. (2-tailed)	.000	.000	.941	.000	.000		.000	.000
	Sum of Squares and Cross-products	1763.983	1746.021	16.093	1871.920	1646.235	2627.398	1836.336	1692.709
	Covariance	6.125	6.063	.056	6.500	5.716	9.123	6.376	5.877
	N	289	289	289	289	289	289	289	289
FC	Pearson Correlation	.615**	.648**	.142*	.720**	.691**	.701**	1	.606**
	Sig. (2-tailed)	.000	.000	.016	.000	.000	.000		.000
	Sum of Squares and Cross-products	1482.464	1552.644	523.896	1820.533	1779.294	1836.336	2609.405	1201.990
	Covariance	5.147	5.391	1.819	6.321	6.178	6.376	9.060	4.174
	N	289	289	289	289	289	289	289	289
UB	Pearson Correlation	.652**	.679**	.010	.631**	.521**	.851**	.606**	1
	Sig. (2-tailed)	.000	.000	.861	.000	.000	.000	.000	
	Sum of Squares and Cross-products	1193.578	1234.907	29.080	1211.858	1018.941	1692.709	1201.990	1505.308
	Covariance	4.144	4.288	.101	4.208	3.538	5.877	4.174	5.227
	N	289	289	289	289	289	289	289	289

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

and H_7 are well supported. Then, the validated correlations claim that the students' behavioral intention to use of ICT tools are directly influenced by SI, EE, SE and PE, among which SI is the most influential. Furthermore, the tested hypotheses reveal that the students' behavioral use of ICT tools are impacted by BI and FC, the former of which is the stronger predictor.

In conclusion, the EFA, the CFA and the tested hypotheses help forecast and quantitatively estimate the students' use of ICT for learning English. Most of the factors of the validated measurement model are positively correlated, and their regression weight paths help predict the causal relations between the determinants and the dependent factors.

4.4. Discussions

After much computation upon the analytic models, this research paper has arrived at the following findings.

The students have sufficient facilitating conditions to own ICT tools and much experience in using them. They are using modern electronic gadgets such as smartphones (85.8%), tablets (11.8%), and personal computers (73.7%) to serve their learning needs. They also exploit trendy social network apps for communication and interaction such as Email (87.5%), Zalo (85.8%), Facebook (89.2%), and Messenger (84%), and they are good at office software such as word processing (90.1%) or presentation (70.1%); as a result, medical students are ready for learning English with the high degree of ICT incorporation, namely *online learning*, *hybrid learning* or *blended learning,* at tertiary level.

The grouping of some constructs of the validated model comes from the fact that they share a high proportion of factor loadings with each other. More specifically, EE is paired with SE to make IP, indicating that ease to use and self-efficacy should go together to influence user attitude; accordingly, the student's attitude towards ICT tools will most likely change positively when they find these tools easy to use and feel capable of using them at the same time. In addition, the blend of PE and SI to establish EI indicates that when the students find ICT tools motivating in the class and simultaneously have their ICT use recognized by those around them, they will more probably take a positive attitude towards acceptance of ICT tools. Finally, the merger of BI and UB as the dependent factor helps predict that the students find these two constructs very conceptually close; hence, when having a positive attitude towards ICT use, they will most likely adopt ICT tools for learning.

Most of the hypotheses stated in Section 2.3 have been supported, and the linear relations among the determinants and the dependent factors have been proven. BI and FC are the strong predictors of the student subjects' use of ICT tools; in a similar way, SI, EE, SE and PE are the direct determinants of BI. In other words, if students are expected to increase their use of ICT tools for learning English, they should really be provided with good facilitating conditions and hold a positive attitude towards ICT use. If wanting their attitude towards ICT use to change positively, they should find ICT tools easy to use and useful for their studying needs, find themselves confident in ICT use, and believe that other people around them recognize their effort.

SE has been a direct determinant of BI as it is proven to be a parallel factor to PE, EE, and SI, meaning that if the students feel confident in using ICT tools, they will more likely change their attitude towards adoption of these tools. However, PANX has been excluded in the research model right after the EFA, indicating that it plays a very little role in affecting the students' acceptance of ICT tools for learning English. This result has been found in earlier studies (Callum, 2011; Venkatesh et al., 2003). The exclusion of PANX might have come from the fact that the student subjects are very good at ICT and do not find ICT tools difficult to use after they have been studying online for some time. This finding is consistent with that of Tran and Nguyen (2021) when they noticed a decrease in students' difficulties regarding cognitive, emotional, and socio-cultural aspects after the intervention.

In short, the computation has successfully explained the correlations among the eight candidate constructs of the hypothesized measurement model. Understanding the variance correlations among the constructs, the teacher, the course administrator, and/or parents will be able to predict the students' use of ICT more accurately and find the right determinant(s) to increase if they want to increase the affected factor in the validated model.

5. Conclusion and implications

5.1. Conclusion

The paper successfully applied the UTAUT to predict the factors that affect medical students' use of ICT tools for studying English in online courses. The validated measurement model has helped explain the intricate relations among the determinants and the dependent constructs. The EFA has simplified the hypothesized model via reducing an indirect determinant and grouping some factors that bear high internal validity. Then, the validated measure scale indicates that UB is influenced by BI and FC, while BI is affected by EI and IP. After that, the CFA examines the model fit indexes to confirm that the validated model can generate consistent results.

Although the research has arrived at some achievements, the research was conducted on the cohort of the students who are homogenous in their age groups, experience, and voluntariness, and the females outnumber the males by four times; as a result, further studies in the future should avoid those limitations and target the larger sample size of different age groups and with more varying levels of experience and voluntariness in ICT use.

5.2. Implications

The findings of this research paper clearly show the complex relations among the constructs of the validated model. Depending on the statistical calculation, the authors of this paper would like to put some major implications forwards as below.

First, FC and BI are influential on UB, indicating that the student's behavioral use of ICT tools is affected by the facilitating condition and their attitude towards ICT use for learning. Accordingly, if teachers, course administrators and/or parents want to increase the students' use of ICT for learning English, they should find ways to change their students' attitude towards

ICT use positively and provide good assistance and resources for them to use ICT tools. When the students find ICT tools useful and interesting to use in the class and get good access to ICT tools and technical support, they will most probably use these tools for learning English.

Second, BI is affected by EI and IP, meaning that if teachers, course administrators and/or parents wish to change their students' attitude towards ICT use positively, they should really help them find ICT tools easy, rewarding and motivating to use, feel confident to use them successfully and consider them useful for their studying. In other words, when the students comprehend the value-adding benefits of using ICI, they will be more probably to use ICT tools for studying (Shachak et al., 2019).

Third, the exclusion of PANX from the validated model indicates that this construct does not have much influence on the students' use of ICT. As a result of that, if teachers, course administrators and/or parents expect to enhance the students' positive behavior towards ICT use, they should choose user-friendly ICT tools for students to use instead of requesting them to deploy a complex system and simultaneously provide sufficient and timely assistance (if any) for them. In short, the students are more likely to use ICT tools for studying when they find the ICT tools free of effort.

Finally, SE is a direct determinant of BI. This means that when the students judge their own capabilities of ICT use and feel confident about the results, they will most likely accept ICT use for studying. Therefore, if teachers, course administrators and/or parents hope to increase the students' positive attitude towards ICT use for learning, one of their jobs is that they should help their students form their ICT self-efficacy first. Their self-efficacy will give them confidence in deploying ICT tools successfully.

On the whole, students' acceptance of ICT is intricately influenced by several constructs as described in the validated measurement model. The job of the teachers, course administrators, parents and/or students themselves is to find out which factor is affected by which one(s) in order that they can timely find the proper predictor(s) to stimulate or increase. Then, the linear relation will guarantee the positive change of its dependent factor naturally.

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Biodata

Trang Hoang Nguyen has her BA degrees in Education with Quy Nhon University in 2011 and in Banking with the University of Finance-Marketing in 2016. Also in this year, she earned her MA degree in Business Management from the University of Finance-Marketing. She is working in the field of educational inspection at tertiary level; thus, her concern and passion mainly cover education, educational management and technology use in education.

Phe Quang Chu earned his BA degree in English Teaching at Quy Nhon University in 2003 and his MA degree in TESOL in 2011 at Ho Chi Minh City University of Social Sciences and Humanities. He is currently a PhD student at Ho Chi Minh Open University and teaches English at the University of Finance-Marketing's Foreign Languages Faculty. His major areas of interest involve translation, writing skills, and ICT use in instruction and learning.

UNIVERSITY OF FINANCE-MARKETING

QUESTIONNAIRE

(Designed for the medical students)

Dear my beloved students,

We are the lecturers working at the Faculty of Foreign Languages. We are doing a research on the impacts of BL for English majors' writing performance. Your responses are vital for us to complete the research. We promise to keep your information confidential, and it is will only serve the research needs.

Yours sincerely,

Part 1: BACKGROUND INFORMATION

1. Year at university: 1☐ 2☐ 3☐ 4☐ 5☐ 6☐

2. Gender: ☐Male ☐Female

3. Do you have a gadget for your own to study online? ☐Yes ☐No

4. Indicate which ICT tools below you have for learning English

☐ personal computer ☐ smart phone ☐ tablet

☐others:_____

5. Indicate which ICT sub-tools below you have for learning English

☐ Google ☐ Wikipedia ☐ websites in general

☐ Youtube ☐ online dictionary ☐ online English courses

☐ Others:_____

6. Indicate which ICT tools below you have for learning English

☐Word processing software (words, excel…)

☐Presentation software (powerpoint, mindmap…)

☐ audio-visual tools (video maker, recorder…)

☐ Others:_____

7. Indicate which ICT tools below you have for learning English

☐ email ☐ Messenger ☐ Zalo

☐ Facebook ☐ Viber ☐ Skype

☐ Others:_____

Part 2: STUDY QUESTIONS

Please blacken the following ratings below, indicating 1 (absolutely disagree), 2 (disagree), 3 (neutral), 4 (agree) and 5 (absolutely agree).

Factors	Variables	Scale				
EE	EE1. I can use ICT.	1	2	3	4	5
	EE2. My interaction with ICT would be clear and understandable.	1	2	3	4	5
	EE3. Learning to use ICT is easy for me.	1	2	3	4	5
	EE4. It would be easy for me to become skilled at ICT.	1	2	3	4	5
SE	SE1: I could complete a task via using ICT tools	1	2	3	4	5
	SE2: I could use ICT tools to complete my course.	1	2	3	4	5
	SE3: I could address trouble with ICT tools.	1	2	3	4	5
	SE4: I could study well with the help of ICT.	1	2	3	4	5
PANX	PANX1. I feel apprehensive about using ICT	1	2	3	4	5
	PANX2: It scares me to think that I could lose a lot of information using ICT.	1	2	3	4	5
	PANX3: I hesitate to use ICT for fear of making serious mistakes.	1	2	3	4	5
	PANX4: ICT is somewhat intimidating to me.	1	2	3	4	5
SI	SI1. Those important to me think that I should know to use ICT.	1	2	3	4	5
	SI2. Those influencing me think that I should use the system.	1	2	3	4	5
	SI3. The university encourages me to use ICT for studying.	1	2	3	4	5
	SI4. The university supports students' use of ICT.	1	2	3	4	5
PE	PE1. I am strongly motivated by the recognition from peers.	1	2	3	4	5
	PE2. Using ICT is helpful for my study.	1	2	3	4	5
	PE3. ICT helps me complete tasks more quickly.	1	2	3	4	5
	PE4. ICT helps me study.	1	2	3	4	5
FC	FC1. I have the resources necessary to use ICT.	1	2	3	4	5
	FC2. I have the knowledge necessary to use ICT.	1	2	3	4	5
	FC3. ICT is compatible with my learning needs.	1	2	3	4	5
	FC4. Technical assistance is always available.	1	2	3	4	5
BI	BI1. It is a good idea to use ICT to study English.	1	2	3	4	5
	BI2. ICT makes studying English more interesting.	1	2	3	4	5
	BI3. I expect to experience studying English with ICT.	1	2	3	4	5
	BI4. I like using ICT for learning.	1	2	3	4	5
UB	UB1. I will use ICT in my daily life.	1	2	3	4	5
	UB2. I will use ICT in studying English.	1	2	3	4	5
	UB3. I plan to use ICT in studying.	1	2	3	4	5

End of the survey