Factors Influencing Vietnamese Teenagers' Intention to Use Mobile Devices for English Language Learning

Quy Hoang[1,*], Thach Pham[2], Quan Dang[3], Thang Nguyen[3]

[1] *English Department, Hanoi University.*
[2] *Board of Trustees, Hanoi University.*
[3] *Faculty of Information and Technology, Hanoi University.*
[*]*Corresponding author. Email:* hoangquy@hanu.edu.vn

ABSTRACT

Teenagers worldwide have been considered as 'digital natives' who are grown up under the influence of modern technologies, including mobile devices; however, their intention to use the devices for language learning is still under research in the literature. This study was conducted in an attempt to explore factors that influenced Vietnamese teenagers' intention to learn English through mobile devices and how they (the devices) could enhance learners' language skills. Using the extended technology acceptance model (UTAUT) as the theoretical framework, the study analyzed data from 617 high school and university students in north, central and south Vietnam. The study results revealed that attitude towards use was the most critical factor affecting teenagers' intention, but facilitating condition and effort expectancy did not correlate with the intention. Learners' gender and prior online learning experience also had an impact on the intention. Mobile devices were more beneficial to learning, listening, reading, and speaking than writing. The study findings offer practical implications for teachers and designers of mobile applications to foster mobile English language learning for teenagers in Vietnam.

Keywords: Teenager, intention, mobile devices, UTAUT, Vietnam

1. INTRODUCTION

Teenagers worldwide have been considered 'digital natives' who are grown up under the influence of modern technologies, including mobile devices, which have proven to bring about many benefits due to their independence of time and place of access [1]. Past studies have indicated that the devices are increasingly used for language learning [2]. However, young users tend to use the devices more for communication and entertainment, like searching for information, receiving and sending messages, calling, and browsing social networks [3], [4]. Exponential growth in the ownership of mobile devices, mainly smartphones, and better access to the Internet are calling for more investigation into users' awareness and attitude towards using these devices for educational affordances.

Over the past decade, Vietnam, an emerging economy in Southeast Asia, has been experiencing fast economic development, which leads to a higher ratio of mobile phone owners and internet users. Most of the country's 64 million internet users use mobile devices, mainly smartphones [5]–[7]. Nonetheless, Vietnamese teenagers mostly use their mobile devices to chat, access social media and read the news [4]. In addition, the teacher-centered pedagogical approach has led to students' expectation of their teacher orientation support to use mobile devices for learning [5]. This phenomenon has led to students' limited usage of mobile devices for language learning despite their positive attitude towards use and usefulness [8], [9].

Studies on the acceptance of mobile-assisted language learning (MALL) in the world and Vietnam have used the Technology Acceptance Model – TAM [10] as a guiding framework for research design and

hypothesis testing. Since its first application, the TAM has been expanded to include a few external factors such as self-management of learning, teacher support, perceived playfulness to the original constructs of perceived ease of use (PEOU), perceived usefulness. (PU), attitude towards use (ATT) and behavioral intention to use (BI) [11], [12]. One of the main aims of the current study was to explore the factors that influenced Vietnamese teenagers' intention to use mobile devices to learn English. In addition, this study attempted to examine students' perceptions on how mobile devices could facilitate language skills enhancement.

Four main components of the original model are design features (represented by X1, X2, X3), cognitive response (perceived usefulness - PU and perceived ease of use - POEU), affective responses (attitude towards using - ATT), and behavior responses (actual system). The arrows in the figure show the causal relationship among the variables, and one can see that attitude towards using is a crucial determinant for a learner's actual use or behavioral intention (BI) of using technology. A few modifications were made from the original TAM, mainly by adding more constructs to the model, such as perceived quality output and expected enjoyment, but two fundamental constructs, namely ATT and BI, were unchanged.
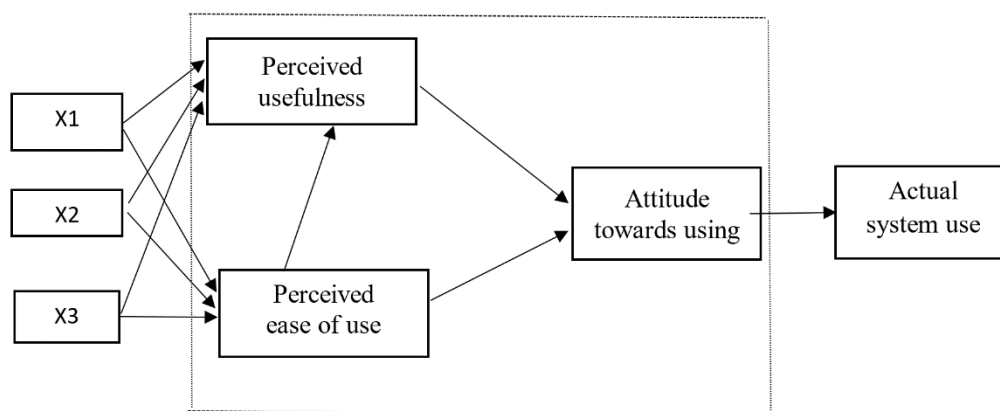

Figure 1 Technology Acceptance Model [10, p. 24]

2. LITERATURE REVIEW

2.1. Technology Acceptance Model (TAM)

Studies in online learning in general and mobile-assisted language learning, in particular, have used Davis' TAM model [10] as a conceptual framework. Key constructs/variable of the TAM model is presented in Figure 1.
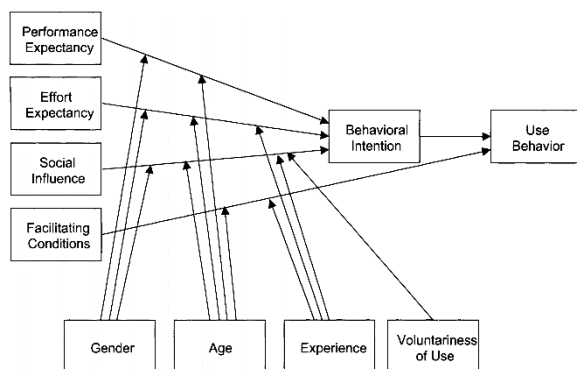

Figure 2 The UTAUT model by Venkatesh et al. [13]

One of the most considerable modifications was adding four moderators by Venkatesh et al. [13]. The four additional moderators were gender, age, experience, and voluntariness of use. These moderators were deemed to have direct effects on the causal relationships between four constructs: performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), and behavioral intention (BI). Taken together, the new model, also called the Unified Theory of Acceptance and Use of Technology (UTAUT), was formulated and presented in Figure 2.

In recent studies, researchers have been adding new constructs to TAM or UTAUT models to expand their applications in technology acceptance studies for different fields, including MALL [5], [14]–[16]. For example, in a study by Hoi and Mu [5], teachers' supports were added because, in top-down teaching practice in an oriental country like Vietnam, one cannot ignore the assistance from teachers in orienting learners' acceptance. Similarly, in a study by Park et al. [12], new constructs like perceived control, skill, and perceived mobility were added and proven to affect learner acceptance significantly. The enjoyment for perceived playfulness (PP) construct was also

added in other studies using the UTAUT model [11], [15], [17], and this factor had a significant effect on learner acceptance. Other moderator constructs like study major and gender have also been included in later MALL-related studies (e.g., [11]).

2.2. Language skills enhancement through mobile devices

There have been numerous studies researching the impact of MALL on learning English language skills [2], [18]–[20]. Results yielded from such studies revealed that mobile devices significantly foster learners' motivation through providing a convenient, attractive, and relatively reliable environment for language skills practice and language test preparation.

Among four macro skills, reports on the enhancement of speaking through mobile devices in the literature appeared to be the most dominant. Generally, mobile applications provide learners with convenient, encouraging, and non-threatening environments to practice oral accuracy and fluency [19]–[21]. This was due to the utilization of speech recognition (SR) technology which provided learners with constant feedback for their repetition of English words, phrases, and sentences [22, p. 72]. Similarly, a study by Vu et al. [20] concluded that SR technology could serve both as a remedial function by providing basic knowledge related to phonetics for beginners of English.

There has also been empirical evidence on the effectiveness of using mobile devices to enhance learners' listening skills. In their study, Al-Shamsi et al. [23] compared the results of a pre-and post-listening test and noticed a significant change in the students' listening comprehension. This was partly thanks to better vocabulary size through the intensive exposure to mobile by the experimental group. Another research project by Artyushina and Sheypak [24] explored the potential use of mobile phones as a portal for podcasts to help learners overcome difficulties in listening comprehension. The results indicated that with proper duration and speed, authentic podcasts, recorded by native English speakers, could improve learners' comprehension and even public speaking performance through self-recording and sending the audio files to teachers for comments. The use of game-based applications has also been studied, and the results revealed that students' listening and speaking skills could be enhanced through creating sentences, saying them aloud, and having them corrected by peers and vice versa [25].

Compared to listening and speaking, only a few research studies have been conducted on the use of mobile devices for reading skills. Wang and Smith [26] revealed that the participants' reading ability was better after taking part in a three-year experimental project. Results of a study by Hsu [27] indicated that participants in experimental groups, who had access to adaptive reading materials and mobile translation annotation, had higher reading achievements than those in the control group. Similarly, Keezhatta and Omar [28] found in their experimental study that mobile devices helped learners to recognize and retain vocabulary better, which resulted in higher scores when doing reading tests. These studies generally agreed that the reading materials had to be engaging, motivating, and personalized for the students to gain reading skills.

Researchers have shown interest in exploring the impact of MALL on writing skills. However, this was one of the less researched topics in the literature [2]. Studies on the effects of mobile devices on developing English writing skills have used experimental design to measure learner enhancement through mobile applications. For instance, Jassim and Dzakiria's study [29] revealed that Iranian students' post-test scores were higher for descriptive essays after six weeks of using mobile devices in collaborative writing lessons. Similarly, a study by Bipinchandra et al. [30], which tested the potential of using a mobile tool to assist the students' argumentative writing, showed positive results for the students' grammar at the sentence level. In general, it was suggested that mobile devices allowed learners to practice writing before the class in flipped learning so the class time could be reserved for discussion and feedback. Similarly, mobile devices could also be effectively used for collaborative learning in the feedback session of process approached writing lessons [31].

In short, the literature has synthesized reports on the effectiveness of MALL on four skills of English which laid an initial foundation for high potential utilization of mobile devices in teaching and learning English. There remain, however, several limitations. Firstly, most of the previous studies were conducted with a limited number of participants in specific settings. The results, therefore, can hardly represent the students of different learning styles, mobile accessibility, or preferences. Secondly, the measurement of some research has mostly been based on participants' perceptions rather than on experimental data. This indicates a need to conduct more studies on participants' performance in a specific application or software to increase the validity and reliability of study findings.

2.3. MALL studies in Vietnam

In Vietnam, quite a few mobile applications have been utilized for language learning, such as Duolingo, Elsa Speak, and BBC Learning English. There have also been some studies on the use of these mobile applications. For instance, Tran [32] conducted a qualitative investigation with 57 teachers of English on their use of different applications (mostly Elsa Speak) for English language enhancement. The study results unveiled five types of MALL users, namely the curious, the critical, the favorable, the playful, and the ambitious. Her study suggested that learners expected regular feedback from instructors about their performance and the 'score' they get from the applications.

In the same vein, Hoi and Mu [5] used the TAM to examine the role of teacher support in promoting learner acceptance of mobile English language learning. Their study results suggested that teacher orientation and behavior support played a vital role in fostering mobile devices for language learning, especially outside the class. Similarly, a recent study by Tra [9] recommended that teachers give clear and concise instructions to increase learning results. In a formal learning context, the results of Maheshwari's study [15] indicated that institutional support was another factor facilitating learner intention for mobile learning. On the other hand, Doan's study [33] revealed that self-management was the most substantial factor influencing learners' intention to adopt mobile learning. This result was also supported in a study by Lin et al. [8], which showed a direct effect of learning autonomy and self-efficacy on learner perceived behavioral control and then behavioral intention.

There were a few interesting results from studies about MALL in the Vietnamese context. First, Doan's study [33] indicated that ease of use was not a significant indicator of BI, which could be explained by learners' higher skills in using mobile devices, especially smartphones, because they (the devices) have become prevalent among the youth. This matter was mentioned in the earlier study by Venkatesh et al. [13], suggesting that when users became more skillful in using mobile devices and technology, they would not find this factor a barrier to mobile learning. Second, the lack of or unstable internet connectivity and speed were some of the factors that had a negative effect on learners' intention, especially inside the classroom or university campus [9], [15], [34].

Overall, the literature indicated that many factors influence learners' intention to adopt mobile language learning and how mobile devices could enhance different language skills. This study aimed to add to the prior knowledge by investigating factors that influenced a specific group of target learners, the teenagers, in their intention to use mobile devices for language learning, the relationships between their demographic characteristics and key constructs of the UTAUT model, and the perceived usefulness of mobile devices for language skills enhancement. The following research questions were addressed:

1. *To what extent do PE, FC, PP, SI, EE, and ATT affect students' intention to use mobile devices for English language learning?*

2. *What is the relationship between students' background variables and their intention to use mobile devices for English language learning?*

3. *How do mobile devices help enhance students' English language skills?*

3. METHOD

3.1. Participants

Participants of this study were high school students (ages 16-18) and university undergraduates (ages 19-24) living in the North, Centre, and South of Vietnam. They were selected purposively to represent people living in both rural and urban areas, studying English or other disciplines in their bachelor's degree. The participants understood that they took part in the study entirely on a voluntary basis. Six hundred fifty-five students completed the questionnaire (described below). After cleaning the data (deleting incomplete and non-valid), 617 surveys were usable for the analysis (374 schools and 243 university students). Twenty-three participants were invited for semi-structured interviews via phones due to social distancing when data collection was administered. The interviews were conducted in Vietnamese to ensure that participants could express their opinions frankly and truthfully on different aspects of mobile English language learning.

3.2. Instrument

We adopted the items from earlier studies on mobile English language learning [12], [35]–[37] to design a questionnaire for this study. The questionnaire comprised relevant demographic variables, purposes of using mobile devices, and seven constructs of the 5-point response (strongly disagree, disagree, neutral, agree, and strongly agree). First, we translated the items into Vietnamese and invited language experts to check the translation for accuracy.

After that, we gave the Vietnamese questionnaire version to a group of students who commented on the items' wording, clarity, and comprehensibility. We then modified some of the translated questions but kept the meaning unchanged from the original items. For example, the term 'A smartphone or tablet' in the original questionnaire was replaced by 'mobile device' for the sake of simplicity. Similarly, the vague English term 'academic performance' was translated into "kết quả học tập" (study results).

3.3. Data analysis

To answer the three research questions of this study, we used exploratory factor analysis (EFA), correlation, and multiple regression to identify the factors that influenced learners' behavioral intention for mobile learning (first question). An independent sample t-test to explore statistically significant differences between participants' demographic characteristics and their intention (second question).

Table 1. Participants' characteristics

Information	School		University		Total	
	No.	*%*	*No.*	*%*	*No.*	*%*
Gender						
Female	221	40.9	161	66.3	382	61.9
Male	153	59.1	82	33.7	235	38.1
Device ownership						
Smartphone	350	93.6	234	96.3	584	94.7
Tablet	24	6.4	9	3.7	32	5.3
Internet connections						
Wi-Fi	311	83.2	201	82.7	512	83.0
3G/4G/5G	63	16.8	42	17.3	105	17.0
Pace of residence						
Urban	196	52.4	124	51.0	320	51.9
Rural	178	47.6	119	49.0	297	48.1
Major (undergraduate)						
English	NA	NA	127	20.6	127	52.2
Non-English	NA	NA	116	18.6	116	47.8
Prior experience in online English language learning						
Yes	98	48.3	105	51.7	203	32.9
No	276	66.7	138	33.3	414	67.1

The questionnaire was then piloted with 81 high school and university students (who did not participate in the primary survey) in rural and urban Vietnam locations. While completing the questionnaire, the participants. Were also invited to comment on the wording and clarity of the items. Minor changes were further made following their comments. A check of reliability of the constructs yielded Cronbach's alpha levels from 0.656 to 0.899 for the seven constructs of the model. After collecting quantitative data, we conducted descriptive analysis such as participants' purposes and frequencies of using mobile devices and their perception of how mobile devices help enhance English proficiency. We used these simple descriptive results to develop questions for semi-structured interviews with 23 participants of both educational levels (high school and university). The interviews were conducted remotely due to the fourth outbreak of COVID-19 in Vietnam at the time. We ensured that participants' anonymity and confidentiality were well protected by using pseudonyms [38].

To investigate participants' perceptions on how mobile devices helped to enhance their English language skills (third question), we used analysis strategies proposed by Creswell [39] to describe, interpret and classify the semi-structured interview data into four main themes relating to macro language skills of listening, speaking, reading and writing.

4. RESULTS

4.1. Participants' demographic characteristics

Data in Table 1 shows some basic information about the participants. First, the vast majority of the learners (94.7%) used smartphones, and most of them connected to the Internet via Wi-Fi (83%) (last column). There was only a small difference between the ratio of participants residing in urban (51.9%) and rural areas (48.1%) and between English and non-English majors (52.2% versus 47.8%.). The ratio of

experienced and inexperienced online learners was 32.9% versus 67.1%.

We ran an independent sample t-test to explore the differences between some of the participants' demographic features and their prior experience of online English language learning. The test results revealed no difference (p>0.05) between the males and females in this matter. However, there were differences between rural and urban teenagers, high school students and undergraduates, and English and non-English majors (*p*<0.05) about a past online learning experience. More specifically, among those with prior experience, 61.1% lived in urban and 38.9% in rural areas, 51.7% were undergraduates, and 48.3% were school students. The percentage of English and non-English undergraduates was 63% and 37%, respectively.

4.2. Exploratory factor analysis

Table 2 Total variance explained

Components	Initial Eigenvalues		
	Total	% of variance	Cumulative %
Performance expectancy	6.193	24.771	24.771
Facilitating conditions	2.153	8.611	33.382
Perceived playfulness	1.796	7.185	40.567
Attitude towards use	1.477	5.909	46.476
Social influence	1.279	5.117	51.593
Effort expectancy	1.136	4.545	56.139

The 33 items to determine the learners' BI for mobile learning were subjected to principal component analysis (PCA) with oblimin rotation. Before performing the PCA, the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of 25 coefficients of 0.3 and above. The Kaiser-Meyer-Olkin (KMO) value was 0.859, exceeding the recommended value of 0.6, and Bartlet's test of sphericity indicated statistical significance (p<0.001), supporting the factorability of the correlation matrix. After removing disqualified items (loaded into more than two groups with the loading of 0.3 or greater), the remaining 25 factors influencing learners' BI were loaded into six groups (see Table 2). After nine rounds of rotation, PCA results revealed the presence of six components with eigenvalues exceeding 1, explaining 24.77%, 8.8%, 7.2%, 5.91%, 5.12%, and 4.55% of the variance, respectively, and the six-component solution explained a total of 56.14% of the variance, which is acceptable [40].

Before accepting the factors, additional criteria were used, including a Scree plot and parallel analysis. An inspection of the Scree plot revealed a clear break after the second and sixth components, so we decided to retain six components lying to the left of the elbow for further analyses. The findings from the Scree plot were further supported by the results of parallel analysis, which showed six components with eigenvalues exceeding the corresponding criterion values for the randomly generated data matrix of the same size (25 variables × 617 respondents). The oblimin rotation solution revealed a simple structure with six components showing several strong loadings and most variables loading substantially on only one component. The interpretation of six components was consistent with past studies on factors influencing learner BI for mobile learning (e.g. [11]) with high loadings and mean scores on aspects such as PE, EE, SI, and ATT.

Data in Table 3 shows that the mean scores for all constructs are relatively high (on the maximum score of 5.0). The results revealed that PE and ATT were the most critical factors (mean score of 3.87 and 3.88) while SI and PP were the least with the lower means of 3.42 and 3.46, respectively. Facilitating condition factor also recorded a relatively high mean score of 3.85, followed by effort expectancy with a mean score of 3.63. The reliability analysis was done on the six factors using Cronbach's alpha, which ranged from 0.74 to 0.79, exhibiting the acceptable level above 0.7 of all the items in the construct.

The data contained in Table 5 reveal six distinctive groups of factors that impacted the learners' intention to adopt mobile learning. The first factor (PE) concerned the participants' expectations on how mobile devices helped them learn quicker, more effectively, and efficiently. The highest loadings for PE4 and PE2 (0.81 and 0.80, respectively) show that learners wanted effective and better improvement of their English language. These findings confirmed the high mean scores of 3.87/5.0. The second factor (FC) was mainly related to learners' conditions for mobile learning (e.g., easy access to the Internet). These items had relatively high loadings from 0.57 to 0.75, agreeing with the descriptive results (M=3.85/5.0). The third factor (PP) was about the playfulness of mobile learning (e.g., learners forget other work). The loadings for these items ranged from medium to high (0.43 to 0.74), which complimented descriptive results (M= 3.46/5.0).

The fourth factor (ATT) showed learners' attitudes towards mobile learning. Items in this factor had medium loadings from 0.64 to 0.70, which indicated

Table 3 Rotated factor loadings of the items

Factor (Mean scores and Cronbach alpha)	Item	1	2	3	4	5	6
Performance expectancy (M = 3.87 α = 0.77)	The usage of mobile devices (MDs) could increase English language (EN) learning effectiveness.	.810					
	The usage of MDs could improve EN skills.	.804					
	I find MD useful in EN learning.	.701					
	The usage of MDs could enable EN learning more quickly.	.675					
	The usage of mobile apps could improve students' academic performance in EN courses.	.642					
Facilitating conditions (M = 3.85 α = 0.79)	I could find apps for foreign language learning on MDs.		.745				
	I have the knowledge necessary to use MDs to learn EN.		.705				
	I can have easy and regular access to the Internet on MDs.		.676				
	I can find support if I have problems with an MD while learning EN.		.604				
	I know a convenient place where I could use MDs to study EN.		.567				
	I have easy access to MDs.		.565				
Perceived playfulness (M = 3.46 α = 0.78)	When using m-learning, I will forget the work I must do.			.742			
	When using m-learning, I will not realize the time elapsed.			.717			
	Using m-learning will stimulate my curiosity.			.626			
	Using m-learning will give enjoyment to me for my learning.			.505			
	Using m-learning will lead to my exploration.			.433			
Attitude towards use (M = 3.88 α = 0.74)	I think that learning EN with MDs is fun.				.703		
	I would like to use MDs to learn EN.				.692		
	I think using MDs to learn EN inside the classroom is a good idea.				.671		
	Using MDs to learn EN is a good idea.				.641		
Social influence (M = 3.42 α = 0.77)	People who are important to me think that I should use MDs to learn EN.					.847	
	People who influence my behavior think that I should use MDs to learn EN.					.824	
Effort expectancy (M = 3.63 α = 0.77)	I would find it easy to practice reading with MDs.						.765
	I would find it easy to practice writing with MDs.						.732
	I would find it easy to practice speaking with MD.						.729

their positive attitude. This, in part, agreed with the results of the simple descriptive analysis (highest mean score of 3.88/5.0). The fifth factor (SI) was related to the influence that learners received from other people (who were important and influential to their behavior). The loadings for these items were also high (0.85 and 0.82, respectively). However, these loadings did not support the results of descriptive analysis (M= 3.42/5.0). The sixth factor (EE) depicted learners' perceptions on the ease of using mobile devices to learn language skills. The loadings for these items were 0.765, 0,732, and 0,729 indicating that mobile devices could be easily used to learn reading, writing, and speaking, respectively.

Table 4 shows the Pearson correlation coefficients between the factors. All independent variables were positively related to BI ($p < 0.01$). ATT had the largest

correlation with BI ($r = 0.627$) whereas PE recorded the smallest association ($r = 0.297$). Among the independent variables themselves, ATT and EE had the strongest correlation ($r=0.406$), while the relationship between FC and EE was the smallest ($r = 0.183$). FC had low correlations with all other constructs (r values mostly lower than 0.3).

4.3. Multiple regression

Multiple regression was used to assess the impact of six control factors (PE, FC, PP, SI, EE, and ATT) on learners' behavioral intention (BI). Preliminary analyses were conducted to ensure no violation of normality, linearity, multicollinearity, and homoscedasticity assumptions. After the entry of the six variables, the total variance explained by the model as a whole (adjusted R square) was 0.479, F (6, 592) =

92.55, $p < .001$. This means that the model explained 47.9 percent of the variance in BI, which is a little smaller than the results of EFA (see Table 2).

Data in Table 5 shows that FC (having a device or skills in using it for mobile learning) and EE (ease of using) did not contribute to learners' intention to adopt mobile learning ($p>0.05$). When all other variables in the model were controlled, ATT made the most substantial contribution to explaining BI ($\beta = 0.43$). This was followed by SI ($\beta = 0.22$). Beta values for PP and PE indicated small contributions (0.14 and 0.07, respectively). These regression results confirmed the descriptive and correlational analyses presented in Tables 3 and 4.

4.4. Independent sample t-test

To explore the relationships between learners' characteristics (gender, education level, place of residence, and prior online learning experience) and BI, we conducted an independent sample t-test. Table 6 shows the test results (mean score, p-value, and eta).

Table 4. Correlation between the factors

	1	2	3	4	5	6	7
1. PE	1	.248**	.306**	.314**	.364**	.416**	.382**
2. FC		1	.270**	.269**	.183**	.344**	.297**
3. PP			1	.306**	.310**	.396**	.420**
4. SI				1	.348**	.396**	.480**
5. EE					1	.406**	.369**
6. ATT						1	.627**
7. BI							1

Data in Table 6 shows that there was significant difference in scores for male (M = 3.7; SD = 0.80) and female students (M = 3.96, SD = 0.64; t (617) = 3.70; p = 0.00, two-tailed). The magnitude of the differences in the means (MD = 0.23, 95% CI [-0.36, -0.11] was very small (eta squared = 0.03) (Cohen 1989). Female students tended to have more intention to use mobile devices for English language learning than the males. Similarly, there was a significant difference in scores for students with prior online learning experience (M = 3.98; SD = 0.65) and those with none (M = 3.82, SD = 0.75; t (617) = -2.80; p = 0.005, two-tailed). The magnitude of the differences in the means (MD = -0.17, 95% CI [0.28, 0.05] was very small (eta squared = 0.02). Students with prior online learning experience were more likely to adopt mobile learning than the inexperienced ones. There were no differences between school and university Students, between urban and rural teenagers in their intention to adopt mobile learning.

4.5. How mobile devices help enhance students' English language skills

In order to answer the third research question of the study – *how mobile devices helped enhance students' English language skills* – we analyzed qualitative data collected from semi-structured interviews with 12 high school students and 11 university undergraduates. Generally, both groups of students voiced that mobile devices provided considerable assistance in improving listening, speaking, and reading skills. However, they were less effective for learning writing. These results, in part, contradicted the findings that emerged from the EFA analysis presented in the previous section of this study (see Table 3). We used UR, RU, EN, and OT codes to represent urban and rural students studying English and other disciplines.

Nearly 70% of the participants viewed that mobile devices primarily enhanced listening skills thanks to their practical convenience and rich availability of learning resources such as YouTube videos, songs, or even movies. With a pair of headphones, students

Table 5. Coefficients of the factors affecting BI

	Beta	t	Sig.	Tolerance	VIF
(Constant)		-.951	.342		
1. PE	.068	1.996	.046	.752	1.330
2. FC	.028	.858	.391	.840	1.190
3. PP	.141	4.209	.000	.778	1.286
4. SI	.223	6.599	.000	.763	1.310
5. EE	.045	1.315	.189	.750	1.333
6. ATT	.427	11.609	.000	.646	1.548
Adjusted R square: .479; F (6, 592) = 92.55, p < .001.					

could access recordings and practice listening regardless of time and space: *"It is convenient to be able to download recordings and plugin headphones at any time"* (UR21). Besides, the diversity of learning resources allowed students to be exposed to authentic materials of multiple genres, therefore, improved the eagerness to learn and interest among learners: *"Regarding listening skills, the app should let me see clips with funny content, it will help me feel like watching and listening more"* (EN14). Another benefit of practicing listening via applications, as added by an undergraduate, was that it did not require learners to depend too much on the screen while using the device, *"Users can take note on separate papers while listening. Looking at the screen for too long can be rather daunting" (EN12)*. In general, participants of both groups appeared to appreciate the help of mobile devices in enhancing listening skills more than other ones. Reasons for this were further explained by some undergraduates: *"When you have a good*

Table 6. Relationships between learners' characteristics and intention

		N	*M*	*SD*	*t*	*Sig. (2 tailed)/eta*	*Mean difference*	*Lower*	*Upper*
Gender	*Male*	235	3.73	0.82	-3.70	0.00/ 0.02	-0.23	-0.36	-0.11
	Female	382	3.96	0.64					
Edu. level	*Uni. Ss*	243	3.89	0.70	0.56	0.58	0.03	-0.08	0.15
	School Ss	374	3.86	0.74					
Place of residence	*Urban*	320	3.84	0.76	-0.99	0.32	-0.06	-0.17	0.06
	Rural	297	3.90	0.68					
Prior OL experience	*Yes*	203	3.98	0.65	-2.80	0.005/ 0.02	-0.17	-0.28	-0.05
	No	414	3.82	0.75					

listening skill, other skills will also be improved" (EN11) or *"I think listening is the weakest skill of Vietnamese learners. When you meet foreigners, if you can listen well, you can communicate better"* (OT16).

Regarding speaking skills, some school students believed that mobile devices were of great help for Vietnamese students because many were rather introverted. Self-recording practice, therefore, motivated them to speak more than having face-to-face conversations with teachers: *"There are some students who find it difficult to talk to others and are afraid to talk directly with teachers, so I think learning English through software can help them to be less shy and overcome this weakness"* (RU31). In this regard, one undergraduate who had experienced more improvement in speaking with the help of mobile apps explained: *"Some applications allow me to mispronounce the words and then try another time again until I can pronounce like the sample sounds. So, speaking is much improved"* (OT20).

During the emergency online learning due to the COVID-19 pandemic, mobile applications, especially those for speaking practice, were appreciated by university students: *"As for listening and speaking, as I just said, with this pandemic situation, online communication is also quite okay, being able to speak with people who are good at English"* (EN13). Both school and university students also expressed their preferences for native speakers' voice: *"For speaking, listening to native speakers in some applications like [name of the application] is easy to learn words and read along"* (UR25), and showed some concerns about local teachers' quality of speaking English: *"Some Vietnamese teachers' do not pronounce the sounds correctly"* (RU32).

Finally, there was an issue of seeking opportunities to practice. Some participants noted that it was difficult to improve speaking because *"Vietnamese students lack chances to use and practice speaking in*

English outside the classroom" (EN14), *"When I was in Year 1 or 2, I studied English at my university, but it was not possible for the teachers to attend to all the students and to correct their pronunciation"* (OT20). Nonetheless, some students stated that online applications could fill in the gap:

An application can allow us to listen to a dialogue and record our repetition. Afterward, we can listen to our voice again and check if our pronunciation is correct. It can also give us a mark showing how close our voice is to that of native speakers. (EN11)

Another student added: *"This is also the skill most students learn through mobile applications"* (OT17).

Reading, as reported, was another skill that could be enhanced via mobile learning. By reinforcing their vocabulary bank, students reported seeing improvement in their reading comprehension: *"The words are repeated in different exercises and reading parts. Then the application can generate flashcards to remember the words better, which helps me improve my reading comprehension and memory"* (EN11). However, shortcomings of mobile devices such as small screens or limitations in navigation discouraged students from spending more time practicing reading via mobile devices: *"It is difficult to learn because of the small screen, and it is difficult to navigate among reading texts and the follow-up questions"* (UR26).

Interestingly, there were some differences in the perceptions of the two target group learners (school students and undergraduates) about using mobile applications to improve reading skills. While school students showed some preferences for learning reading with teachers: *"For reading, I think it is better to have the teacher's help"* (RU32); *"I can [use the mobile devices] to read on the Internet, but I would rather learn reading with teachers"* (UR25), university students stated that study reading on mobile

devices required learning autonomy or sense of self-regulation *"For me, we can be autonomous in listening and reading. We can listen to a dialogue or read a text and check the answers by ourselves"* (EN12); *"I have thought much about reading, but anyone who needs serious reading will certainly opt for using the devices for this purpose"* (OT17). In short, while the undergraduates considered mobile devices as a possible way to enhance their reading comprehension, school students seemed to downplay the role of the devices for this language skill.

Finally, although most participants did not have much experience with writing practice through mobile devices, they still believed that this skill would be more effective with the help of teachers than virtual self-practice: *"I think it is difficult to improve reading and writing skills [via applications]"* (EN10*).* A school student added: *"for writing, I prefer to write on papers. I think it is easier than typing"* (RU31). Another undergraduate said that learning writing via social networks such as Facebook in which people could share ideas and interact with one another was more helpful: *"I think it is more suitable to learn writing if we have an application like a social network so people can interact and share ideas"* (EN13). One of the challenges lay in the inability of an application to correct learners' texts: *"After writing and posting the work on the Internet, only grammar can be corrected. A machine cannot help with our implications or certain ways of expression"* (OT20).

One common viewpoint shared by both high school students and undergraduates is that the most critical factors to mobile learning success are self-discipline, hard work, and perseverance. One participant stated, *"I think students should have the self-discipline to avoid being lured by the appeal of other applications"* (OT18). Another added, *"The most important thing to learn English is that you have to work hard, study hard, and pay attention to lectures"* (RU34). According to the participants, the efficiency of mobile learning applications largely depends on the users, *"The mobile phone is a personal device, so it is totally up to us whether we personalize as a learning device or entertainment tool."* (UR26). An English-majored student added:

> Having passion is essential, but not everyone has it nowadays. English is indeed essential. If you want to learn without the initial passion, you must know the importance of language in addition to the supervision [from others]. Learning English is essential for the future, that is clear. You need to be serious

about learning and understand the importance of language upon graduation. (EN12).

In conclusion, both high school students and university undergraduates concurred that mobile devices could help enhance listening, speaking, and reading thanks to available functions such as sound player, speech recognition engine (SRE), and document reader. However, writing was more preferred to learn traditionally with the help of teachers.

5. DISCUSSION

This study aimed to explore the factors affecting Vietnamese teenagers' intention to use mobile devices for English language learning and their perceptions of how they could enhance language skills. The study results were obtained using descriptive, inferential techniques and describing, interpreting, and classifying strategies to analyze quantitative and qualitative data. The results of this study will now be compared to the findings of previous work.

Regarding the factors influencing Vietnamese teenagers' intention to use mobile devices for English language learning, the results of this study revealed that all the seven constructs of the UTAUT model used in this study were positively correlated to one another. However, only four had effects on learners' intention, namely: perceived expectancy (PE), perceived playfulness (PP), social influence (SI), and attitude towards use (ATT). The participants' gender and place of residence also had some effects on BI but at different magnitudes.

The insignificant correlation between EE and BI ($p > 0.05$) in this study is in agreement with findings of some previous studies which showed that effort expectancy (ease of using mobile devices) did not have a significant positive influence on behavioral intention [14], [33], [41]. This finding is unexpected but not necessarily surprising. It is unexpected because in research projects using the TAM as a conceptual framework [5], [8], [15], [16], EE had significant effects, either directly or indirectly, on BI. Nonetheless, this result may not be necessarily surprising because, over the years, mobile devices have become very popular in Vietnam. Thus, the participants of this study, teenagers who are grown up under the influence of modern technologies, may find it easy to use mobile devices for different purposes, including learning.

Contrary to expectations, this study did not find a significant correlation between FC and BI ($p > 0.05$). In many earlier research projects using the UTAUT

model, FC was a significant positive variable influencing BI directly or indirectly through PU [14]–[16]. However, the effect of FC on BI was generally at a moderate level (beta smaller than 0.3) or through another construct like perceived enjoyment [15]. Although FC was found to be insignificantly correlated to BI in this study, it is vital to bear in mind the possible bias in responses from the participants, the majority of whom (67,1%) did not have prior experience with online English language learning as presented in an earlier section of the study.

The significant correlation (in order of effect size) between ATT, SI, PE, PP, and BI supports previous research in MALL [5], [8], [14], [16], [33]. However, there are similarities and differences in effect sizes between this study and the literature. First of all, the most substantial effect of ATT on BI in this study (beta = 0.43) supports the study's findings by Botero et al. [14] with an ATT effect size of 0.54. Nonetheless, when other factors like learning self-efficacy and autonomy were added to the model, ATT had a lower effect on BI [8]. Second, small coefficient between PE and BI (beta = 0.068) is in agreement with the findings of Botero et al. [14] but contradictory to the results of other research projects, for example, 0.23 in Doan's study [33], 0.38 in a study by Hoi and Mu [5] and 0.28 in Mekhzoumi's research project [16]. In Maheshwari's study [15], PE was not a factor affecting learners' BI, which was explained by the lack of online learning experience in Vietnam.

Differences in the correlation coefficients can also be observed between PP and BI of this study and the literature. The findings of this study revealed a small effect of PP on BI with a beta value of 0.14. This effect size was smaller than those in past studies. For example, in Doan's study [33], enjoyment was a significant predictor of intention with a medium effect size of 0.22. Similarly, in Lin and Li's study [42], the effect size between PP and BI was 0.298. Enjoyment or playfulness did not directly impact BI but was mediated through ATT at the beta level of 0.22 in the Padilla-Meléndez et al.'s study [43].

In this study, the impact of SI on BI agrees with the literature on acceptance, but there are differences in effect sizes. The correlation coefficient of 0.22 in this study is much higher than the beta value of 0.076 in Mekhzoumi's research [16] and more extensive than another small effect size of 0.02 in Venkatesh's study [13]. However, this study's beta value (0.22) is smaller than the total impact of SI on BI in a study by Botero et al. [14] (coefficient = 0.44). Similarly, the sizes of effects from SI to BI in studies by Hoi and Mu [5] and by Botero et al. [14], which were 0.46 and 0.44,

respectively, are more prominent than that of this study (0.22). In short, except for the high effect from ATT to BI as observed in most studies, there were both similarities and differences in the sizes of effects between the moderating factors (PE, SI, and PP) and BI.

Regarding the influence of participants' demographic characteristics on BI, the study result indicated significant differences between the females and males in their behavioral intention. This result, in part, matches those observed in earlier studies [13], [16], [44] in which gender indirectly affected BI through social influence, self-management, and facilitating conditions. However, this result does not support Nikolopoulou's study [11], which found no effect of gender on many factors. Indeed, there is an inconclusive finding in the literature on the relationship between gender and mobile learning intention.

The significant differences between experienced and inexperienced online learners in this study are, in part, consistent with Nikolopoulou's findings [11], which revealed that the longer students use mobile devices, the more positive their attitude towards adopting mobile learning. However, this finding does not agree with the results of Park et al.'s study [45] in which mobile learning self-efficacy was not correlated to BI in the Korean higher education context. Although the findings of this study revealed that experienced online learners were more likely to adopt mobile learning than the inexperienced ones, with a small sample size, caution must be applied, as the findings might not be transferable to other groups of learners and other contexts.

The independent sample t-test results indicated no significant differences between urban and rural groups in their intention for mobile learning. This finding does not agree with Tran's study [32], which revealed that rural and urban learners in Vietnam possessed similar digital skills. In other words, there is a slight gap in the digital divide between rural and urban areas in Vietnam. This is possibly due to the efforts of the country's Ministry of Education and Training in teaching computer and internet skills for students of all educational levels nationwide. On the other hand, the insignificant difference between school and university students regarding their mobile learning intention seems to contradict Nikolopoulou's study results [11], which indicated that the higher the grades, the more likely students opted for mobile learning. The insignificant difference in this study was not clear, but it might have something to do with the forbidden use of smartphones during formal lessons in high schools

in Vietnam, where teachers and parents express concerns about what students do with the device [46].

Regarding the third research question*, "How do mobile devices help enhance students' English language skills?"* results from the current study suggested that MALL was more effective for reading, listening, and speaking but not much for writing. These results are, in part, consistent with those of the study by Fučeková and Metruk [18], which suggested that learners used mobile devices for speaking, listening, reading, and writing, respectively. However, in the participants' perceptions, reading, listening, and speaking could be enhanced one way or another through better vocabulary. For example, with more vocabulary, learners could understand reading texts better, and with a more accurate ability to pronounce individual words, learners can understand native speakers more and be more confident in their verbal communications. The effect of learning vocabulary on learners' language competence through mobile devices has been the focused area of research in MELL [2].

The current study's findings mirrored those of the previous studies related to enhancing mobile devices on speaking skills. One apparent reason for the preference for mobile applications was avoiding shyness when speaking directly to the teachers. This finding corroborates the ideas of Liu and Jackson (2008 as cited in [19]), who suggested that fear was observed among undergraduates when they had to speak in front of the class. Results of this study also accord with earlier observations about students' preferences of instant feedback from conversational chatbots or mobile social networking sites in non-threatening judgment-free contexts [19], [20]. In addition, findings of the current study match those observed in earlier research projects that learner's listening and speaking skills could improve hand in hand through a process of listening to authentic speech, repeating the aural words, sentences [23]–[25].

Although little was mentioned by the participants of this study on the usefulness of mobile devices for reading skills, they did recognize that their vocabulary size improved through reading authentic materials. These results agree with the findings of other studies, in which students gained achievements in reading through being exposed to authentic materials and better vocabulary recognition and retention [26], [28]. The less impact of improvement in reading skills through mobile devices is partly because reading is customarily considered a passive skill that needs a long training time to make any difference [47].

Besides, while most of the previous studies on this topic reply on the experimental assessment of tests to measure the impact of mobile devices on reading skills, this research only uses the participants' perspectives and experiences. As a result, the findings show specific differences.

In terms of writing skills, findings of the current studies revealed that teenagers favored studying this skill with teachers. These findings were, in part, consistent with the results of a study by Zaki and Yunus [31] suggesting that mobile devices could be useful to help students enhance students writing but through teacher intervention like using flipped learning or applying process approach. Students can use mobile devices to draft essays before the class and send them to peers for feedback during class time; hence, they can all learn collaboratively. The findings observed in this study also mirror the results of a research project by Jassim and Dzakiria [29] in which the teacher intervention was needed through sending messages to students after the class time to remind them of the writing tasks. In short, it seems that the involvement of teachers or peers was necessary to promote learning of writing through mobile devices.

6. CONCLUSION, LIMITATION, AND IMPLICATIONS

Mobile English language learning is in its infancy in Vietnam despite increasing websites and mobile applications developed by educational and commercial organizations. This phenomenon is due to objective and subjective factors such as lack of learning autonomy and poor internet connectivity [9], [34]. This study has found that attitude towards use was the most critical factor affecting teenagers' behavioral intention to use mobile devices for English language learning. This attitudinal factor was strongly related to the perceived usefulness of mobile learning. This study also confirms the significant role of social influence (e.g., facilitation from teachers) on learners' intention to adopt mobile learning. Hence, first and foremost, teachers, educators, and software designers should concentrate on raising learners' perceptions about the usefulness, which will, in turn, result in higher acceptance of mobile learning. Taken together, these findings support practical measures to enhance Vietnamese teenagers' attitudes towards mobile English language learning.

The second significant finding of this study was that mobile devices could better be used to improve listening, reading, and speaking than writing skills. This can be realized through simple tasks such as listening to authentic materials for comprehension and

then repeating after the scripts to acquire pronunciation and accuracy at word and sentence levels naturally. SRE has shown advantages in providing mobile learners with instant feedback on their oral utterance of the words, phrases, and even sentences. Reading tasks could help students learn new vocabulary and text comprehension accordingly, but small devices might hinder learning. Finally, learners preferred to interact with real teachers for writing skills improvements.

Despite these findings, the current study was constrained by some limitations. First, quantitative data were collected via self-reporting, which could have been subject to biases. This is especially true when the percentage of experienced online learners was still limited. Data should be gathered from other resources in future studies, especially from learners' actual use of specific mobile applications to increase data validity and reliability. Second, as the sample was collected only in Vietnam, there is a limitation over the transferability of the findings in other non-English speaking countries. Thus, future studies should be expanded to other countries with similar contexts to Vietnam. Third, the study did not take into account the role of teachers in encouraging mobile learning, which is very important in the Vietnamese context [5], [32].

Similarly, the effects of other important factors such as internet connectivity, learning autonomy, and styles were not included as moderating factors in this research. Subsequent studies may need to include more latent factors for a more comprehensive analysis of factors affecting learners' intention for mobile learning. More interviews should also be conducted to obtain a clearer picture of the usefulness of mobile devices for language skills improvement.

This study's findings have implications for researchers, teachers and software designers, and researchers. The study contributes to the current knowledge about factors that drive young learners to study English through mobile devices. Although there is a growing body of research on the potential benefits of mobile devices for English language learning, more empirical findings of the roles of factors such as usefulness, enjoyment, and others will help raise the awareness of young learners in their intention to adopt mobile learning. Attitudes significantly influence their intention; therefore, teachers are one of the key players in providing learners with regular orientation, instructions, and feedback [5], [32]. In this regard, content (language teachers) and technical experts (software designers) should work closely with one another to develop mobile applications that can improve learners' language skills through compelling,

engaging, and authentic learning activities. However, it is the learners whose personal beliefs and attitudes are vital in using technology for learning. With an increasing number of smartphone owners and being digital natives, teenagers may gradually make the most of the advantages that mobile applications and devices offer to study English.

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