Influences on Smartphone Adoption by Language Learners

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Abstract

With the growing versatility and accessibility in today's society, smartphones have been emerging as a fertile ground for a more innovative and effective language learning environment. However, little is known about how to foster smartphone adoption amongst language learners as end-users. Therefore, this study aims to identify factors that drive students' intention to use smartphones for language learning based on the Technology Acceptance Model by Fred Davis (1989). Completing the survey for this study were 348 university students who were studying English as a foreign language in Vietnam. Results of a regression analysis revealed that perceived usefulness, perceived playfulness and self-management of learning had a positive influence on students' intention to use. The study thus provides practical implications for successful implementation of smartphones for language learning.

Keywords: language learning, mobile learning, smartphones, Technology Acceptance Model.

Introduction

Recent years have seen considerable growth in smartphone use in Vietnam, and smartphones have become an integral part of student life there. These devices are affordable, portable and increasingly capable of various daily tasks including those beneficial to language learning. With fast connectivity speed, big screen size, advanced audio output and visual features of modern mobile technology, smartphones and other mobile devices are promisingly bringing a paradigm shift in language education (Kukulska-Hulme, 2015).

According to Godwin-Jones (2017) and Kukulska-Hulme (2015), mobile technology will create positive impacts on language learning. Offering a new way of transferring knowledge that is not confined by time and place, mobile learning can effectively engage learners in learning activities as well as improve their comprehension and retention of learning materials (Kukulska-Hulme, 2015). Mobile learners can have "rich, real time, collaborative and personalised experiences both inside and outside the classroom" (Duman, Gedik, & Orhon, 2015, p. 201). It seems to be evident that mobile devices including smartphones can act as a practical alternative to traditional language learning technologies.

Nevertheless, the present versatility and prevalence of smartphones do not guarantee that language learners are willing to accept using these devices for learning purposes (Dashtestani, 2016; Stockwell, 2008). Students are the center of all learning activities, and the current lack of understanding of their perceptions of this newly introduced learning tool can result in their resistance to the implementation of smartphone-based language learning. Therefore, it is

essential to identify factors that drive the smartphone adoption for language learning from the perspectives of students themselves.

Accordingly, this study proposed a research model drawn from the Technology Acceptance Model (TAM) by Fred Davis (1989). The TAM aims to explain the technology adoption process by identifying key factors that determine the acceptance and use of a technology among current users in order to help promote the future adoption of both current users and potential users (Davis, 1989). By extending the TAM with two frequently validated factors in mobile learning adoption literature, perceived playfulness and self-management of learning, this study aims to explore critical factors that positively influence students' intention to use smartphones for language learning.

Review of Literature

From Mobile Learning to Mobile Assisted Language Learning (MALL)

Characterized by the adoption of personal wireless devices such as mobile phones, smartphones, personal digital assistants, iPads, tablets, etc., mobile learning has attracted a lot of research attention thanks to its compatibility with major learning goals. According to Sharples, Taylor and Vavoula (2007), mobile learners can have quick access to various learning resources anywhere and anytime, and thus can be successfully engaged in ubiquitous learning. Additionally, mobile learners can easily involve themselves in actively discussing and instantly sharing information in a collaborative and networked learning environment (Kukulska-Hulme & Viberg, 2017). More personalized learning experiences may result from learners' own choice of what to learn and where to learn with their personal mobile devices without time constraints (Godwin-Jones, 2017). Furthermore, the increasing durability of mobile devices is highly likely to foster learners' lifelong learning skills (Sharples et al., 2007).

No less important, mobile learning can create a motivating learning environment. Studies by Perry (2003) and Thomas and Muñoz (2016) both revealed that students generally find mobile learning exciting and appealing, since mobile devices are perceived as their favorite daily devices. Enabling users to stay connected, these devices prove highly effective in helping students and teachers participate socially in learning and teaching, making learning experiences relevant to their goals and styles (Traxler, 2009). Attewell (2005) asserted that mobile learners expressed much less anxiety and more confidence about their learning task performance thanks to their familiarity with these everyday devices. Much more student satisfaction with learning was recorded when Nihalani and Mayrath (2010) integrated a mobile application delivering course materials into their classes. Since attention, relevance, confidence and satisfaction are fundamental principles of motivation in education (Keller, 2008), mobile learning promises to support student engagement and success in learning.

More interestingly, mobile learning is likewise well-associated with the communicative teaching approach, one of the most influential theories in the current second language education (Godwin-Jones, 2017; Kukulska-Hulme, 2015). This approach aims to use authentic activities to develop language learners' communicative competence (Celce-Murcia, 2007). Unlike traditional

language classrooms where there exists only learner-learner interactions, mobile learning conditions various real-life interactions with the free availability of social applications such as Facebook or Twitter which can lead to substantial improvements in language learners' communicative competence (Kukulska-Hulme & Viberg, 2017).

As a result, Mobile Assisted Language Learning (MALL) has become one of the most studied applications of mobile learning (Kukulska-Hulme, 2015). Different mobile devices have been investigated in MALL research, but the majority of these studies focus on the use of smartphones as effective language learning tools (Duman et al., 2015; Godwin-Jones, 2017; Mahmoud & Khrisat, 2013).

Language Learning Using Smartphones

Despite not originally being designed for education, smartphones have numerous built-in features that can facilitate language classrooms. Mahmoud and Khrisat (2013) involved university students in a language classroom in Saudi Arabia in different activities using these features. Specifically, the participants were engaged in using smartphones to note down newly-introduced linguistic items, to record news and lectures in the target language for later self-study, to use dictionary applications as well as to search online for authentic learning materials. Findings showed that mobile learners performed better in the post-test and most of the participants expressed a strong desire for mobile learning adoption. Similar positive findings were likewise documented in classroom-based research on learning different language skills.

Regarding listening comprehension, Azar and Nasiri (2014) found that language learners were actively engaged in mobile tasks and these tasks proved effective in improving their performance. In terms of writing competence, Estarki and Bazyar (2016) revealed higher test scores among English language learners after encouraging group discussions in English using smartphones. More recently, Milliner (2017) obtained evidence for beneficial impacts of these devices on extensive reading activities while Moghaddam and Mazaheri (2017) provided support for vocabulary mobile applications. Evidently, smartphones one day will become an authorized learning tool in language classrooms.

Tracing out-of-class activities, Kurtz (2012) found that university students to a large extent were autonomously using smartphones for language learning, especially for lexical inquiries using dictionary applications. Similarly, Dang (2013) revealed a highly regular use of these devices to improve English vocabulary knowledge with full enjoyment among Vietnamese students. It seems to be the case that smartphones can support both formal and informal language learning. Therefore, the time has come for an understanding of factors that can promote the smartphone adoption among language learners, especially in the Vietnamese context.

Research framework: Technology Acceptance Model

Original proposed and tested by Davis (1989) to account for technology adoption, the TAM identifies perceived usefulness and perceived ease of use as key determinants of this complicated process. According to Davis (1989), perceived usefulness is "the degree to which a person believes that using a particular system would enhance his or her job performance" (p. 320), and

perceived ease of use is "the degree to which a person believes that using a particular system would be free of effort" (p. 320). Accordingly, a new technology is suggested to be useful and easy to use and to learn in order for its users to have a positive attitude, a high intention to use and frequent actual usage of that technology. The relationships among these TAM variables are illustrated in Figure 1.
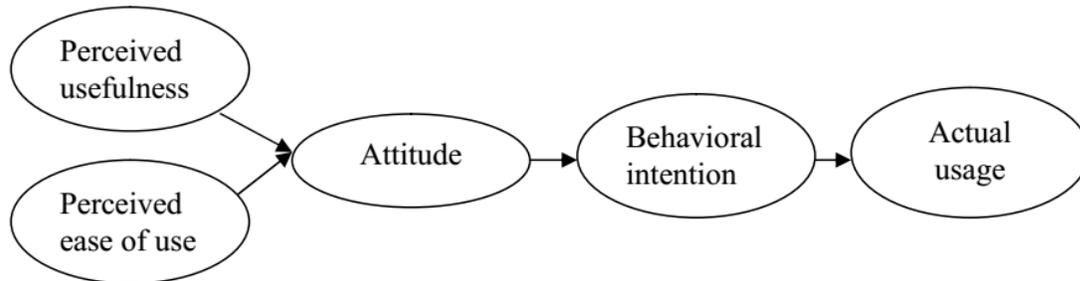

Figure 1: Technology Acceptance Model (TAM) by Davis (1989)

However, the attitude and actual usage variable in the original TAM were later removed due to their weak significance in the model (Venkatesh, Moris, Davis & Davis, 2003), leading to the intention to use serving as the only indicator of future adoption in a number of subsequent TAM research (Bakhsh, Mahmood, & Sangi, 2017; Huang, 2014). Consistently accounting for over one third of variance in the future adoption in these studies, this simplified TAM has been validated with high reliability and thus become one of the most widely used measures of technology adoption in education (Marangunić & Granić, 2015).

Accordingly, the TAM has been employed in a growing body of research in mobile learning (Bakhsh, Mahmood, & Sangi, 2017; Chen, Chen, & Yen, 2011; Huang, 2014). In addition to verifying the modified TAM, these studies successfully increased its predictive ability by adding more variables as direct determinants of intention to use such as self-management of learning (MacCallum, 2011) and perceived playfulness (Huang, 2014). Meanwhile, TAM studies concerned with MALL remain scarce, with no study found in Vietnam and very few examples in Taiwan (Chang, Lian, Yan, & Tseng, 2012; Chung, Chen, & Kuo, 2015). Since the significance of TAM factors and its additional factors differs in user, technology and using environment type (Moon & Kim, 2001), they were employed in this study to examine factors influencing students' intention to use smartphones for language learning in Vietnam.

Research Hypothesis and Research Model

As the fundamental TAM factors, perceived usefulness and perceived ease of use have been repeatedly tested and proven significant in MALL research. Both Chang et al. (2012) and Chung et al. (2015) provided support for the positive influence of perceived usefulness on language students' intention to use mobile technology. As Davis (1989) asserted, if users believe in the effectiveness of a certain technology in improving their performance, they will have more extrinsic motivation to adopt that technology. Similar belief in MALL may result from the increasing versatility of today's mobile devices to effectively assist language learning anywhere and anytime. Therefore, it is hypothesized that:

Hypothesis 1 (H1): Perceived usefulness has a statistically significant positive influence on students' intention to use smartphones for language learning.

Likewise, perceived ease of use was confirmed to have a positive impact on students' intention to use MALL (Chang et al., 2012; Chung et al., 2015). Davis (1989) stated that the less effort a new technology requires to use or to learn to use, the more willingness users have to adopt that technology in the future. Although this impact of perceived ease of use has been regularly validated in mobile learning adoption literature, similar findings remain questionable in different MALL contexts. Accordingly, the following is proposed:

Hypothesis 2 (H2): Perceived ease of use has a statistically significant positive influence on students' intention to use smartphones for language learning.

Another factor that has been recently examined in mobile learning adoption literature is perceived playfulness (Huang, 2014; Jawad & Hassan, 2015). Perceived playfulness refers to the level of a user's concentration, curiosity and enjoyment in the interaction with the technology environment (Moon & Kim, 2001). Once learners find mobile learning interesting, they will be intrinsically motivated for further adoption, since their use is still on a voluntary basis. Indeed, perceived playfulness was found to be significant in determining students' continuance intention to use an English mobile learning system (Chang et al., 2012). However, the effect of this factor has not been validated in other language learning contexts, which necessitates further examination. Consequently, it is assumed that:

Hypothesis 3 (H3): Perceived playfulness has a statistically significant positive influence on students' intention to use smartphones for language learning.

Also investigated in this study is self-management of learning. Self-management of learning refers to a learner's capability of taking charge of his or her own activities in order to achieve learning goals (Zou & Zhang, 2013). Possessing the self-management skill, learners tend to find and use effective tools to assist their learning activities on their own without overly relying on others (Godwin-Jones, 2011). As a new learning tool that provides ready access to various learning resources, smartphones can satisfy the need of these learners (Mahmoud & Khrasit, 2013). Further, since MALL has not received institutional supports yet, learners will have no intention to adopt MALL if they do not have a high sense of self-management. Nevertheless, while some mobile learning research provided evidence supporting the significance of self-management of learning on students' intention to use (Abu-Al-Aish & Love, 2013; Masrek, 2015), this factor appears to be neglected in MALL, heightening the need for further investigation. Thus, it is logical to propose that:

Hypothesis 4 (H4): Self-management of learning has a statistically significant positive influence on students' intention to use smartphones for language learning.

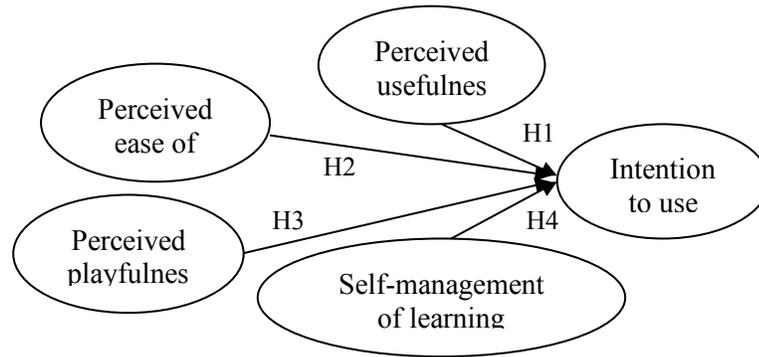Figure 2 presents the research model with all the hypotheses proposed above.

Figure 2. Research model with hypotheses

Research Methodology

In order to test the proposed model and its hypotheses, measurement items were adapted from previous research with a minor modification regarding the evaluated technology to ensure their validity and reliability. The constructs were measured using a 5-point Likert scale, ranging from *strongly disagree* to *strongly agree*. All the items carried positive meaning as the use of positively and negatively worded items within the same Likert scale might communicate different underlying traits or beliefs and thus threaten both the validity and reliability score (Weems, Onwuegbuzie, & Lustig, 2003). The questionnaire was then piloted among both experienced researchers and a small group of university students for higher face and content validity. Table 1 presents the measurement items and their relevant literature.

After the acquirement of university ethics approval, the survey was delivered in both online and offline forms to English language majors at a university in Vietnam for four weeks. Students' participation was totally voluntary, and their survey completion was associated with no incentives. Since TAM measurement scales aim at current users of a technology to identify key adoption determinants (Davis, 1989), the survey asked if the students had any experience in MALL, and only those who provided confirmation were invited to fill in the questionnaire.

A total of 348 students completed the survey, including 308 females and 40 males at the average age of 19.2. With the individual item loadings ranging from .49 to .82 and Cronbach's alpha values from .61 and .82, their responses were valid and reliable for statistical analysis using IBM SPSS Statistics 21 software.

Table 1
Measurement Variables

Construct		Wording	References
Perceived usefulness	1	Smartphones help me access useful guidance for language learning.	Chung et al. (2015)
	2	Using smartphones for language learning improves my learning performance.	
	3	Language learning through smartphones is not restricted by time and place.	
	4	Using smartphones for language learning increases my productivity.	
Perceived ease of use	5	I find it easy to learn how to use smartphones for language learning.	Chung et al. (2015)
	6	My interaction with smartphones for language learning is clear and understandable.	
	7	I find it easy to use smartphones for language learning .	
	8	It is easy for me to become skillful at using smartphones for language learning.	
Perceived playfulness	9	I find language learning through smartphones a favorite thing to do.	Moon and Kim (2001)
	10	Language learning using smartphones gives enjoyment to me.	
	11	Language learning using smartphones stimulates my curiosity.	
	12	Smartphones encourage me to spend more time on language learning.	
Self-management of learning	13	Smartphones help me set aside reading and homework time for language learning.	Masrek (2015)
	14	Smartphones provide me more flexibility in controlling my language learning and choosing what I want to learn.	
	15	Smartphones help me manage language learning time and schedules effectively and complete assignments on time.	

	16	Smartphones help me fulfill the goals of language learning.	
Intention to use	27	I am willing to receive learning instructions via smartphones.	Chung et al. (2015)
	18	I am willing to take part in mobile learning activities in class.	
	19	I am willing to pay more to use smartphones for language learning.	
	20	I will recommend using smartphones for language learning to others.	

Research Model Evaluation and Hypothesis Testing

Pearson's Product Moment Correlation

Correlations among the variables included in this study were first tested using a Pearsons' product - moment correlation to determine the level of multicollinearity of the proposed model. As presented in Table 2, the correlation matrix confirmed statistically significant relationships among all the variables. However, these correlations were not high enough to entail a real risk of multicollinearity, which eliminates the possibility of Type II errors in statistical modeling.

Table 2
Descriptive Statistics and Inter-Correlation Matrix

	M	*SD*	Perceived usefulness	Perceived ease of use	Self-management of learning	Perceived playfulness	Intention to use
Perceived usefulness	3.97	.68	---	.432**	.385**	.366**	.453**
Perceived ease of use	3.75	.65		---	.467**	.391**	.397**
Self-management of learning	3.64	.69			---	.443**	.490**
Perceived playfulness	3.66	.76				---	.455**
Intention to use	3.74	.64					---

Note: **. Correlation is significant at the 0.01 level (2-tailed). n= 348

As marked in Table 2, with the correlation coefficient above .3, intention to use moderately or strongly correlated with all the other variables, confirming the positive linear relationships between the outcome variable and predictor variables of the proposed model. All the four hypotheses were thus supported at the zero-order level.

Standard Multiple Regression

At the maximum border, standard multiple regressions are a powerful tool to test the adoption model and the ability of each variable to predict the level of students' intention to use mobile learning. By the regression results, the adoption model was statistically significant with a large effect size ($R^2 = .37$, $F(4, 348) = 50.07$, $p < .001$, $f^2 = .06$). The coefficient of determination R^2 revealed that a significant 37% of students' intention variance was explained, indicating a strong goodness of fit statistics or a strong predictive power of the model to predict students' intention to use. The regression results on the proposed model were summarized in Figure 3.

However, as can be seen in Figure 3, the model included a non-significant regression coefficient associated with perceived ease of use ($p > .05$), thereby rejecting Hypothesis 2. In contrast, consistent with all the other three hypotheses, perceived usefulness, perceived playfulness and self-management of learning had a statistically significant positive influence on intention to use ($p < .05$). Among them, self-management of learning was found to be the strongest factor with the highest beta value of .26 ($p < .001$).
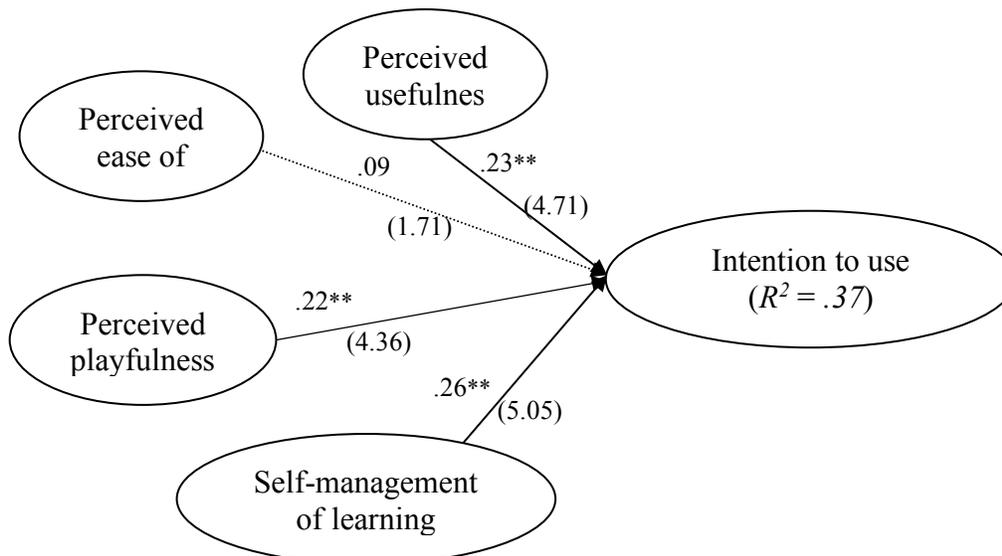

Figure 3. Regression results on the proposed model.
Note: Regular numbers represent "Standardized coefficient" whereas numbers in () represent t-value. Italicized numbers indicates "Squared Multiple Correlations." **: p < .001.

Discussion and Conclusion

Key Findings and Practical Implications

As powerful everyday devices with different educational values, smartphones have the potential to serve as a more accessible but innovative language learning tool in Vietnam. However, MALL adoption research is still in short supply, which might not fully inform those who are interested in fostering students' MALL adoption. Therefore, the present study aimed to identify factors positively influencing EFL students' intention to use smartphones basing on the TAM by Fred Davis (1989). Multiple regression analysis of 348 survey responses from university students in Vietnam provides support for perceived usefulness, perceived playfulness and self-management of learning as positive determinants of intention to use but rejects the significance of perceived ease of use. The resulting model had a relatively strong model fit, indicating its accuracy to a high degree.

In this model, self-management of learning had the strongest influence on students' intention to use despite being a newly introduced factor in MALL research. Such a noticeable impact has not been reported in previous mobile learning research (Abu-Al-Aish & Love, 2013; Masrek, 2015), implying a more decisive role of the self-management skill in MALL adoption. MALL has remained excluded in formal education; therefore, MALL adoption may demand a higher degree of student self-management to occur. Another explanation may come from the versatility and affordability of mobile phones themselves that are immediately appealing to those seeking for a self-learning tool. Therefore, it can be said that students with a higher sense of self-management of learning will have a firmer intention to use smartphones for language learning. In consequence, there is a strong need to increase self-management skills among language learners. Educators should develop mobile language learning activities that enable students to elect what, when and where to learn. Another effective approach is to encourage students' use of mobile learning applications that are designed to foster their self-management such as assessment sheets, decision trees, guidebooks or e-library.

As indicated by the beta value of the regression results, the second strongest factor is perceived usefulness and the third is perceived playfulness. These findings are consistent with those of Chang et al. (2013) and Chung et al. (2015), confirming that those who find smartphones useful, compelling and pleasurable are more likely to intend to use these devices for their learning. Moon and Kim (2001) asserted that mobile learning is still working on an entirely voluntary basis, thus requires students to have both extrinsic and intrinsic motivation to be fully engaged in it. Such motivation can only be generated from their enjoyable experiences and their expectation for improvements in their performance promoted by mobile learning. Accordingly, it would be necessary for mobile application designers, researchers and lecturers to raise students' awareness of practical usefulness of smartphones in language learning as well as to arouse their interest in MALL activities. These can be done by showing successful projects or engaging students in language learning mobile games.

The only insignificant factor revealed in this study is perceived ease of use. Accordingly, students' intention to use smartphones seems not to be under the effect of their perception of the ease of use. This finding is unanticipated given the leading role of this factor in the original TAM model as well as in the previous MALL studies (e.g., Chung et al., 2015). The resulting insignificance may cast doubt on the validity of the TAM in the context of using smartphones for language learning in Vietnam but may not be necessarily surprising. Venkatesh et al. (2003) claimed that the impact of perceived ease of use will decline over time as users get familiar with

the target technology. As smartphones have become increasingly popular in Vietnamese universities, performing mobile tasks appears to be no longer a matter of concern to today's students.

Theoretical Implications

MALL and its pedagogical benefits have been extensively researched while little attention has been paid to how to promote MALL adoption among students as end-users. This study contributes to the current limited knowledge of factors driving students' adoption of mobile phones for EFL learning by proposing an adoption model with high resulting predictive power based on the TAM. The significance of perceived usefulness, perceived playfulness and self-management of learning were confirmed in the Vietnamese context. Meanwhile, the influence of perceived ease of use was not validated, questioning its role in today's MALL adoption.

Limitations and Future Studies

This study has some limitations that should be noted. Firstly, it collected data at one point in time and could have better coverage by longitudinal research. Secondly, females were over-represented in the data sample, making it unlikely to assess the effects of gender in the proposed model and thus necessitating further investigation. Thirdly, the study surveyed only English majors in a university in Vietnam; therefore, subsequent research should target different student groups from more universities to deal with the generalizability issue. In addition, despite being rejected in this single study, perceived ease of use as a core TAM factor may require further rigorous analysis rather than be ruled out given its well-established validity in the literature. Finally, the resulting model did not account for all the variance in students' adoption intention, indicating other factors which have not been investigated. More factors should be included in future studies to have a better understanding of influences on students' intention to use smartphones for language learning.

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