

# Extended TAM Model: Impacts of Convenience on Acceptance and Use of Moodle\*

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The increasing online access to courses, programs, and information has shifted the control and responsibility of learning process from instructors to learners. Learners' perceptions of and attitudes toward e-learning constitute a critical factor to the success of such system. The purpose of this study is to take TAM (technology acceptance model) as a foundation and include perceived convenience as a new external factor in predicting students' perceptions about the acceptance and use of Moodle, an open source e-learning system. A total of 47 college students and 35 senior high school students participated in this research. The results indicated that perceived convenience had a direct effect on perceived usefulness. Perceived ease of use, perceived convenience, and perceived usefulness had significantly positive impacts on attitude toward using Moodle. Continuance intention to use Moodle was directly influenced by attitude toward using Moodle. Several practical implications of the present study are offered at the end of paper.

*Keywords:* e-learning, perceived convenience, TAM (technology acceptance model)

## Introduction

The rapid development of information technologies has been acknowledged as bringing about a significant change in education institutions. Internet-based e-learning (electronic learning) as an alternative education form has both created an innovative learning environment and provided learners with an exceptional opportunity to interact with others. With e-learning systems, online delivery of instruction and supply of electronic resources of knowledge can be performed without limitation of time and space. Sánchez and Hueros (2010) indicated that e-learning environments helped pedagogical systems cross spatial and temporal barriers, fostered meaningful learning, and provided flexibility and convenience. Yoon and Kim (2007) further suggested that perceived convenience would be considered as a key determinant of the users' acceptance and use of IT (information technology).

Individual acceptance and use of IT have been considered as the two key factors to the success of e-learning systems (Dasgupta, Granger, & McGarry, 2002). Results of several studies (Lin & Lu, 2002; H. Lou, W. Luo, & Strong, 2000; Moon & Kim, 2001; Venkatesh, 2001) have empirically verified the TAM

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(technology acceptance model) proposed by Davis (1989) as a powerful and valuable instrument in predicting individual acceptance and use intentions of online learning technology. In this study, the research model which draws on TAM and integrates the external variable, perceived convenience, is to predict learners' acceptance behavior and use intentions of an e-learning system, Moodle.

### **Theoretical Background**

#### **TAM**

Based on the TRA (theory of reasoned action) (Fishbein & Ajzen, 1975), Davis (1989) proposed the TAM. TAM was developed specifically for investigating the impact of technology on users' behavior. The model proposes that both perceived usefulness and perceived ease of use of the technology are the two key factors that influence the individual's attitude toward using the technology. Perceived usefulness means that the user believes that the use of technology will improve his/her performance, while perceived ease of use refers to the belief that using the technology will not take too much effort (Davis, 1989).

Perceived ease of use of a system is considered to influence perceived usefulness of technology. Both perceived ease of use and perceived usefulness have effects on the use of technology. A number of studies have used the TAM model to test users' acceptance of IT, for example, in e-mail (Gefen & Straub, 1997; Szajna, 1996), e-collaboration (Dasgupta et al., 2002), Websites (Koufaris, 2002; Lin & Lu, 2002; Van der Heijden, 2003), online shopping intentions (Van der Heijden, Verhagen, & Creemers, 2003), etc..

With the development of ICT (information communication technology), TAM has been applied in numerous studies to examine learners' acceptance of e-learning systems (Y. C. Chen, Lin, C. Y. Chen, & Yeh, 2007; Liaw, Huang, & Chen, 2007; Ngai, Poon, & Chan, 2007; Ong & Lai, 2006; Ong, Lai, & Wang, 2004; Sánchez & Hueros, 2010; Šumak, Heričko, Pušnik, & Polančič, 2011; Van Raaij & Schepers, 2008), online learning community (Liu, Chen, Sun, Wible, & Kuo, 2010), the wireless LAN (local area network) (Yoon & Kim, 2007), PDAs (personal digital assistant) (Chang, Yan, & Tseng, 2012), and blended learning (Tselios, Daskalakis, & Papadopoulou, 2011). The results of these studies indicated that TAM could efficiently predict and explain users' acceptance of IT.

Though perceived usefulness and perceived ease of use are the key determinants for an individual to accept and use IT, other external variables can also affect users' acceptance of IT (Moon & Kim, 2001). Hence, several researchers have recognized that other external factors might play crucial roles in strengthening the TAM model (Legris, Ingham, & Collette, 2003; Venkatesh & Davis, 2000).

In the studies of computer self-efficacy, the results showed a positive causal relationship between computer self-efficacy, perceived usefulness, and perceived ease of use (Venkatesh & Davis, 1996; Venkatesh, 2001; Y. S. Wang, Wu, & H. Y. Wang, 2009). Results of other studies on perceived convenience (Yoon & Kim, 2007), critical mass effect (Lou et al., 2000), usage (Selim, 2003), technical support (Ngai, Poon, & Chan, 2007), and perceived playfulness (Moon & Kim, 2001; Roca & Gagné, 2008) also demonstrated that there exists a significant relationship among these external variables, ease of use, and usefulness.

#### **The Concept of Perceived Convenience**

In terms of user evaluation of service experiences, the term convenience refers to an individual's preference for convenient product and services. Time and effort saving are the two key factors that determine whether a product or service is convenient (Berry, Seiders, & Grewel, 2002). Brown (1989; 1990) proposed

five dimensions of convenience: time, place, acquisition, use, and execution. On the basis of Brown’s (1989; 1990) work, Yoon and Kim (2007) excluded two dimensions, namely, the acquisition and use, in their study to examine convenience of the wireless LAN. The reason is that acquisition is not definitely related to intention to use technology, and the use dimension is similar to ease of use in TAM. Therefore, they defined three dimensions of convenience: time, place, and execution. In Cheolho and Sanghoon’s (2007) study, they used four variables: perceived usefulness, perceived ease of use, behavioral intention, and perceived convenience, to investigate a ubiquitous wireless LAN environment. The results indicated that perceived ease of use had a positive impact on perceived convenience. In a discussion-oriented online course study, Poole (2000) found out that students participated in online discussions at time and place most convenient to them. Another study done by Murphy and Collins (1997) found similar results.

The results of To, Liao, and Lin’s (2007) study revealed that convenience affected consumers’ shopping intention. Gupta and Kim (2006) found that convenience had a positive impact on online shopping intention as well. A recent study on investigating English learning through PDAs done by Chang et al. (2012) showed significantly positive effects of perceived ease of use on perceived convenience, perceived convenience on perceived usefulness, and perceived convenience on attitude toward using PDAs. On the basis of studies of Chang et al. (2012) and Yoon and Kim (2007), we define three dimensions of perceived convenience, namely, place, time, and execution, in the present study.

**Research Model and Hypotheses**

Perceived convenience is one of the advantages identified in online learning. Therefore, perceived convenience would be considered as a salient determinant of the individual’s acceptance and use of IT. In the present study, perceived convenience was employed for extending the model of TAM. The research model and hypotheses, as shown in Figure 1, were proposed to explain how exogenous variables affect users’ acceptance process in TAM. A path analysis is applied to explore the empirical strength or the relationship in the proposed model.

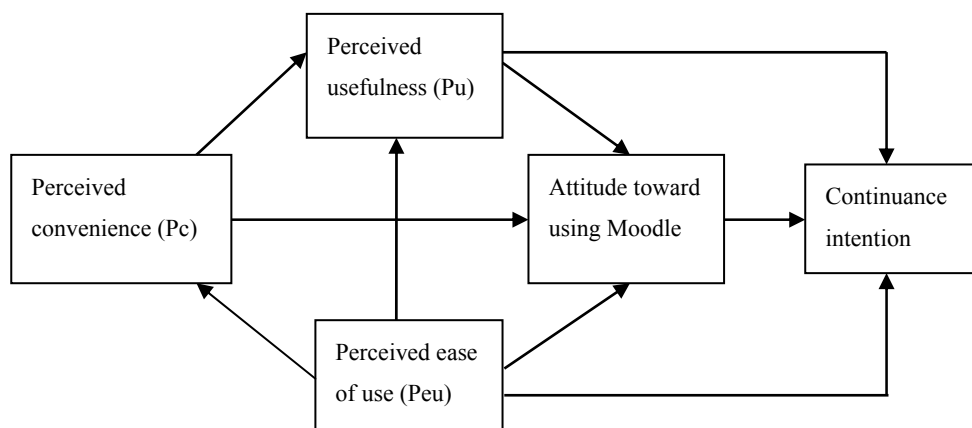


Figure 1. Research model.

Chang et al. (2012) and Yoon and Kim (2007) found that perceived ease of use had a positive influence on users’ perception of convenience in their studies. This leads to the hypothesis: H1: Perceived ease of use positively affects perceived convenience of using Moodle.

In TAM, two variables: Perceived ease of use and perceived usefulness affect the attitude and behavioral intention of users. Perceived ease of use positively affects perceived usefulness; perceived usefulness and perceived ease of use positively affect attitude toward using; perceived usefulness and attitude toward using positively affect intention to use. The causal relationship that exists between these variables has been confirmed by a number of studies (Chang et al., 2012; Davis, 1989; Kuo & Yen, 2009; Moon & Kim, 2001; Venkatesh & Davis, 1996). Studies done by Ong, Lai, and Wang (2004) and Yoon and Kim (2007) found perceived ease of use had a positive impact on intention to use. Thus, we propose the following hypotheses:

- H2: Perceived convenience positively affects perceived usefulness;
- H3: Perceived ease of use positively affects perceived usefulness;
- H4: Perceived ease of use positively affects attitude toward using Moodle;
- H5: Perceived usefulness positively affects attitude toward using Moodle;
- H6: Perceived convenience positively affects attitude toward using Moodle;
- H7: Perceived ease of use positively affects continuance intention to use Moodle;
- H8: Perceived usefulness positively affects continuance intention to use Moodle;
- H9: Attitude toward using Moodle positively affects continuance intention to use Moodle.

## **Methodology**

### **Data Collection**

The data collection for this study was conducted at a technological university and a vocational high school in Taiwan. In total, 82 usable questionnaires (47 from technological university and 35 from vocational high English majors) were used for analyses.

### **Instrument**

The questionnaire, using a 5-point Likert-style scale ranging from (1) “Strongly disagree” to (5) “Strongly agree”, was employed to collect data for constructs of the research model. For the measurement of the latent variables in the model, multiple items from the previous studies were modified for the present study. The measurements of perceived convenience were adapted from Yoon and Kim (2007). And the measurements of perceived ease of use, perceived usefulness, attitude toward using, and continuance intention to use were adapted from Davis (1989).

## **Results**

### **Measurement Scales of the Constructs and Items**

The reliability analysis was conducted in order to ensure the internal consistency of the items used for each variable. Nunnally and Bernstein (1994) recommended that Cronbach’s alpha is reliable if its values is at least 0.7. The value of Cronbach’s alpha for the five constructs in this study is above 0.8. Hence, the results demonstrate the questionnaire is a reliable measurement instrument.

### **Modeling Testing Results**

The linear regression analysis was used to validate the research model by examining the path coefficients. *T*-tests were applied to assess the significance of these path coefficients. Figure 2 illustrates the standardized path coefficients and coefficients of determination ( $R^2$ ) for each dependent construct.

The results showed that the impact of perceived ease of use on perceived convenience ( $\beta = 0.575$ ,  $p <$

0.001) and the impact of perceived convenience on perceived usefulness ( $\beta = 0.638, p < 0.001$ ) were significant, but perceived ease of use had no significant effect on perceived usefulness ( $\beta = 0.152, p > 0.05$ ). H1 and H3 were supported but H2 was not supported.

Three constructs, perceived ease of use, perceived usefulness, and perceived convenience, positively affected attitude toward using Moodle ( $\beta = 0.393, p < 0.001$ ;  $\beta = 0.254, p < 0.05$ ;  $\beta = 0.31, p < 0.01$ ). Thus, H4, H5, and H6 were supported.

Paths that affect continuance intention to use Moodle included perceived ease of use ( $\beta = 0.147, p > 0.05$ ), perceived usefulness ( $\beta = 0.162, p > 0.05$ ), and attitude toward using Moodle ( $\beta = 0.462, p < 0.01$ ). H9 was supported, but H7 and H8 were not supported.

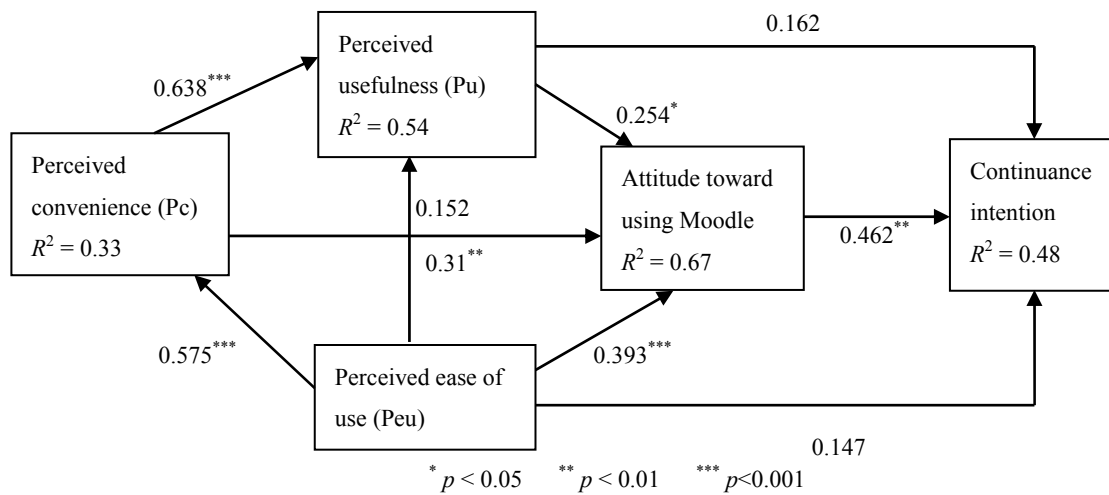


Figure 2. Results of the research model.

### Discussion and Conclusions

The goal of this research, which is based on the TAM model, was to add perceived convenience to the model and explore the willingness of users to adopt the use of Moodle. The results revealed the positive direct effect of perceived ease of use on perceived convenience, which is aligned with outcomes from previous studies (Chang et al., 2012; Yoon & Kim, 2007). In line with their studies, the model confirms that perceived convenience has a direct effect on perceived usefulness, meaning that the more convenient the learner feels the Moodle system is, the more useful one perceives it to be.

H3 postulated that the direct effect of perceived ease of use on perceived usefulness is insignificant, which is opposed to several studies (Chang et al., 2012; Liu et al., 2010; Liu, Liao, & Pratt, 2009; Tselios et al., 2011; Šumak et al., 2011; Van Raaij & Schepers, 2008). A plausible reason for the lack of support for H3 is that the learners in the present study may not see ease of use as a critical factor that will help them improve their learning in the process of using Moodle.

Consistent with previous studies (Chang et al., 2012; Masrom, 2007; Ong et al., 2004; Saadé, Nebebe, & Tan, 2007; Šumak et al., 2011; Tselios et al., 2011), H4, H5, and H6 referring to the relationship between perceived ease of use and attitude (H4), perceived usefulness and attitude (H5), and perceived convenience and attitude (H6) showed significantly positive results.

H7 and H8 referred to the impact of perceived ease of use on continuance intention to use Moodle (H7)

and perceived usefulness on continuance intention to use Moodle (H8). Both perceived ease of use and perceived usefulness had no significant effects on continuance intention to use Moodle. This result is not consistent with the hypothesis of TAM, but it echoes the findings of Liao, Tsou, & Huang (2007) and Kuo and Yen (2009). One of the possible reasons of this inconsistency can probably be attributed to the low frequency of use of Moodle by the learners. The other possible reason would be due to the fact that users are mandatorily required to use Moodle by their instructors.

The current study contributes to the validation of the extended TAM model by introducing and confirming the influence of perceived convenience as an external variable on the users' attitude and continuance intention to use Moodle. The results of the study reveal that perceived convenience, perceived ease of use, and perceived usefulness are three important determinants of attitude toward using Moodle, whereas perceived ease of use is the most significant determinant that directly affects attitude. The findings also illustrate users' continuance intentions for using Moodle are neither a result of users' perceptions about how easy it is to use the system, nor perceptions about how useful the system will help users in their learning process.

The current study is not without limitations. First, the use of Moodle is mandatory during the course, which may influence users' perceptions of how useful the system is in helping them in their learning. Follow-up studies should examine users' Moodle using frequency and behavior outside the classroom, users' self-efficacy, users' Moodle pre-using experiences and the motivational factors that influence learners' participation in online learning; and Second, participants in this study are college and high school students, but we did not analyze their demographic data. Future studies including categories of gender, age, and the length of using online learning system should be conducted to obtain a deeper understanding of the factors that influence attitude and continuance intention toward using Moodle.

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