

Investigating the Antecedents of University Students' Behavioral Intention to Use iPad for Learning

Chunping Wu, Yating Kuo, and Shuling Wu

Abstract—This study, grounded on the Technology Acceptance Model, investigated a model incorporating the antecedents of university students' behavioral intention to use iPad for learning purposes. A survey was conducted to gather data from 392 subjects who are matriculated in information technology-related undergraduate programs at Taiwan. The results supported the proposed model that university students' behavioral intention was influenced by both of their perceived usefulness and ease of using iPad for learning. Moreover, their perceived ease of using iPad was in turn predicted by their self-efficacy toward this technology. Implications for practice and future studies are recommended.

Index Terms—Behavioral intention, iPad self-efficacy, structural equation Modeling, technology acceptance model.

I. INTRODUCTION AND RESEARCH PURPOSES

The iPad, one of the web-based tablet technologies, has gained increasing attention from people in the fields of business, industry medical, architecture, education and so on. Taking advantages of its features, learners could efficiently and effectively keep track their learning progress, personalize their learning activities, or even interact with the iPad itself and the people at the distant via diverse Apps, which are especially developed for the learning purposes [1]. However, the above-mentioned potential use and benefits are determined by learners' acceptance and adoption of integrating this technology into learning. In other words, despite the fact that several high interactive functions built in the iPad and educational Apps are available, the potential learning gains come with those functions might be obstructed by their unwillingness to accept such a kind of tablet technologies for learning.

The Technology Acceptance Model (hereinafter named TAM) argues that users' use of the technology is directed by their behavior intention, which is in turn influenced by their perceived usefulness and ease of using it [2]. This mode model provides a basic framework, which does not only clearly spell out the underlying psychological determinants of individual behavioral intentions, but also has been repeatedly shown to have strong practical utility in a variety of domains [3]-[10]. After carefully examining previous research which validated the TAM in diverse technology adoption cases, two research gaps were found and will be investigated in the current study. First, studies have devoted

efforts to investigating the impacts of integrating the iPad into teaching or learning process; however, few studies examined the found impacts from learners' acceptance perspectives taking into account of the TAM theory. Second, after in-depth observing the variables depicted in the TAM model and related research [11], [12], users' perceived ease of using the iPad might be influenced by their self-efficacy toward it. The university students, who are called as the generation of born digitals, are heavily influenced by the technology in their ways to think, learn, interact with peers and so on [13]. They might be more persistent in facing the challenges or frustration brought by trying the innovative technology, with which they are not familiar. They tend to perceive themselves more capable in using technology as well. However, their perceived self-efficacy do not necessarily guarantee their observation of the usefulness of iPad for learning purposes. Therefore, the aim of this paper is to empirically test whether the TAM framework, incorporating the variable of self-efficacy could adequately explain behavioral intention of the university students in using iPad for learning purposes.

II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The Technology Acceptance Model, originally proposed by Davis [2], has been extensively studied in past decades to explain users' acceptance of innovative technologies, for instance, web-technology, tablet PC, decision-support systems and wireless internet in industrial and business sectors [5], [10], [13], [14] and computers, e-portfolio systems, video-game, wiki and web-based systems in educational settings[4], [6], [7], [9], [15]-[19]. The TAM posits that a user's actual use of an innovative technology is determined by his/her behavioral intention to use (BI) [2]. Such an intention is found to be influenced by users' attitudes and perceptions towards the technology.

Specifically, two aspects of the perception are studied: perceived usefulness (PU) and ease of use (PEU). PU is defined as the degree to which individuals believe using a technology will improve their performance in near and long terms, and PEU is defined as the degree to which individuals believe using a particular technology will be effortless [2]. Both PU and PEU help to explain how and when users form attitudes towards an incorporated innovation and their intention to use the technology, which in turn leads to different levels of actual adoption and acceptance [20]-[22]. Nonetheless, in light of recent findings indicating its insignificant contribution to the actual use of technology [23] [24], the element of attitude was removed and therefore not examined in this study.

On the other hand, users' self-judgment on their capability

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to operate a technology to accomplish a given task might influence their willingness and persistency in exploring the features of the technology. Recently, empirical evidence substantiated the impacts of users' computer self-efficacy on their perceived ease of use and technology acceptance (for instance, [3], [11], [12], [25]).

Therefore, answers to question on "will the TAM, incorporating users' iPad self-efficacy as the antecedent variable, predict their behavioral intention to adopt iPad for learning" will have important implications for future diffusion of the tablet technology into teaching and learning.

III. METHODS

A survey method was employed to gather data for the variables presented in the hypothetical SEM model via a self-reported questionnaire at spring semester of 2011. The examined variables, which include iPad self-efficacy, perceived ease of use, perceived usefulness and behavioral intention, and their proposed relationships, were depicted in Fig. 1.

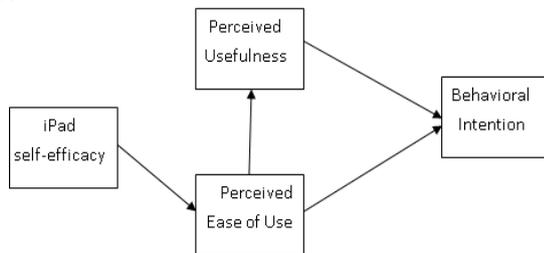


Fig. 1. Hypothetical SEM model.

These variables were assessed by one modified questionnaire, which consist of four 7-point Likert scales (7=strongly agree, 4=neutral, 1=strongly disagree). Existing instruments on related areas (i.e. [2], [12], [26]) were referred to, items were translated and adapted to fit the targeted context and validated by a group of 123 university students for instrument validity and reliability. An Exploratory factor analysis was conducted and only factors with eigenvalues greater than 1.0 and items with factor loading greater than 0.50 were included in the actual study. Quality indices on each of the adopted scales reported in the pilot study are listed in Table I.

TABLE I: QUALITY INDICES OF THE ADOPTED SCALES REPORTED IN THE PILOT-STUDY ($N=123$)

Scale	iPad self-efficacy	Perceived ease of use	Perceived usefulness	Behavioral Intention
No. of item	9	6	4	2
Factor loading	0.65~0.85	0.70~0.9	0.89~0.96	
Variance explained	64.41%	73.28%	85.5%	
Cronbach α	0.91	0.92	0.94	0.97

In total of 21 items were used to collect data in regards to the examined variables. Quality indices on each of the adopted scales reported in the study are listed in Table II. The Cronbach's α values range from 0.91 to 0.95 indicating good internal consistency of the sets of items in measuring the variables.

TABLE II: QUALITY INDICES OF THE ADOPTED SCALES REPORTED IN THE ACTUAL STUDY ($N=392$)

Scale	iPad self-efficacy	Perceived ease of use	Perceived usefulness	Behavioral Intention
No. of item	9	6	4	2
Factor loading	0.65~0.81	0.69~0.86	0.83~0.9	
Variance explained	72.11%	79.6%	85.5%	
Cronbach α	0.91	0.95	0.95	0.93

The structural equation model (SEM) statistical analysis allowed for an overall test of the fit of a particular model to the observed data, rather than just significance tests of the different estimations within the analysis. Therefore, SEM was conducted using Amos 18 to investigate overall fit of the model. The fit of a model to observed data was made on three levels. First, several global fit indices were considered as tests of the overall model. The chi-square statistic was used to test if the observed covariance matrix was significantly different from the implied covariance matrix. In SEM, the desired finding was a failure to reject the null hypothesis ($p>0.05$). Since the chi-square is affected by sample size, the ratio of the chi-square statistic to the model degrees of freedom was used as an indicator of fit. Small values of this ratio indicate good fit [27]. Second, a detailed assessment was made in which differences between the observed and reproduced covariances were examined. Third, indices suggesting possible model revisions were provided by Amos. A combination of these three indicators was used to determine model fit.

IV. DATA SOURCE

The population defined in this study is 2692 adult learners who were matriculated in undergraduate programs related to information or communication technology in one private university at Taiwan during the academic year of 2011. The academic major was considered in the procedure to use the stratified sample recruitment technique.

A survey on examined variables was disseminated to the selected participants. Three hundred and ninety-two completed questionnaires were returned. The response rate is approximately 44%. Forty-five percent of the 392 respondents are female. Sixty percent of the respondents are junior.

V. RESULTS

The means, standard deviations of each scale are listed in Table III. The participants reported high confidence in their ability to operate and use iPad for accomplishment of learning tasks (mean=5.19). Similar patterns were found in the reported scores of their perceived ease of using iPad and their behavior intention to use iPad for learning (mean=5.03, 5.39, respectively). However, they did not feel very positive toward the usefulness of iPad for making learning efficiency or effectiveness (mean=4.52). This would be a very interesting phenomenon for further exploration.

Data was analyzed using the structural equation modeling technique. The results indicated that proposed structural model (Fig. 2) provided a good fit to the data ($\chi^2 = 3.424$, $df=2$,

$p=0.18$, the ratio of CMIN and DF = 1.71, NFI=0.996, CFI=0.998, and RMSEA=0.043).

TABLE III: DESCRIPTIVE STATISTICS OF OBSERVED VARIABLES

Observed variables	Mean	SD	Score Ranges
iPad self-efficacy	5.19	1.23	1~7
Perceived ease of use	5.03	1.48	1~7
Perceived usefulness	4.52	1.52	1~7
Behavioral Intention	5.39	1.56	1~7

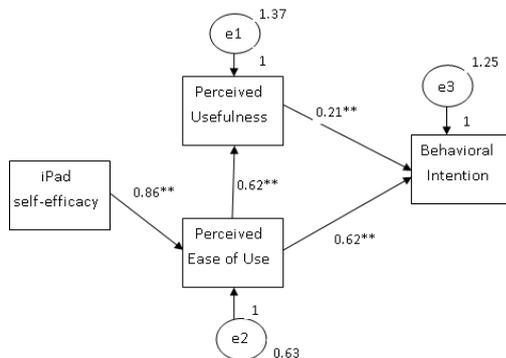


Fig. Standard output of the hypothetical model.

VI. CONCLUSION

Since prior research witnessed factors that might contribute to users' behavioral intention to adopt an innovative technology, thus leading to their usage [2], [20]-[22], the researchers followed up on examining if the technology acceptance model, incorporating self-efficacy toward the iPad could further explain university students' adoption of the iPad for learning. The current study confirmed the applicability of the researchers' proposed model in the context of the iPad. Specifically, university students' behavioral intention was influenced by their perceived usefulness and ease of integrating iPad into learning process. Additionally, the direct predictive effect of students' perceived ease of use on their perceived usefulness of iPad was substantiated. However, despite the fact that the students reported high self-efficacy, only one set of direct relationship between the self-efficacy and perceived ease of use was found. In other words, students with higher iPad self-efficacy did not necessarily observe the usefulness of adopting the iPad into learning.

The obtained findings have important empirical significance as well as implications for developing program in diffusing iPad and future study. First, learners or instructors interested in adopting the iPad into the learning process are suggested to observe different successful cases, which demonstrate how to use iPad for learning, rather than spend time on exploring the hard features of the technology. Second, the participants selected for this study might be the technology-savvy group and more willing and sensitive to the new technology due to the impact of their majors. Future study might be interested in exploring the potential impact of the academic training on strengthening or weakening the explanative power of the TAM model by extending this study to the group of participants with majors which are not closely related to the technology. Finally, users' frequency or behavior of exchanging or sharing information in regard

with how they successfully use the iPad for enhancing their learning efficiency and effectiveness might be another variable, moderating the relationship intensity among variables proposed by TAM while the iPad has gained more popularity in the education market for a longer time. Therefore, future studies are recommended to investigate the moderation effects of users' active sharing behavior.

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