

What drives user to continue using e-learning: An extension of the Expectation-Confirmation Model

Ming-Chi Lee

Yi-Wei Chen

Dept. of Information Engineering, National Ping Tung

Dept. of Information Engineering, National Ping Tung

Institute of Commerce

Institute of Commerce

lmc@npic.edu.tw

s97318007@student-mail.npic.edu.tw

Abstract

Although e-learning has been prompted to various education levels, the intention to continue using such systems is still very low, and the acceptance-discontinuance anomaly phenomenon (i.e., users discontinue using e-learning after initially accepting it) is a common occurrence. This paper synthesizes the expectation confirmation model (ECM), the technology acceptance model (TAM), the theory of planned behavior (TPB), and the flow theory to hypothesize a theoretical model to explain and predict the users' intentions to continue using e-learning. The hypothesized model is validated empirically using a sample collected from 363 learners of a Web-based learning program designed for continuing education. The results demonstrate that satisfaction has the most significant effect on users' continuance intention, followed by perceived usefulness, attitude, concentration, subjective norm, and perceived behavior control as significant but weaker predictors. The implications of these findings for e-learning practitioners are discussed at the end of this work.

Keywords: Expectation-confirmation model (ECM), Theory of planned behavior (TPB), Technology acceptance model (TAM), E-learning.

1. Introduction

With the rapid growth of the Internet, numerous education/training institutes and companies have devoted great efforts and large sum of money to develop e-learning programs for users. However,

while e-learning has been promoted to various levels of users, the intention to continue using such system is still very low (Chiu 2006). In addition, the acceptance-discontinuance anomaly phenomenon (users discontinue using e-learning after initially accepting it) frequently occurs (Roca 2006). Although initial acceptance of e-learning is an important first step toward achieving e-learning success, actual success still needs continued usage. Therefore, understanding the factors affecting customers' intention to continue using e-learning will not only assist e-learning developers in designing popular contents, but also help teachers and vendors design strategies that are more likely to increase the use of e-learning.

In this paper, we synthesize the expectation confirmation model (ECM), technology acceptance model (TAM), theory of planned behavior (TPB), and flow theory to hypothesize a new model to explain users' intention to continue using e-learning. We combine these four theoretical perspectives for the following three reasons. First, although previous research has found ECM to be a robust model for continued IT adoption (Bhattacharjee 2001), it employs only three variables to explain behavioral intention, namely satisfaction, confirmation, and post-adoption expectations. However, a user's behavioral intention toward adopting IT will also be affected by other factors, such as the opinions of important individuals (subjective norms) (Fishbein, M 1975). Furthermore, even if users have a strong intention

to perform a behavior, they may feel that they lack the necessary resources and skills (perceived behavioral control) (Ajzen 1991), and the use of TPB addresses this gap. Second, while TPB captures the roles of individuals, organizational members, and social influences on behavioral intention, it does not inform us what attitudinal beliefs would affect a user's attitude toward e-learning (Wu 2005). According to Taylor's research (Taylor 1995), TAM provides two attitudinal beliefs, namely perceived ease of use and perceived usefulness as two major antecedents of attitude, which make up precedent factors of attitude for TPB. Moreover, since each theory has distinct roots and is based on a different set of antecedent variables, we contend that they independently provide a partial understanding of users' cognitive processes related to IT usage. It is therefore possible that, when combined, these theories may collectively provide an improved and more comprehensive understanding of the cognitive processes and behaviors related to IT usage than when each theory considered alone. Third, adding the flow theory allows us to capture the elements of motivation related to fun and entertainment, with regard to the adoption of e-learning (Koufaris 2002). Flow has been used to describe a state in which "people are so involved in an activity that nothing else seems to matter" (Csikszentmihalyi 1975), such as when users play online games. During the states of flow, other events occurring in users' surrounding environment lose significance and their sense of time becomes distorted (Hoffman 1996). When people use e-learning systems, there is potential for them to experience flow, as most e-learning products provide chats room, message boards, and entertainment functions, all of which may provide enjoyment and lead to concentration and engagement in users. Therefore, we will also use flow theory to examine user's continued usage of e-learning.

While prior research has examined ECM, TAM, and TPB independently in explaining information technology (IT) usage, to the best of our knowledge, no study has yet theoretically combined these three models. The primary contributions of this study are its examination of the integration of ECM,

TAM, TPB and flow theory in explaining long-term e-learning usage intention and an empirical evaluation of which factors are critical to affecting this intention. The findings from this paper may therefore help bridge the existing gap between acceptance and continuance streams of e-learning usage research. The results of this work are expected to give both practitioners and academics an increased understanding of users' continuance intention, which can then be used as a guideline to devise more appropriate e-learning products.

The rest of the paper is organized as follows. The next section presents our research model and hypotheses, while Section 3 proposes the measurement method and scales. We present the research results in Section 4, followed by discussion in Section 5. Finally, the implications and conclusions of this work are presented in Sections 6 and 7.

2. Research model and hypotheses

In this section, we develop our research model and hypotheses based on the expectation confirmation model (ECM), the technology acceptance model (TAM), the theory of planned behavior (TPB), and flow theory (Flow).

2.1. Expectation-confirmation model (ECM)

There are five main hypotheses in the ECM. First, users' satisfaction with IT has a positive effect on their intention to continue using the IT. Studies in marketing have discovered that the major reason for a consumer's decision to repurchase products or patronize services is the their level of satisfaction (e.g. (Bearden 1983; Oliver 1993; Bhattacharjee 2001; Szymanski 2001)). Owing to the similarity between re-purchasing products/services in a consumer context and the continued usage of IT products/services, the ECM posits an equivalent relationship in the latter context. In turn, user's satisfaction with IT is determined by the user's confirmation of expectations and their perceived usefulness of IT (which is one type of post-adoption expectation). The confirmation of expectations suggests that users obtained expected benefits through their usage experiences with the

IT, and thus leads to a positive effect on users' satisfaction. On the other hand, based on the expectancy-confirmation paradigm, users' perceived usefulness of IT has a positive effect on their satisfaction with IT by working as a baseline for reference against confirmation judgments. This relationship is supported by the adaptation level theory, which proposes that users perceive stimuli only in relation to an adapted level.

H1. Users' satisfaction with e-learning is positively related to their continued e-learning usage intention.

H2. Users' confirmation of expectations is positively related to their satisfaction with e-learning.

H3. Users' perceived usefulness of e-learning is positively related to their satisfaction with e-learning.

H4. Users' perceived usefulness of e-learning is positively related to their continued e-learning usage intention.

H5. Users' confirmation of expectations is positively related to their perceived usefulness of e-learning.

2.2. The technology acceptance model (TAM)

E-learning users need to see e-learning as a useful tool that can improve their learning efficiency, enabling them to better communicate with their teachers, friends, colleagues and others online. Moreover, e-learning users need feel that the system is easy to use. Both perceived usefulness and perceived ease of use are beliefs that, according to TRA, will affect a user's attitude. Thus, we posit that:

H6. Perceived usefulness is positively related to behavioral attitude toward e-learning.

H7. Perceived ease of use is positively related to behavioral attitude toward e-learning.

H8: Perceived ease of use is positively related to perceived usefulness of e-learning.

2.3. Theory of planned behavior (TPB)

Attitude (A) refers to "the degree of a person's favorable or unfavorable evaluation or appraisal of the behavior in question" (Fishbein. M 1975).

According to the TPB, attitude impacts users' behavioral intention, which in turn influences their actual behavior. When individuals form positive attitude towards e-learning, they will have a stronger intention toward adopting it, and thus they are more likely to use it. Recently, some studies have viewed users' continuance and acceptance decisions as the same as acceptance decisions (Hong 2006; Hsu 2006). Therefore, the following hypothesis is proposed.

H9: Behavioral attitude toward e-learning is positively related to the continued intention to use e-learning.

H10. Subjective norm is positively related to the continued intention to use e-learning.

H11. Perceived behavioral control is positively related to the continued intention to use e-learning.

2-4 Flow experience and user acceptance of e-learning

Flow experience is defined as "the holistic experience that people feel when they act with total involvement" (Csikszentmihalyi 1977; Hagel 1997). When people are in the flow state, they become absorbed in their activities and unable to recognize changes in their surroundings. Specially, they lose self-consciousness, concentrating only on their ongoing activity. This concept has been extensively applied in studies in a broad range of contexts, such as sports, shopping, and gaming (Csikszentmihalyi 1997).

Perceived enjoyment is defined as "the extent to which the activity of using a specific system is perceived to be enjoyable in it's own right, aside from any performance consequences resulting from system use" (Venkatesh 2000). Perceived enjoyment as an intrinsic motivation has been found to have a significant impact on a technology acceptance, especially for hedonic systems (Davis 1992; Koufaris 2002). We can thus expect that perceived enjoyment will improve their affective attitude toward e-learning and increase their acceptance intention. Thus, we propose that:

H12. Perceived enjoyment is positively related to the attitude toward e-learning.

H13. Perceived enjoyment is positively related to

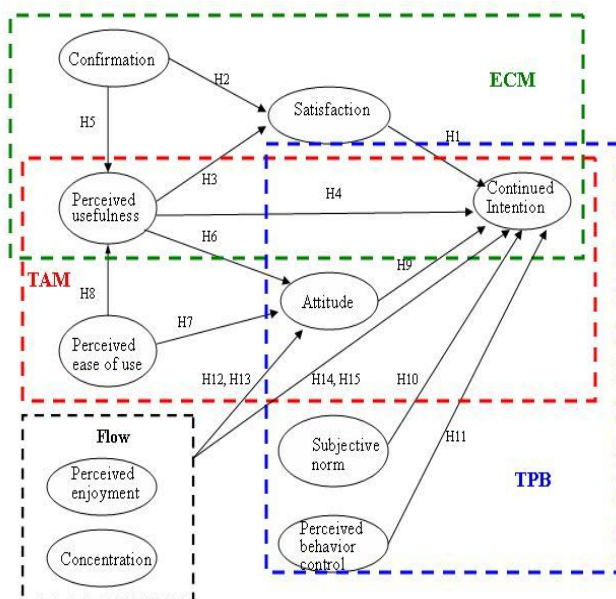
the behavioral intention to use e-learning.

Concentration is another important component of the flow experience. For users to be in a flow state, they must first concentrate on their activities (Koufaris 2002). Consequently, if users perform many tasks simultaneously and cannot focus on a limited field, they will not be able to acquire the flow experience. In contrast, e-learning users who focus their attention on learning or discussing on chat rooms should find it easier to be in a state of flow, which in turn will positively affect their attitude toward and promote their usage of e-learning. Thus, we posit that:

H14. Concentration is positively related to the behavioral attitude toward e-learning.

H15. Concentration is positively related to the behavioral intention to use e-learning.

Fig1, presents our research model and hypotheses



3. Research methodology

The scale items for perceived usefulness and perceived ease of use were adapted from Davis (Davis, Bagozzi et al. 1989), while the scale items for subjective norm, perceived behavioral control, and attitude were adapted from the Taylor and Todd (1995). In addition, the items measuring perceived enjoyment and concentration were

adapted from Moon & Kim (2001), and the continuance intention, satisfaction, confirmation were adapted from Bhattacharjee (2001). After the questionnaire was drafted, it was first sent to three academic experts on e-learning for their review, and then revised according to their comments and suggestions to make the wording of the items more precise.

The questionnaire was pilot-tested by convenient sampling. There were 150 responses, of which 123 were complete, giving a valid response rate of 82%, and the results of the pilot test were evaluated by using Cronbach's reliability and factor analysis. The reliability coefficient was first calculated for the items of each construct, and the standard lower bound for Cronbach's alpha set at 0.7 (Hair 1998), with items that did not significantly contribute to the reliability being eliminated. A factor analysis was then performed to examine whether the items produced the anticipated number of factors and whether the individual items were loaded on their appropriate factors. All items had high loadings on their related factors and low cross-loadings on other factors, showing good convergent and discriminate validities.

The sample for the study was taken from 12 class sections that were conducted using the e-learning service in the continuing education program of National Pingtung University in Taiwan.

4. Results

In analyzing the collected data, we followed the two-step procedure suggested by Anderson and Gerbing (1988). First, we examined the measurement model to measure convergent and discriminant validity. We then examined the structural model to investigate the strength and direction of the relationships among the theoretical constructs.

4.1 Analysis of the measurement model

The Cronbach's alpha scores indicated that each construct exhibited strong internal reliability, which all the standard factor loading (λ) values in confirmatory factor analysis of the measurement model exceeded 0.5 and were significant at

$p=0.001$. In addition, the composite reliabilities of constructs ranged from 0.81 to 0.93, and the AVE, ranging from 0.57 to 0.83, was greater than the variance due to measurement error. Therefore, all three conditions for convergent validity were met.

Discriminant validity assesses the extent to which a concept and its indicators differs from another concept and its indicators (Bagozzi 1991). The square root of the variance shared between the construct and its items was greater than the correlations between the construct and any other construct in the model, satisfying Fornell and Larckers' (1981) criteria for discriminant validity. All diagonal values exceeded the inter-construct correlations, and thus the results confirmed that our instrument had satisfactory construct validity.

4.2 Analysis of the structural model

We assessed the overall goodness of fit using the chi-square test. The chi-square test assesses the adequacy of a hypothesized model in terms of its ability to reflect the variance and covariance of the data. Due to its tendency to be sensitive to sample size, other fit indices (namely GFI, AGFI, CFI, NFI, and RFI) were considered in conjunction with the chi-square. For the statistical significance of parameter estimates, t values were used. The results of structural equation modeling obtained for the proposed conceptual model revealed a ratio of chi-square to the degree of freedom (χ^2 / df) of 2.04 ($p < 0.001$), goodness-of-fit index (GFI) of 0.91, adjusted goodness-of-fit index (AGFI) of 0.85, comparative fit index (CFI) of 0.95, normed fit index (NFI) of 0.95, relative fit index (RFI) of 0.94, and root mean square error of approximation (RMSEA) of 0.05. Generally, fit statistics greater than or equal to 0.9 for GFI, NFI, RFI, and CFI indicate a good model fit (Bagozzi 1991; Hair 1998). Furthermore, RMSEA values ranging from 0.05 to 0.08 are acceptable (Hair 1998), indicating that our model fit was acceptable. The other fit indices, except AGFI, indicated that our proposed model obtained an adequate model fit. The low AGFI values may have been due to the small sample size used.

4.3 Hypotheses testing

The fifteen hypotheses presented above were tested collectively using the structural equation

modeling (SEM) approach (Bagozzi 1991), also performed using AMOS 6. The path significance of each hypothesized association in the research model and variance explained (R^2 value) by each path were examined, and Fig. 2 and Table 2 show the standardized path coefficients and path significances. All fifteen hypothesized associations were strongly significant at $p < 0.05$, except for the two links between perceived enjoyment and continuance intention and between concentration and attitude. The continuance intention to use e-learning in this study was jointly predicted by satisfaction ($\beta = 0.518, p < 0.001$), perceived usefulness ($\beta = 0.208, p < 0.05$) attitude ($\beta = 0.164, p < 0.05$), concentration ($\beta = 0.11, p < 0.001$), perceived behavior control ($\beta = 0.103, p < 0.001$), and subjective norm ($\beta = 0.141, p < 0.05$) and these variables together explained 80% of the variance of intention to use ($R^2 = 0.80$, coefficient of determination). In addition to its direct effects, perceived usefulness also had a significant indirect effect on continuance intention ($\beta = 0.33, p < 0.05$) via the satisfaction and attitude constructs, explaining 18% of the variance in the dependent variables. Satisfaction, in turn, was predicted by confirmation ($\beta = 0.283, p < 0.001$) and perceived usefulness ($\beta = 0.586, p < 0.001$). Confirmation also had a small indirect effect ($\beta = 0.11, p < 0.05$) on satisfaction, via the perceived usefulness construct.

Attitude was predicted by perceived usefulness ($\beta = 0.183, p < 0.001$), PEOU ($\beta = 0.211, p < 0.01$), and perceived enjoyment, and together these variables explained 67% of the total variance. To further assess the significance of indirect effects of predictor variables on continuance intentions to use e-learning, a decomposition of the effects analysis was conducted. A discussion of these effects for e-learning continuance is presented in next Section.

5. Discussion

The results of this study provide support for the research model and for the hypotheses regarding the directional linkage among the model's variables. The overall explanatory power of our research

model had an R-square of 80% for continued intention to use e-learning and an R-square of 65% for satisfaction, and 65% for attitude toward continued intention, suggesting that the extended ECM model is capable of explaining a relatively high proportion of variation of continued intention to use e-learning. Several insightful results could be summarized from our research framework, and these are presented below.

5-1 Understanding associations between antecedent constructs and continuance intention

We have examined the effects of satisfaction, perceived usefulness, attitude, flow theory, subjective norm, and perceived behavioral control on the adoption and continuance intention of e-learning. The results of the study show that satisfaction is the strongest predictor of users' continuance intention, followed by perceived usefulness, attitude, concentration, and perceived behavioral control as significant but weaker predictors. The satisfaction-intention link has previously been validated in consumer behavior research over a wide range of product and service contexts (Bhattacharjee 2001; Bhattacharjee 2001; Lin 2005), and its revalidation in the e-learning context further attests to the robustness of this association. Further, satisfaction may be the key to explaining the e-learning acceptance-discontinuance anomaly (user discontinuance of e-learning after its initial acceptance), a little-understood phenomenon in the literature. Because satisfaction was the strongest predictor of continuance intention (explaining 43% of variance) relative to the other predictors (which jointly explained 33% of variance), users dissatisfied with e-learning may stop using it, despite having positive perceptions with regard to other elements. In other words, dissatisfaction is the necessary condition for e-learning discontinuance. In contrast, TAM, which predicts user intention based on perceived usefulness and attitude, cannot explain this anomaly satisfactorily, unless the determinants change from the pre-acceptance to post-acceptance phases.

Perceived usefulness was identified in this study as a secondary determinant of continuance intention. When this result is compared with

previous TAM-based studies of IS acceptance, some interesting patterns emerge. For example, perceived usefulness was a stronger predictor of acceptance intention in TAM than attitude (Davis, Bagozzi et al. 1989; Taylor 1995), while satisfaction was a stronger predictor of continuance intention in this study than perceived usefulness. Perceived usefulness is a cognitive belief, while attitude and satisfaction both reflect user affect (pre- and post-acceptance, respectively). Users' pre-acceptance attitude is based solely on cognitive beliefs (e.g., usefulness and ease of use) formed potentially via second-hand information from referent others, the media, advertising or other sources. These influence sources may be biased, and hence user attitude potentially may be inaccurate, unrealistic, and uncertain. In contrast, post-acceptance satisfaction is grounded in users' first-hand experience, and is therefore more realistic, unbiased, and less susceptible to change. The above findings imply that perceived usefulness is more closely related to acceptance intention, while satisfaction plays a more important role for continuance intention. Therefore, e-learning practitioners should adopt a two-fold strategy in order to increase the adoption and continued usage of e-learning: inform new (potential) users of the potential benefits of e-learning use, and educate old (continued) users on how to use e-learning effectively so as to maximize their confirmation and satisfaction with such methods.

While all the TAM and ECM variables are significant in this study, they implicitly assume that behavior is volitional. However, e-learning users face several new constraints, such as the impersonal nature of the online environment, certain necessary resources and skills (perceived behavioral control), and influence of the opinions of other important persons (subjective norms). These issues call for the inclusion of TPB in the e-learning adoption model, and both subjective norm and perceived behavioral control are verified as having a significant influence on continuance intention. This finding implies that when users find that people around them have adopted e-learning services, they will be more willing to use it. E-learning providers may use positive word-of-mouth strategy to enhance the awareness

of the e-learning and promote its benefits. They may need to consider how to bring positive experience to their existing customers to remain their future acceptance, rather than rely on mass media only (Bhattacharjee 2000)

5-2 Understanding associations between antecedent constructs

In this research, perceived usefulness was found to have the most significant effect on satisfaction, which suggests that a user's belief in usefulness is a decisive antecedent of her/his perception of satisfaction. In addition, confirmation was a significant predictor of satisfaction and perceived usefulness in the proposed model, and then it influences continuance intentions in two (indirect) ways: by influencing e-learner satisfaction toward the service and by impacting learners' perceptions of its usefulness.

Perceived enjoyment strongly affected the behavioral attitude (H12), while concentration had a significant influence on the continuance intention (H15). When users log into an e-learning platform, they not only want to learn the online course, but also communicate with others and enjoy themselves, and thus seeking a flow experience (Lee 2005). Therefore, perceived enjoyment, as a user's intrinsic motivation, is as important a consideration as perceived usefulness for e-learning providers. However, the results of this work showed that perceived enjoyment had no obvious effect on the continuance intention (H13), and concentration had no significant effect on the behavioral attitude (H14). Thus, users' attitude towards e-learning mediated the relationship between perceived enjoyment and their continued intention. The results found that concentration directly affected users' intention to continue with the e-learning service, and this may be if users can concentrate on such services then it is easier for them to obtain the flow experience. However, a user might not realize when concentrating on e-learning, and as a result it does not affect his/her conscious attitude. It is worth noting that the results of our study were different from those of Koufaris (2002). In his paper, Koufaris did not examine attitude, and found that perceived enjoyment, rather than concentration, significantly affected a user's

intention to return to a shopping website. The difference results may be attributed to the different technological contexts—online shopping compared to e-learning.

6. Implications

6-1 implications for Academics

In terms of theory building, this study attempts to develop a new theory by grounding a new variable in an integration of two schools of the nomological structure model (TRA) as well as a derivation of expectation disconfirmation theory (EDT) and applying them into a new context. It is important to note that the new variable, flow theory, is compatible with the TAM, TPB and ECM variables. This approach is likely to ensure a stable theory development. Hence, the proposed model makes an important contribution to the emerging literature on e-learning.

The present study has two implications for future e-learning research. First, the empirical results show that the unified model supports all the hypotheses and has good explanatory power, implying that the integration of ECM, TAM, and TPB provides a model with a theoretical basis to explain e-learning. This approach may provide an initial blueprint for the further integration of other theoretical acceptance models. For example, information technology (IT) research (Venkatesh 2003) has already yielded many competing models such as innovation diffusion theory (IDT), social cognitive theory (SCT), expectation disconfirmation theory (EDT) and theory of reasoned action (TRA), each with different sets of acceptance determinants. It is anticipated that this study may encourage other research that integrates these competing models into unified ones.

Second, while the results show that the factors in TAM, TPB and ECM all have significantly direct or indirect effects on continuance intention to use e-learning, satisfaction has the strongest effect. Since confirmation and expectations are critical antecedents to satisfaction, future research may explore what factors influence these variables and how they can be manipulated in order to improve eventual user experience with e-learning, and hence its subsequent continuance.

6-2 Implications for practitioners

Instructors and system designers should make full use of the rich multimedia capabilities of the Internet to better facilitate student understanding and memorization of the course material. Ultimately, students are more likely to adopt and continue to use e-learning if they find that such services can enhance their learning.

Instructors should make good use of playing-and-learning, quizzes, and other creative approaches to instill more fun and interest in the learning process. Csikszentmihalyi (1997) contended that the concept of flow captures the peak experiences of intrinsic motivation, and his experiments demonstrated that most flow experiences occurred most often when actively involved in challenging task, and thus this knowledge should be applied to use e-learning.

Furthermore, instructors can make use of online chat rooms and discussion boards to foster student collaboration and a sense of community. The more users there are in an e-learning class, the more user-generated experiences are likely to be exchanged, and the more new users the services will attract. The idea called a dynamic loop, was found by Hagel and Armstrong (1997) to yield increasing returns in a virtual community.

7. Conclusions

This study developed an integrated model to predict and explain an individual's continuance intention with regard to using an e-learning system, with the work based on the concepts of the ECM with TAM, TPB and flow theory. The measurement model indicated the theoretical constructs have adequate reliability and validity, while the structured equation model was confirmed as having a high model fit for the empirical data. The study's findings show that a user's behavioral intention towards e-learning system continuance is mainly determined by user satisfaction and additionally affected by perceived usefulness, attitude, concentration, subjective norm and perceived behavior control.

However, this study has several limitations. First, the work was conducted using a short-term snapshot of users' behavior, and additional research efforts with longitudinal studies would give a

clearer picture of how the users and the relationships among variables change over time. Second, because we collected the data for the independent and dependent variables from the same respondents, concerns about common method bias could arise (Woszczyński 2004), and we conducted Harmon's one-factor test (Podsakoff 2003) to assess the risk of this. We entered all the variables into a factor analysis. These factors emerged with the first factor, accounting for 23.4% of the variance in the variables. Because more than a single factor emerged from the factor analysis and no general factor accounted for the majority of the variance in those variables, we saw no evidence to suggest the presence of common method variance bias. Third, about 62% of the respondents were male in this empirical study, and thus the gender distribution was not symmetric between men and women. Therefore, the results of the current empirical study might tend to model the specific behavior of men, rather than general behavior of all users. Much evidence has shown that gender differences can cause discrepancies in the effects of satisfaction, perceived behavioral control, and subjective norm on a user's behavioral intention (Armitage 2002; Liao 2006). Other references also show that the effect of ease of use and perceived usefulness on behavioral intention can be moderated by gender difference (Gefen 1997). Accordingly, further research may be needed to examine the moderating effect of gender difference on the behavioral performance of an e-learning user.

Reference

1. Ajzen, I. (1991). "The Theory of Planned Behavior. ." Organizational Behavior and Human Decision Processes: 179-211.
2. Armitage, C. J., P. Norman, et al (2002). "Can the theory of planned behavior mediate the effects of age, gender and multidimensional health locus of control?" British Journal of Health Psychology 7: 299-316.
3. Bagozzi, R. P., Y. Yi, et al (1991). "Assessing Construct Validity in Organizational Research." Administrative Science Quarterly 36(3): 421-430.
4. Bearden, W. O. a. J. E. T. (1983). "Selected

- determinants of consumer satisfaction and complaint reports." Journal of Marketing Research 20(1): 21-28.
5. Bhattacharjee, A. (2000). "Acceptance of Internet applications services: the case of electronic brokerages." IEEE Transactions on Systems, Man, and Cybernetics --- Part A: Systems and Humans 30(4): 411-420.
 6. Bhattacharjee, A. (2001). "An empirical analysis of the antecedents of electronic commerce service continuance." Decision Support Systems 32(2): 201-214.
 7. Bhattacharjee, A. (2001). "Understanding information systems continuance: An expectation-confirmation model." MIS Quarterly 25(3): 351-370.
 8. Chiu, C.-M., S.-Y. Sun, et al. (2006). "An empirical analysis of the antecedents of web-based learning continuance." Computers & Education.
 9. Csikszentmihalyi, M. (1975). "Beyond Boredom and Anxiety." Jossey-Bass, San Francisco.
 10. Csikszentmihalyi, M. (1977). "Beyond Boredom and Anxiety." Jossey-Bass, San Francisco.
 11. Csikszentmihalyi, M. (1997). "Finding flow: the psychology of engagement with everyday life." New York: Basic Books.
 12. Davis, F. D., R. P. Bagozzi, et al. (1989). "User acceptance of computer technology: a comparison of two theoretical models." Management Science 35(8): 982-1003.
 13. Davis, F. D., R. P. Bagozzi, et al. (1992). "Extrinsic and intrinsic motivation to use computers in the workplace." Journal of Applied Social Psychology 22(14): 1111-1132.
 14. Fishbein, M, I. A. (1975). " Belief, attitude, intention, and behavior: An introduction to theory and research." MA: Addison-Wesley.
 15. Gefen, D. a. D. W. S. (1997). "Gender differences in the perception and use of email: An extension to the technology acceptance model." MIS Quarterly 21(4): 389-400.
 16. Hagel, J. a. G. A. A. (1997). "Net again: expanding markets through virtual communities." Boston, MA: Harvard Business School Press.
 17. Hair, J. F., R. E. Anderson, et al., Eds (1998). Multivariate Data Analysis, Upper Saddle River, NJ: Prentice-Hall.
 18. Hair, J. F., R. E. Anderson, et al., Eds (1998). Multivariate Data Analysis (5th ed.), Englewood Cliffs: Prentice Hall.
 19. Hoffman, D. a. T. N. (1996). "Marketing in hypermedia computermediated environments: conceptual foundations." Journal of Marketing 60: 50-68.
 20. Hong, S., J. Y. L. Thong, et al (2006). "Understanding continued information technology usage behavior: A comparison of three models in the context of mobile internet." Decision Support Systems 42(3): 1819-1834.
 21. Hsu, M. H., C. H. Yen, et al (2006). "A longitudinal investigation of continued online shopping behavior: An extension of the theory of planned behavior." International Journal Human-Computer Studies 64: 889-904.
 22. Koufaris, M. (2002). "Applying the technology acceptance model and flow theory to online consumer behavior." Information Systems Research 13(2): 205-223.
 23. Lee, M. K. O., M. K. Christy, et al (2005). "Acceptance of Internet-based learning medium: the role of extrinsic and intrinsic motivation." Information & Management 42(2): 1095-1104.
 24. Liao, C., J.-L. Chen, et al (2006). "Theory of planning behavior (TPB) and customer satisfaction in the continued use of e-service: An integrated model." Computers in Human Behavior
 25. Lin, C. S., S. Wu, et al (2005). "Integrating perceived playfulness into expectation-confirmation model for web portal context." Information & Management 42: 683-693.
 26. Oliver, R. L. (1993). " Cognitive, Affective, and Attribute Bases of the Satisfaction Response." The Journal of Consumer Research 20(3): 418-430.
 27. Podsakoff, P. M., S. B. MacKenzie, et al (2003). "Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies."

- Journal of Applied Psychology 88(5): 879-903.
28. Roca, J. C., C.-M. Chiu, et al (2006). "Understanding e-learning continuance intention: An extension of the Technology Acceptance Model." Human-Computer Studies 64: 683-696.
 29. Szymanski, D. M. a. D. H. H. (2001). "Customer satisfaction: a meta-analysis of the empirical evidence." Journal of the Academy of Marketing Science 29(1): 16-35.
 30. Taylor, S. a. P. A. T. (1995). "Understanding information technology usage: a test of competing models." Information Systems Research 6(2): 144-176.
 31. Venkatesh, V. (2000). "Determinants of perceived ease of use: integrating control, intrinsic motivation, and emotion into the technology acceptance model." Information Systems Research 11(4): 342-365.
 32. Venkatesh, V., M. G. Morris, et al (2003). "User acceptance of information technology: Toward a unified view." MIS Quarterly 27(3): 425-478.
 33. Woszczyński, A. B. a. M. E. W., Eds (2004). The problem of common method variance in IS research, The Handbook of Information Systems Research, Idea Group Inc., Hershey, PA, pp.66-77.
 34. Wu, I. L. a. J. L. C. (2005). "An extension of Trust and TAM model with TPB in the initial adoption of online tax: An empirical study." International Journal of Human-Computer Studies 62(6): 784-808.

Table 1: Correlation Matrices and Discriminant Validity

Construct	PU	PEOU	SN	PBC	A	COI	CON	SAT	PE	CONT
Perceived usefulness	0.81									
Perceived ease of use	0.53	0.79								
Subjective norm	0.42	0.32	0.81							
Perceived behavior control	0.34	0.34	0.35	0.82						
Attitude	0.65	0.51	0.54	0.39	0.83					
Continuance intention	0.59	0.55	0.67	0.51	0.62	0.88				
Confirmation	0.62	0.53	0.12	0.22	0.54	0.61	0.86			
Satisfaction	-0.51	-0.23	-0.20	-0.20	-0.58	-0.24	-0.23	0.787		
Perceived enjoyment	-0.33	-0.24	-0.43	-0.26	-0.62	-0.34	-0.21	0.02	0.81	
Concentration	-0.26	-0.34	-0.43	-0.38	-0.09	-0.15	-0.18	0.21	0.26	0.81

Note: All correlations significant at $p < 0.05$ except where noted. Diagonal elements are square roots of average variance extracted.

Table 2: Summary of hypotheses tests

	Hypotheses	β	p-value	Support
H1	satisfaction \rightarrow continuance intention	0.492	***	Yes
H2	confirmation \rightarrow satisfaction	0.273	***	Yes
H3	perceived usefulness \rightarrow satisfaction	0.543	***	Yes
H4	perceived usefulness \rightarrow continuance intention	0.193	***	Yes
H5	confirmation \rightarrow perceived usefulness	0.161	0.04*	Yes
H6	perceived usefulness \rightarrow attitude	0.163	***	Yes
H7	perceived ease of use \rightarrow attitude	0.171	***	Yes
H8	perceived ease of use \rightarrow perceived usefulness	0.221	***	Yes
H9	attitude \rightarrow continuance intention	0.154	0.02*	Yes
H10	subjective norm \rightarrow continuance intention	0.131	0.04*	Yes
H11	perceived behavior control \rightarrow intention	0.103	0.002**	Yes
H12	perceived enjoyment \rightarrow attitude	0.341	***	Yes
H13	perceived enjoyment \rightarrow continuance intention	0.02	0.43	No
H14	concentration \rightarrow attitude	0.07	0.22	No
H15	concentration \rightarrow continuance	0.111	***	Yes

a. Standardized estimates are shown.

b. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Fig 2 show the standardized path coefficients and path significances

