The Role of Social Presence and Moderating Role of Computer Self Efficacy in Predicting the Continuance Usage of E-Learning Systems

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ABSTRACT

The continuous growth of the electronic learning (e-learning) market has drawn a lot of discussion about the effectiveness of virtual learning environments (VLE). The initial emphasis of e-learning in the context of information technology skills training continues to be relevant. The success of an e-learning program in information technology (IT) may require users to be equipped with a certain degree of computer self-efficacy and affect for information systems. These factors may, in turn, influence the satisfaction level of online learners and their intention to continue using the e-learning system. Therefore, it is plausible that these factors may be as important as or more important than the design of an effective VLE in an IT context. This paper blends the Computer Self-Efficacy (CSE) and Expectation-Confirmation Models (ECM), and assesses their applicability on the intention of online learners who continue using the e-learning system as a vehicle to assimilate IT skills. Second, it theorizes the causal relationship of the factors of Perceived Usefulness, Confirmation, Satisfaction, and IS Continuance in the e-learning context. Finally, it assesses the relative importance of social presence in helping online learners to prevail over the online asynchronous environment. Our results indicate that, in the context of assimilating IT skills, there is not a significant relationship among the CSE of online learners, their perceived usefulness, confirmation, and satisfaction level. As a moderating factor, computer self-efficacy does not have significant influence on learning outcomes. For knowledge long transfer, social presence was shown to have an effect in different VLEs.

Keywords: Expectation-Confirmation Model (ECM), Computer Self-Efficacy (CSE), Perceived Usefulness, Confirmation, Satisfaction, IS Continuance Intention.

1. INTRODUCTION

International Data Corporation (IDC) estimated the world corporate e-learning market was $6.6 billion in year 2002 and will grow to nearly $24 billion by 2006 at a compound annual rate of 35.6%.

However, there are many main challenges to implementing e-learning systems. They include (1) the cost of developing and purchasing e-learning systems; (2) the time required to develop e-learning systems; (3) the need to be convinced of e-learning's effectiveness compared to other training models (Bloom, 2003). Building upon (3), a pedagogical interpretation of how can we use the technology effectively for teaching and learning is posited (Rossiter, 2003).

A pilot field survey was conducted with online users, who had used the online learning system http://www.blackboard.com in taking an introductory core MIS course for a undergraduate Business Administration degree, from September to December, 2002. Course materials with differential degree of social presence were designed to understand its potential impacts on our proposed theory.

A path analysis was conducted to test the proposed integrative model and to identify the constructs of the model and their relationships. Our integrative framework will be useful to an educational administrator or e-learning system provider exploring the ways to improve the retention rate of online users. The immediate findings of our field survey will also be useful for a researcher beginning to recognize the importance of computer efficacy and expectation and their contribution to the re-adoption of e-learning systems.

This article is organized as follows: In the next two sections, we proposed an integrative framework to predict the continuing use of e-learning system based on the literature reviews on the Technology Acceptance Model (TAM), ECM, CSE and End-User Computing (EUC) theories. We then test the integrative framework against hypotheses on the causal relationship among different constructs in three e-training environments. The article is concluded with the analysis and discussion of the results, the study limitations, implications for research and our conclusions.

2. LITERATURE REVIEW

2.1 Technology Acceptance Model
The Technology Acceptance Model (TAM) theory is useful to explain the usage behavior of Information Technology (IT) (Davis, 1989). The theory was built upon Fishbein and Ajzen's (1975) theory of reasoned action that asserts that

beliefs could influence attitudes, which lead to intention to use and finally actual usage behavior. Conceiving the causal relationship would help us understand the IT (including e-learning system) adoption behavior.

Davis (1989) asserted that perceived usefulness (PU) and perceived ease of use (PEOU) represent beliefs finally leading to the actual use of IT. Perceived usefulness is the degree to which a person believes that a particular system would enhance his or her job performance (i.e., by reducing the time to accomplish a task or providing timely information). Perceived ease of use is the degree to which a person believes that using a particular system would be free of effort (Davis, 1989). Two other constructs in TAM are attitude towards use and behavioural intention to use. Attitude towards use is the user's evaluation of the desirability of employing a particular information systems application. Behavioural intention to use is a measure of the likelihood a person will employ the application (Ajzen and Fishbein, 1980). The research has demonstrated that Computer Self-Efficacy (CSE) would also exert a significant influence on individuals' emotional reactions to using computers, as well as their actual computer use (Compeau and Higgins, 1995). Hence it is plausible that CSE may also have effects on the constructs of the ECM.

2.2 Expectation-Confirmation Theory
The Expectation-Confirmation Theory (ECT) is derived from marketing and asserts that consumers' intention to repurchase a product or service is significantly influenced by their prior experience with that product or service (Anderson and Sullivan 1993; Oliver 1980). Satisfactory experience is viewed as a key enabler for building and retaining a long-term consumer relationship. ECT is widely used in the customer behaviour literature to study consumer satisfaction (Anderson and Sullivan, 1993), post-purchase behaviour, such as repurchase (Dabholkar et al. 2000) and customer complaints (Oliver, 1980), and service marketing in general (Patterson et al. 1997; Tse and Wilton 1998). The predictive ability of this theory has been demonstrated over a wide range of product repurchase and service continuance contexts, including automobile repurchase (Oliver 1993), camcorder repurchase of photographic products (Dabholkar et al. 2000), restaurant service (Swan and Trawick 1981), and business professional services (Patterson, Johnson and Spreng, 1997).

Satisfaction was initially defined in the context of job performance as "a pleasurable or positive emotional state resulting from the appraisal of one's job (Locke 1976)." Oliver (1980) applied the concept to the consumption context and defined as "the summary psychological state resulting when the emotion surrounding disconfirmation expectations is coupled with the consumer's prior feelings

about the consumption experience." Both definitions underscore a psychological or affective state related to and resulting from a cognitive appraisal of the expectation-performance discrepancy (confirmation). Lower expectation and/or higher perceived performance may lead to a greater confirmation, which results in positive influences to customer satisfaction and continuance intention. Reversing the relationship would cause disconfirmation, dissatisfaction, and discontinuance intention. Hence, confirmation is inversely related to expectation and directly related to perceived performance. ECT also theorized expectation as another determinant of satisfaction, because expectation provides a baseline or reference level with which customers evaluate products and services. Customers with a high baseline level or expectation for a product or service are likely to have higher satisfaction levels after using it. On the contrary, customers with a low expectation for a product or service often have lower satisfaction levels after using it.

2.3 Expectation-Confirmation Model

Bhattacherjee (2001) suggests that the IS users' continuance decision is similar to consumers' repurchase decision because both decisions (1) follow an initial (acceptance or purchase) decision, (2) are influenced by the initial use (of IS or product) experience, and (3) can potentially lead to an ex post facto reversal of the initial decision.

Bhattacherjee (2001) developed the Expectation-Confirmation Model (ECM) by integrating the Expectation-Confirmation Theory (ECT) with the Technology Acceptance Model (TAM). This model is mainly derived from ECT, and the most significant difference is the use of pre-consumption and post-consumption.

The ECT holds that consumer's intention to repurchase a product or continue service use is determined primarily by satisfaction with prior use of that product or service (Anderson and Sullivan 1993; Oliver 1980, 1993). However, Bhattacherjee extended ECT to a different context in three ways. First, while ECT examines both pre-consumption and post-consumption variables (indicated by t1 and t2 respectively in ECT), the ECM focuses only on post-acceptance variables. The effects of any pre-acceptance variables are already captured within the confirmation and satisfaction constructs. Second, ECT only examines the effect of pre-consumption expectation, but not post-consumption expectation. The ECM amends ECT to include ex post facto expectation. Third, (ex post) expectation is represented in the proposed model by (ex post) perceived usefulness, because perceived usefulness is a cognitive belief salient to IS use (Davis et al. 1989). IS continuance intention is the belief that is demonstrated to consistently influence user intention across temporal stages of IS use (Davis et al. 1989; Karahanna et al. 1999). Bhattacherjee (2001) emphasized that the ECM is a post-acceptance model of IS Continuance.

Based on TAM-based studies, perceived usefulness is an adequate expectation in the IS continuance and often

imposes monetary and non-monetary costs on IS users. Hence, rational users most likely go through a non-trivial decision process, similar to that in ECT, prior to making an informed decision choice. However, in order to adapt ECT to a different context (i.e., IS continuance), several theoretical extensions may be required. Such extensions provide unique opportunities for theory refinement. Potentially they can explain IS continuance decisions better than the ECT alone.

2.4 Computer Self-Efficacy

Self-efficacy, the belief that one has the capability to perform a particular behaviour, is an important construct in social psychology. Self-efficacy perceptions have been found to influence decisions about what behaviours to undertake (Barling and Beattie., 1983; Betz and Hackett, 1981), the effort exerted and persistence in attempting those behaviours (Brown and Inouye, 1978), the emotional responses (including stress and anxiety) of the individual performing the behaviours (Bandura, 1977), and the actual performance attainments of the individual with respect to the behaviour (Barling et al., 1983; Locke and Latham, 1990; Wood and Bandura, 1989).

Several more recent studies (Burkhardt and Brass, 1990; Gist, et al., 1989; Hill, et al., 1978; Martocchio and Webster, 1992) have examined the relationships between self-efficacy with respect to using computers and a variety of computer behaviours. These studies found evidence of a relationship between self-efficacy and registration in computer course at universities (Hill, et al., 1987), adoption of high technology products (Hill, et al., 1986) and innovations (Burhardt et al., 1990), as well as performance in software training (Gist, et al., 1989; Martocchio, et al, 1992). All of the studies argue the need for further research to fully explore the role of self-efficacy in computer behavior.

Bandura (1986) defines self-efficacy as:

People's judgments of their capabilities to organize and execute courses of action required to attain designated types of performance. It is not with the skills one has but with judgments of what one can do with whatever skills one possesses (p.391).

This definition highlights a key aspect of the self-efficacy construct. Specifically, it indicates the importance of distinguishing between component skills and the ability to "organize and execute courses of action." Thus, in an IT usage context, internal control is conceptualized as computer self-efficacy which represents an individual's perceptions of his or her ability to use computers in the accomplishment of a task, rather than reflecting simple component skills.

Computer self-efficacy (CSE), then, refers to a judgment of one's capability to use a computer. It is not concerned with what one has done in the past, but rather with one's judgments of what could be done in the future. Moreover, it does not refer to simple component subskills, like formatting diskettes or entering formulas in a spreadsheet.

Rather, it incorporates judgments of the ability to apply those skills to broader tasks (Compeau and Higgins 1995).

Derived from the theory of self efficacy theory, CSE was found to exert a significant influence on individuals' expectations of the outcomes of using computers, their emotional reactions to computers (affect and anxiety), as well as their actual computer use. Thus, self-efficacy represents an important individual trait, which moderates organizational influences (such as encouragement and support) on an individual's decision to use computers (Compeau and Higgins 1995).

Compeau et al. (1995) suggest that individuals would use computers if they could see that there would be positive benefits (outcomes) associated with using them.

2.5 Training Approach in an OAL Environment

To assess the appropriateness of blending the TAM and ECM with the CSE construct, it is necessary to control the effects of training approaches and individual learning styles in an online asynchronous learning (OAL) environment. Particularly, it is prudent to control the effects of training methods available for the training content delivery. There exist a number of different training approaches including: Exploration-Based, Instruction-Based, and Behavioral-Based (Simon, Grover, Teng and Whitcomb, 1996; Bostrom, Olfman and Sein, 1990). These different training approaches have been found to effect individual outcomes depending on their learning style (Appendix I). To mitigate the compound effect of these extraneous factors, the study deliberately applied the Behavioral Modeling (BM) approach to the experimental study. BM has been found to be neutral to learning style and have little effect on outcomes in the F2F environment. Employing the approach teases out the potential interaction effect between training approach and learning style.

BM approach applied in an OAL environment may pose some challenges. Although the Behavioral Modeling approach in the online asynchronous environment retains some of the benefits established in the F2F environment (Appendix I), additional benefits may manifest itself such as higher visibility of peer pressure to learn via the posted messages of bulletin boards. This may result in a higher motivation to learn, thereby improving training outcomes. However, in the online asynchronous environment students may have trouble with the lack of modeling behavior from a live instructor in learning. One alternative to this challenge is to substitute scripted or videotaped lectures for the instructor's lectures. The interactive presence of the instructor was the key determinant for the success of the Behavioral Modeling approach in the F2F environment. The validity of the claim that using the video replacement for the instructor is the most effective training approach for trainees of all learning styles in the asynchronous environment may not be supported in an online environment and needs to be studied. Additionally, learning outcomes can be further degraded because the real-time reiterative communication process between instructor and students is lost.

There have been some studies which revealed a relationship between social presence and self efficacy. It was shown in that people with low computer self efficacy benefit most with higher social presence (Wang, Newlin, 2002). In the asynchronous e-learning environment, cyber-students who have low self efficacy performed better when they received virtual feedback and confirmation from other study partners. The high virtual social presence community increased learner satisfaction. But further investigation is needed in the area of social presence in online education environments (Richardson, Swan, 2003).

The evident dissimilarity of the BM approach in online and offline environments indicate the importance of controlling the extraneous influence of social presence factor. We therefore devise three forms of BM approach with differential social presence – face-to-face or FBM (high social presence), video-taped or VBM (medium social presence), and scripted-based or SBM (low social presence). The design will garner higher generalizability for the study.

3. RESEARCH MODEL

ECT states user satisfaction is defined by two variables: expectation of the Information Systems and Confirmation of the Expectation

Expectation is the personal inherent foundation level in which confirmation is evaluated by users to determine the level of satisfaction. The theory defines Confirmation as positively associated with satisfaction when using information systems if the expected realized benefits of IS occurs. Vice versa, if the level of satisfaction realized is below the expected prerequisite foundation level, the user may perceive the net benefits of using the IS as unsatisfactory.

Our research purpose is to test and verify the constructs of ECM in different virtual learning environments. In addition, our research introduces a Computer Self-Efficacy (CSE) construct into ECM, and explores the relationship between CSE and other constructs of ECM.

We propose an integrated theoretical framework which blends CSE and ECM theories and to test their validity and applicability in the VLE based on eight hypotheses (Figure 1).

3.1 Hypotheses

Prior to using the e-learning system, if the user had a lower baseline expectation level and/or received better performance results using the e-learning system, the effect is higher confirmation. Higher confirmation causes higher satisfaction and improved IS continuance.
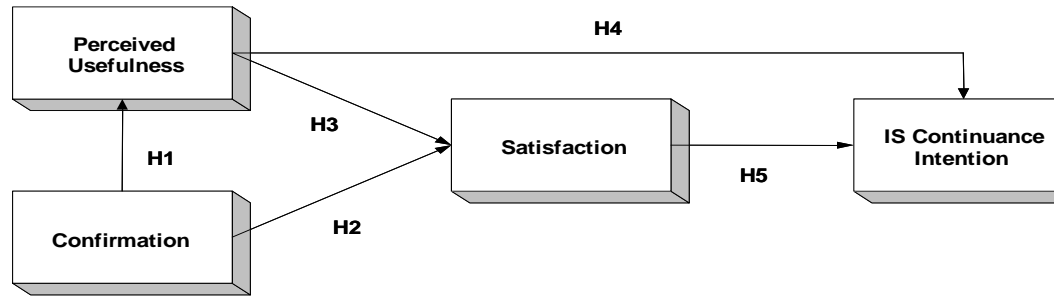
Figure 1: A Framework for Predicting Continuance in the Usage of E-Learning Systems for Assimilating IT Skills (note: for H6 and H7, Computer Self Efficacy is serving as a moderating variable)

Similar to the causality relationship between perceived ease of use, perceived usefulness and actual use (Davis et al. 1989), the expectation confirmation theory's confirmation construct may also be related (Bhattacherjee 2001) to perceived usefulness.

Although the users may have low perceived usefulness of the technology, there still may be a desire to use the information system. E-learning users may have varying confirmation experiences and satisfaction levels in different VLEs. The logic that the positive correlation between confirmation and perceived usefulness exists may still hold. Therefore, we argue that the better confirmation experience e-learning users have, the higher their perceived usefulness of e-learning system. The hypothesis should be supported in VLEs with different degrees of social presence.

H1: Confirmation vs. Perceived Usefulness
H1a: Tthe stronger the end users' extent of confirmation, the higher their perceived usefulness for a low social presence learning system in a VLE.

H1b: The stronger the end users' extent of confirmation, the higher their perceived usefulness for a medium social presence learning system in a VLE.

H1c: The stronger end users' extent of confirmation, the higher their perceived usefulness for a high social presence learning system in a VLE.

As the users continue using the information systems with improved results, the confirmation of better than expected results can influence the perceived usefulness in a positive fashion. On the other hand, if the use of the e-learning system generates worse results, the disconfirmation will negatively affect the pre-established perceived usefulness. Thus, the hypothesis proposed is as follows:

H2: Confirmation vs. Satisfaction
H2a: The higher extent of confirmation end users have, the higher their satisfaction with a low social presence learning system in a VLE.

H2b: The higher extent of confirmation end users have, the higher their satisfaction with a medium social presence learning system in a VLE.

H2c: The higher extent of confirmation end users have, the higher their satisfaction with a high social presence learning system in a VLE.

Perceived usefulness and perceived ease of use are essential factors influencing IS usage and satisfaction. (Davis et al. 1989; Mathieson 1991; Taylor and Todd 1995) Although the perceived usefulness factor was considered more influential than perceived ease of use (Davis et al. 1989), both constructs effect perceived usage and actual use. Perceived usefulness and ease of use are the main factors in IS acceptance and satisfaction. As a consequence, IS acceptance and satisfaction effect IS continuance intention. A number of longitudinal studies show that usefulness impacts attitude at a high degree during both stages of IS use (pre and post) while perceived ease of use has a variable effect on attitude (Davis et al. 1989; Karahanna et al. 1999). Thus, with perceived usefulness influencing satisfaction more than perceived ease of use, it is used in the following hypothesis:

H3: Perceived Usefulness vs. Satisfaction
H3a: The higher perceived usefulness end users have, the higher their satisfaction with a low social presence learning system in a VLE.

H3b: The higher perceived usefulness end users have, the higher their satisfaction with a medium social presence learning system in a VLE.

H3c: The higher perceived usefulness end users have, the higher their satisfaction with a high social presence learning system in a VLE.

Davis et al. (1989) describes perceived usefulness as the primary factor in predicting intention to use. If the user physically uses the system based on some type of motivation (e.g., rewards, improved productivity), the user may want to continue using the system. Thus, actual continued use can be considered a motivator to increasing perceived usefulness. IS continuance intention can then be related to perceived usefulness resulting in the following hypothesis:

H4: Continuance Intention vs. Perceived Usefulness
H4a: The higher the continuance intention end users have, the higher their perceived usefulness of a low social presence learning system in a VLE.

H4b: The higher the continuance intention end users have, the higher their perceived usefulness of a medium social presence learning system in a VLE.

H4c: The higher the continuance intention end users have, the higher their perceived usefulness of a high social presence learning system in a VLE.

Expectation Confirmation theory states that IS continuance intention is positively correlated with satisfaction. A number of research studies on IS satisfaction indicate that IS satisfaction directly effects intention to use and actual use (Davis et al. 1989; Karahanna et al. 1999; Taylor and Todd 1995). Thus, the relationship between satisfaction and IS continuance intention can be tested via the following hypothesis:

H5: Satisfaction vs. Continuance Intention
H5a: The higher the satisfaction level with initial use end users have, the higher their continuance intention is using a low social presence learning system in a VLE.

H5b: The higher the satisfaction level with initial use end users have, the higher their continuance intention is using a medium social presence learning system in a VLE.

H5c: The higher the satisfaction level with initial use end users have, the higher their continuance intention is using a high social presence learning system in a VLE.

Self-efficacy perceptions are predicted to be a significant precursor to computer use. This hypothesis is supported by research regarding computer use (Burkhardt and Brass 1990; Hill et al. 1987) and research in a variety of other domains (Bandura et al. 1977; Betz and Hackett 1981; Frayne and Latham 1987). While self-efficacy has not been explicitly measured in other IS research, there is some evidence to support the influence of self-efficacy. Maish (1979) included a variables that measured the extent to which the user felt ready to use the new system. This variable is conceptually quite similar to self-efficacy and was found to be related to the degree of use. Similarly, the

"willingness to change" construct measured by Barki and Huff (1985), which in part reflects self-efficacy, was found to be related to use of a decision support system. This leads to the sixth hypothesis:

H6: Computer Self-Efficacy vs. Actual Use
H6a: The higher end users' computer self-efficacy, the higher their actual use using a low social presence learning system in a VLE.

H6b: The higher end users' computer self-efficacy, the higher their actual use using a medium social presence learning system in a VLE.

H6c: The higher end users' computer self-efficacy, the higher their actual use using a high social presence learning system in a VLE.

Self-efficacy judgments are held to have a substantial influence on the emotional responses of the individual. Individuals will tend to prefer and enjoy behaviour they feel capable of performing and dislike those they do not feel they can successfully master. Several studies in psychology provide support for this contention. One found that self-efficacy perceptions were significantly related to affect (or interest) for particular occupations (Betz and Hackett 1981). There is experimental evidence supporting the causal flow from computer self efficacy to system-specific perceived ease of use, but Social Cognitive Theory affords a prominent role to self-efficacy perceptions. Self-efficacy judgments are purported to influence outcomes expectations since "the outcomes one expects derive largely from judgments as to how well one can execute the requisite behaviour" (Bandura 1978). And based on the TAM, perceived usefulness is also affected by external variables such as computer self-efficacy (Venkatech and Davis 1996).

The group with high computer self-efficacy may have higher perceived usefulness of e-learning systems in different delivery formats. They may consider the offering of an e-learning system as a challenge to their computer-related skills. Therefore, this group should be affected more by e-learning systems than the group of low computer self-efficacy. Due to the constraints of asynchronous e-learning systems, the group of high computer self-efficacy may also experience some difficulty using the e-learning systems. Their experiences may therefore cause lower satisfaction. Thus, the motivation to continue using e-learning systems is reduced. On the other hand, the group with low computer self-efficacy have lower expectation about the usefulness of e-learning systems. Therefore, satisfaction is less influenced by the confirmation experience of using systems. Hence, the intention to continue using e-learning systems is reserved. This leads to the seventh hypothesis:

H7: Computer Self-Efficacy as a Moderating Factor among Perceived Usefulness, Satisfaction, and Continuance Intention
H7a: The group with high computer self-efficacy have higher perceived usefulness of e-learning systems, but a lower satisfaction level after using them.

H7b: The group with low computer self-efficacy have lower perceived usefulness of e-learning systems, but a higher satisfaction level after using them.

3.2 Research Design
The experiment was conducted in a field setting that enabled the study to garner greater external validity than would be the case with a laboratory experiment. A field experiment methodology has the merits of "testing theory" and "obtaining answers to practical questions" (Kerlinger, 2000, p.583). The exploratory nature of the study requires that variables (e.g., learning style, training methods and subject areas of study) under investigation be manipulated.

The setting for the field experiment was two accredited universities: California State University at Northridge and Loyola Marymount University. The experiment was motivated by the need of 110 college undergraduate Business majors to learn Microsoft Access. Participants filled out a questionnaire regarding their experiences of using Microsoft Access and other database applications. This survey was used to check the effects of computer literacy and experience on the findings, thereby improving the internal validity of the study. To control the exposure time of subjects to the e-learning system and training duration, subjects were evaluated immediately after the thirty-minute training session. These subjects completed another post-test questionnaire regarding their affect and confirmation of the e-learning system. Validated research instruments were used to test the constructs (Table 1, Appendix).

Perceived usefulness items were adapted from Davis et al. (1989) six-item perceived usefulness scale. We modified it and used seven-point Likert type, and summed up the score from six to forty two. The higher score means the perceived usefulness of an individual is much stronger.

Confirmation items are operationalized in the ECT literature in three ways: objective, inferred, and perceived. And we adapted Bhattacherjeer's (2001) three-item confirmation and the scale is from one to seven, very disagreed to very agreed, respectively.

Satisfaction was measured using Spreng and Olshaysky's (1996) overall satisfaction scale from the ECT literature, originally designed to assess users' satisfaction with camcorder use. This scale captured respondents' satisfaction levels along seven-point scales anchored between four semantic differential adjective pairs: "very dissatisfied/very satisfied," "very displeased/very pleased," "very frustrated/very contented," and "absolutely terrible/absolutely delighted." This scale was appropriate because affect such as satisfaction is best measured along bipolar evaluative dimensions (e.g., good/bad) (Ajzen and Fishbein 1977). Further, this semantic differential technique distinguished the satisfaction scale clearly from other constructs that used Likert scales. Prior satisfaction instruments from the IS literatures, such as Doll and Torkzadeh's (1988) end-user computing satisfaction scale

or Ives, Olson and Baroudi's (1983) user information satisfaction scale, were not employed.

IS continuance intention was measured using three items adapted from Bhattacherjee (2001). The two initial items measured respondents' intention to continue e-learning as opposed to discontinuing it or using any alternate method, such as traditional learning environments. The third item assessed respondents' overall discontinuance intention (worded negatively to control for potential common-method bias).

Computer Self-Efficacy (CSE) was measured by the ten-item instrument developed by Compeau and Higgins (1995). The respondents' have to answer "yes" or "no" first, if yes, then they choose the confidence degree from one to ten. Otherwise, the confidence degree will be zero. Bandura's (1986) theory of self-efficacy and Schunk's (1991) model of classroom learning guided the development of the Computer Self-Efficacy Scale.

4. DATA ANALYSIS RESULTS

4.1 Validation of Theoretical Model Fit
Confirmatory factor analysis (CFA) was used to test collectively the formulated hypotheses. Doll, Xia and Torkzadeh (1994) recommended the approach be used when a study involves "the specification and estimation of one or more putative models of factor structure, each of which proposes a set of latent variables (factors) to account for covariances among a set of observed variables" (p.453). CFA is often used when a study grounds on theoretically justified models (Armstrong, 1967). The study is to extend the expectation confirmation model (ECM) of Bhattacherjee to the constructs of online asynchronous software training. The exploratory nature of CFA allows us to introduce an additional construct and examine its relationship with other theoretically established factors. The maximum likelihood approach is used to estimate the degree of correlation among five factors of the theoretical construct. An initial check of overall goodness-of-fit of the theoretical model is conducted using Bartlett's Test of Sphericity ($\chi 2$=257.52; df=10). The indicator $\chi 2$/df is 0.00 (p<0.01) and is much less than five (Bentler, 1989). This suggests the CSF model has a good fit and further investigation is encouraged.

The communality estimate of computer self-efficacy factor is greater than 1.0. There are two plausible explanations for the finding. First, it may not be relevant to integrate the factor into the existing ECM. Second, treatments of the study may compound the model and cause its inability to capture the importance of the CFA model. In addition, the indicator factor loading (λ) of IS Continuance Intention is not greater than 0.7 even though the factor shows its significant correlation with the other three factors of the existing ECM. Experimental treatments may have a certain degree of influence to the goodness-of-fit of the theoretical model. The initial analysis suggested that a further analysis on the goodness-of-fit of integrating ECM into the CFA model be conducted with three data sets collected from

different treatments (low, medium and high social presence course contents).

To validate the finding, the data set was reorganized for another round of CFA testing based on its treatments (low, medium and high social presence). The sample size for each treatment is 39 (low social presence), 27 (medium social presence) and 44 (high social presence). Three indicator factor loadings (λ) were generated for each experiment: low social presence ($\chi2$=100.32; df=10); medium social presence ($\chi2$=79.296; df=10); high social presence ($\chi2$=71.25; df=10). The indicator$\chi2$/df of all three treatments is 0.00 (p<0.01) and much less than five (Bentler, 1989). This comparison provides the evidence that the theoretical model is an adequate fit in all three online environments.

5. DISCUSSION AND RESULTS

Hypotheses were further tested against the linkage of the five constructs under three online training environments with differential degrees of social presence (Figure 2, 3 and 4, Appendix). Variables are standardized for discussion purposes (Table 1). Table 2 shows the mean and variance of each factor in three VLEs. Three tables (Table 3, 4 and 5, Appendix) show the path significance of each hypothesized association of the theoretical model in different online learning environments. The variance (R^2 value) of each path is also examined to understand the differential effects of factors (Figure 2, 3 and 4, Appendix). All hypothesized paths of ECM in the extended model were significant at p <0.01. The finding is consistent across three different learning environments. This finding supports the first explanation made in the initial test of the overall theoretical model. Therefore, it is necessary to take the ECM factors into consideration in order to improve the intention of end users to continue using e-learning system to assimilate IT skills.

All paths of the model sustain their significant association as identified in ECM. An interesting finding is that the differential degree of social presence did not show the impacts on cognitive perception of end-users to adopt e-learning system to assimilate IT skills. This pattern eliminates the possibility that social presence is a strong indicator for the intention of continuance of use and other cognitive indicators. However, the study has provided stronger evidence to support the adequate fit of the ECM. The model can relatively represents end-user satisfaction and continuance intention of using e-learning system to assimilate IT skills.

5.1 Low Social Presence
The R^2 value of Intention to continue e-learning is significant at F=0.001. IS Continuance Intention (ICI) can be directly predicted by PU (β=-0.134) and S (β=0.705). These three variables accounts for 40% and 62% ICI variance, respectively.

Perceived usefulness (β=-0.322) and confirmation (β=-0.693) explained 73% and 88% satisfaction variance, respectively. There is a 61% of satisfaction variance that resulted from the indirect effect of confirmation on perceived usefulness. Thus, Hypotheses 1a to 5a are supported.
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5.2 Medium Social Presence
Intention to continue IS use was predicted by perceived usefulness (β=-0.396) and satisfaction (β=-0.231), which explained 59% and 57% of the continuance intention variance respectively. Perceived usefulness (β=0.436) and confirmation (β=0.527) explained 86% and 87% satisfaction variance, respectively. All these variances did not differ significantly from our findings at the low social presence setting. However, there is 81% of satisfaction variance that resulted from the indirect effect of confirmation on perceived usefulness. The indirect effect has been improved by 20%, which may be caused by the social presence factor. The above discussion supported Hypotheses 1b through 5b.

5.3 High Social Presence
Intention to continue e-learning use was predicted by perceived usefulness (β=0.686) and satisfaction (β=-0.397), which explained 40% and 8% of the continuance intention variance respectively. Satisfaction lost its explanatory power for the variance in IS continuance intention. The finding is encouraging for instructor who would like to utilize e-learning systems to motivate trainees to assimilate IT skills. Given the same degree of perceived usefulness, confirmation and satisfaction for software training in online and off-line modes, online training in high social presence could better improve trainee's continuance intention. Hypothesis 4 was supported, but not Hypothesis 5. Perceived usefulness and confirmation explained 70% and 66% satisfaction variance, respectively. Confirmation factor lost 22% of its explanatory power for the variance in satisfaction factor. This indicates that e-training sessions, regardless of social presence difference, could provide end-users with higher satisfaction levels, thereby improving the continuance intention of using e-learning systems to assimilate IT skills. There is a 61% satisfaction variance that resulted from the indirect effect of confirmation on perceived usefulness. This indicator is relatively the same across three training sessions.

5.4 High vs. Low Computer Self-Efficacy
The collected data (n=110) was divided into two groups based on their mean value of computer self-efficacy (CSE) indicator, 6.7. The group of students who scored less than or equal to the mean value are categorized as the group of low CSE or LCSE (n=47). Otherwise, students are categorized as high CSE or HCSE (n=53). Further analyses of these groups indicate that computer self-efficacy is a potential moderating factor for the ECM model. However, the results of the study are not strongly conclusive.

For the low CSE or LCSE group, intention to continue e-learning use was predicted by perceived usefulness

(β=0.770) and satisfaction (β=-0.904), which explained 55% and 47% of the continuance intention variance respectively. However, the indicators for the strength of the correlation drop in the group of HCSE. Intention to continue e-learning use was predicted by perceived usefulness (β=0.569) and satisfaction (β=0.796), which explained 52% and 46% of the continuance intention variance respectively. Since experience and other confounding factors have been properly controlled, the cause for lower degree of correlation among CSE factors may be due to the HCSE of trainees. To reduce the influence of CSE to the intention of continuance usage, it may be important to improve course content and utilize different online learning environments.

The CSE construct continued to account for very little of the variance in perceived usefulness (10%), satisfaction (14%), and continuance intention (-1%) of using online training to assimilate IT skills. Hypotheses 6c to 8c could not be supported.

6. LIMITATIONS

Course materials of VBM and SBM were delivered to students through a projector. Technical barriers for students to take advantage of higher levels of learner control and flexibility available in online asynchronous environment seems to be an issue that leads to insignificant differences in end-user satisfaction between VBM and SBM. Most answers towards the open-ended question, "What are missing from or needed to be added to the online training session?" centered on the control issue. One student commented that "sometimes there was confusion and the training went on further and caused some confusion." Another participant stated that the need for "the ability to stop and go back, just in case you missed something." Another way of expressing the lower control level of the course materials includes the control of audio quality and learning pace. Students with varying degree of experience and knowledge in database applications expressed dissatisfaction with the play speed of course materials and the frequency of repetition of some of the basic commands. For instance, one student stated that "maybe the sound could be better and a little bit slower pace." While another students suggested that "background noise should be omitted – they were distracting"; "long pauses should be omitted"; and "it may not have been necessary to instruct the users on how to drag and drop when creating the queries (at least not more than once)."

Although the study was not designed to have replay/forward/backward functions, the degree of control seems to be an issue that relevant. Given there was no difference on the end-user satisfaction and knowledge near-transfer, we were not able to determine whether the control or social presence is a more influential factor. Despite these limitations, we can confidently conclude that the control factor is a less important issue than the social presence factor to the effectiveness of far knowledge transfer.

Subjects of the study taking VBM and SBM were given no control of the replay/forward/backward functions, yet we can clearly identify the different impacts of social presence on the measure of far-knowledge transfer. This evidence points out the possibility that the control factor may have impact on the end-user satisfaction and knowledge near-transfer. The study could not testify or quantify the possibility because we could not overcome technical barriers of having the replay/forward/backward functions enabled for all trainees in the first place. This explains why we used the open-ended questions to measure participants' opinions about the potential value of such functions. Additionally, the control element of social presence is also measured using a survey. Our findings indicate that the three modes of BM training do provide a satisfactory level of control. In future studies, to measure end-user satisfaction and near knowledge transfer, the degree of control may need to be manipulated to directly investigate its relative impacts.

Another limitation is the existence of potential flaws in the recording quality and speed. Although we conducted a survey to measure the realism factor of VBM and SBM, no significant impacts on the three dependent variables can be identified. This may result from the varying perceptions of audio and video quality, pace, etc. among all participants. A better instrument to measure these perceptions should be used to serve as covariates for further analysis.

The failure to equalize the cell size of the three treatments requires the assumptions of MANOVA and ANOVA be complied with in order to improve the study's reliability. Most of their assumptions were met except that the independent observations and equal variance-covariance were somewhat compromised. Participants receiving FBM treatment are students from Loyola Marymount University, Los Angeles. The other participants, students from California State University, Northridge, received VBM and SBM treatments. The former is a private university while the latter is a state university. Trainees' demographical background may pose a potential threat to the assumption of the independent observations. Additionally, the assumption of equal variance-covariance may also be endangered. The correlation test indicates that students' self-reported GPA, class year, and frequency of using database application positively correlate with learning outcomes. Interpreting our findings may require the consideration of the correlation effect.

In addition to the potential threats of internal validity, the experimental study is also constrained with the generalizability of its findings to the assimilation of conceptual knowledge. However, we do not believe that this is an issue because the study was principally rooted in the end-user computing field and had a clear objective of improving the learning effectiveness of IT skills, that is, primarily procedural knowledge. Still, researchers can make the generalizaibility of our findings a less debatable issue by replicating the study with different applications or with different research methodologies.

7. CONCLUSION

While the importance of a learning strategy and the degree of student control may continue to prevail, the design of course materials with higher social presence elements may not need to be properly incorporated in the online asynchronous environment. End-user intention to continue using e-learning system depends greatly on the gap between expectation and post-use experience. The narrower the gap, the higher the satisfaction level end users have with e-training systems, regardless of its social presence elements. Considered as an important element for the adoption of information systems in general, computer self-efficacy seems to be a less salient factor to improve end-user satisfaction with e-learning systems. The factor may also not directly affect end-user intention to continue using e-learning system.

Neither computer self-efficacy nor social presence may have an effect on the intention of end-users to continue using e-learning systems to assimilate IT skills. Online trainers may want to increase the gap between e-trainers' expectation of e-learning systems and their actual experience. For instance, e-trainer may want to point out the weaknesses of e-training systems to students before the e-learning is conducted. This can lower trainees' expectations. In the meantime, e-trainer needs to focus on the clarity of their course materials and combine the application-based and instruction-based approach to improve end-user satisfaction levels and actual performance, which help improve the satisfaction levels of actual using experience.

Improving satisfaction levels can lead users into using e-learning systems more often. Consequently, learning outcomes that include satisfaction and performance can be improved. Satisfaction and learning outcomes tend to be positively correlated. This corresponds to one of three effective training strategies – mapping via usage -- in the field of information technology (Bostrom, Olfman and Sein, 1990).

A salient fact is that conducting online asynchronous software training is much more complex than the choice between hybrid and pure BM modes. When faced with a more complex learning environment (e.g. subjects with varying cultural and educational backgrounds, IT skills, cognitive ability, and learning platforms) (Piccoli et al., 2001), control, interaction, and other factors may have more influential impacts than social presence factors on the learning outcomes. The investigation of those factors not within the scope of this study may need to be performed.

As important as, or more important than the social presence factor, the degree of control may enhance or relegate the learning outcomes of trainees. Too much control by a trainer may risk devaluing the merits of a personalized and flexible learning experience. Without a certain degree of control by a trainer, students may risk over-exercising the merits of a flexible learning experience which may lead to distraction and degraded learning productivity. How to balance the degree of control relegated to trainees and based on what factors may need to be researched.

Our findings also indicate that personal attributes (e.g. experiences with targeted software and intelligence level) correlated with learning outcomes. However, self-perceived efficacy in computing may be a barrier to adopting e-learning systems. It may be necessary to make trainees take a test or provide a lesson before participating in an e-learning session. This can provide e-training instructors with information about each trainee's real capability to use an e-learning system. More importantly, based on the information or training instructors can help trainees properly evaluate their true capability of adopting an e-learning system.

Some students complained that learning materials were not customized for them. Their answers are either "too fast," or "too slow" for certain commands, such as "how to drag and drop when creating the queries." Future research may want to focus on the capability of online asynchronous training session to present alternatives for trainees with varying personal backgrounds. For instance, a trainer may want to distribute to trainees a package of learning materials with differential control levels. The package may includes three modes of BM approach in VCD format (e.g., .avi file), or video stream formats for few popular applications (Realplayer, Windows Media Player and QuickTime). This technological design would allow us to closely examine the importance of control factor.

The human dimension is far more challenging to a trainer in a pure online asynchronous environment where in-class interaction never takes place. A wide variety of individual characteristics may lead to the incapability of any trainer to individualize programs for all trainees. This leads to inefficiency of producing online course materials, and ineffectiveness in satisfying end-users. The friction between users' desire for learning flexibility and trainer's scarce resource is "the biggest challenge in online learning" (Cameron, Beam and Beam 2000, p.101). Nonetheless, future research may be able to cope with the challenges by examining the impacts of cognitive styles on the effectiveness of different online asynchronous functions. For instance, researchers who are interested in the Discussion Forums function may want to investigate the usefulness of forming forums based on leadership, learning or creativity styles.

Trainees with different creativity styles may be receptive to different tasks (Fellers and Bostrom, 1993). Online asynchronous platforms could be a fertile "Press" or environment that can be used to support both explorative and generative tasks. Since the learner-centered environment improves the accessibility and availability of information are domain experts (instructors and knowledgeable classmates), it is possible that the production of creativity could be more efficient than the traditional F2F environment (Csikszentmyhalyi, 1990).

However, whether the OAL is suitable for any particular creativity style remains an open question.

In conclusion, the study attained its objectives by clearly confirming the robustness of expectation confirmation theory in the e-training field. The study also refutes our hypothesis that it is necessary to integrate computer self-efficacy into the ECM theory. Most interestingly, we disproved the existence of salient effects of social presence factor in conducting e-training session. Course materials in higher social presence do not necessary improve end users' using experience. It may be other control factors that need to play more important roles. In short, the study extends the generalizability of ECM models while it raises research questions that need to be addressed in order to better understand the e-training programs.

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APPENDIX

Table 1. Acronyms of Theoretical Constructs			
Construct Factors	**Operational Definition**	**Acronym**	**Instrument**
IS continuance intention	Online learners' intention to continue using e-learning systems to assimilate IT skills	ICI	Mathieson's (1991) behavioural intention
Satisfaction	Online learners' affect with the experimental e-learning experience	S	Spreng et al.'s (1996) overall satisfaction
Perceived usefulness	Online learners' perception of the expected benefits of using e-learning systems to assimilate IT skills	PU	Davis et al.'s (1989) perceived usefulness.
Confirmation	Online learners' perception of the congruence between expectation of e-learning systems and its actual performance	C	Bhattacherjee's (2002) Confirmation Scale
Moderating Factors			
Low social presence	Online course materials delivered in scripted approach	LSP	None
Medium social presence	Online course materials delivered in video-taped approach	MSP	None
High social presence	Online course materials delivered in face-to-face approach	HSP	None
High Computer Self-Efficacy	Online learners' confidence of using e-learning systems to assimilate IT skills	HCSE	Compeau and Higgins' (1995) computer self-efficacy (HCSE <=6.7 mean value)
Low Computer Self-Efficacy	Online learners' confidence of using e-learning systems to assimilate IT skills	LCSE	Compeau and Higgins' (1995) computer self-efficacy (HCSE > 6.7 mean value)
Behavioural Modeling Approaches			
Scripted Behaviour Modeling	A training approach that utilizes the Hypercam application and combines general concept with a procedural training session	SBM	New course content developed
Videotaped Behavioural Modeling	Videotape is adopted to deliver the image of a live instructor and his/her voice to trainees in the online asynchronous environment.	VBM	New course content developed
Face-to-Face Behavioural Modeling	A regular instructor conducts class on site	FBM	New course content developed

Table 2. Means and Standard Deviations of Factors					
Theoretical Factors	**FBM (44)**		**VBM (27)**		**SBM (42)**
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
CSE	6.95	2.09	7.45	1.51	6.54	1.40
ICI	4.36	0.64	3.54	0.75	4.01	0.67
PU	5.46	1.16	4.10	1.40	4.53	1.31
S	5.12	1.34	4.21	1.39	4.51	1.38
C	4.83	1.03	4.22	1.14	4.34	1.33

Table 3. Factor Analysis of Research Model Low Social Presence (Asynchronously Scripted Approach)				
Construct Factors	**Factor Correlations**			
	ICI	**PU**	**S**	**C**
ICI	1.00	0.40*	0.62*	0.59*
PU	0.40*	1.00	0.73*	0.61*
S	0.62*	0.73*	1.00	0.88*
C	0.59*	0.61*	0.88*	1.00

R^2=67.09; n= 39
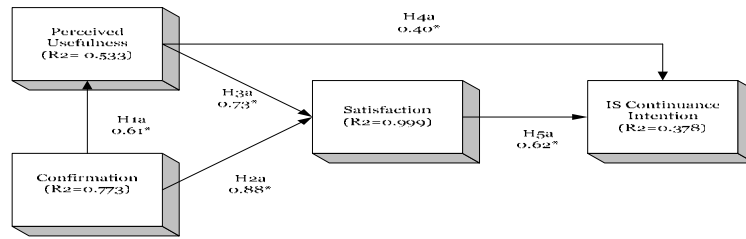
Figure 2. Path Analysis of Research Models (Low Social Presence), * path significance: p < 0.01

Construct Factors	Factor Correlations			
	ICI	PU	S	C
ICS	1.00	0.59*	0.57*	0.50*
PU	0.59*	1.00	0.86*	0.81*
S	0.57*	0.86*	1.00	0.87*
C	0.50*	0.81*	0.87*	1.00

Table 4. Factor Analysis of Research Model Medium Social Presence (Video-Taped Approach)

R^2=72.70; n= 27
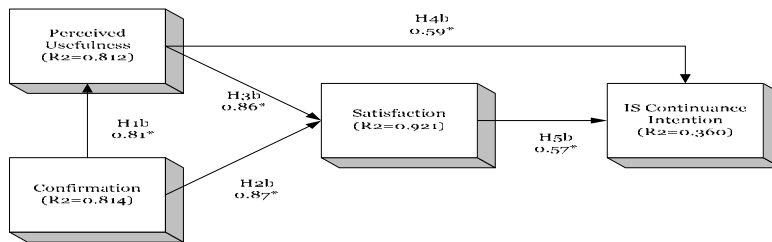
Figure 3. Path Analysis of Research Models (Medium Social Presence), * path significance: p < 0.01

Construct Factors	Factor Correlations			
	ICI	PU	S	C
ICI	1.00	0.40*	0.08	0.35*
PU	0.40*	1.00	0.70*	0.61*
S	0.08	0.70*	1.00	0.66*
C	0.35*	0.61*	0.66*	1.00

Table 5. Factor Analysis of Research Model High Social Presence (Face-to-Face Approach)
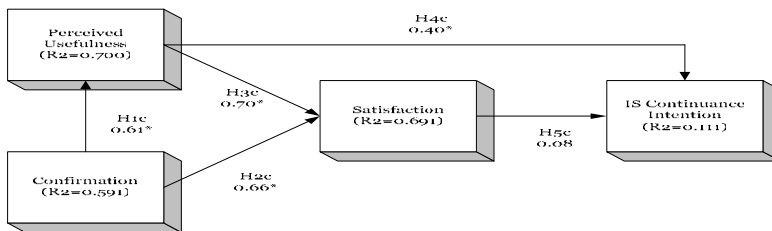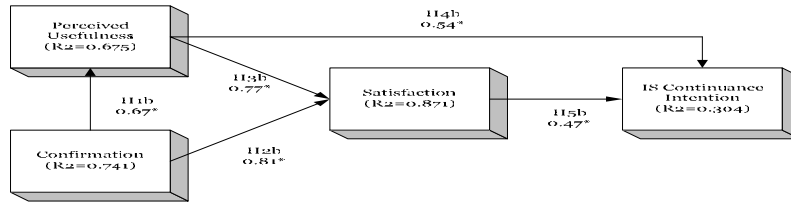
R^2=52.32; n= 44

Figure 4. Path Analysis of Research Model (High Social Presence), * path significance: p < 0.01

Table 6. Factor Analysis of Research Model Overall Computer Self-Efficacy				
Construct Factors	**Factor Correlations**			
	ICI	**PU**	**S**	**C**
ICI	1.00	0.54*	0.47*	0.51*
PU	0.54*	1.00	0.77*	0.67*
S	0.47*	0.77*	1.00	0.81*
C	0.51*	0.67*	0.81*	1.00

R^2=64.79

Figure 5. Path Analysis of Research Models (Medium Social Presence), * path significance: p < 0.01; n=110

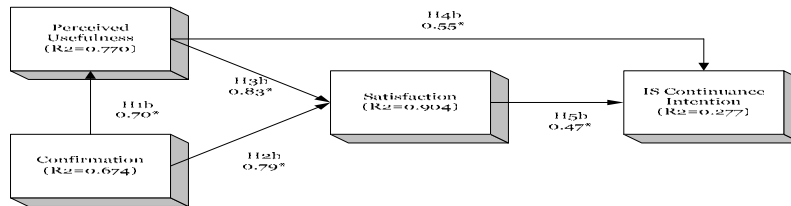| Table 7. Factor Analysis of Research Model Low Computer Self-Efficacy (CSE Indicator <= 6.7 mean value)				
Construct Factors	**Factor Correlations**			
	ICI	**PU**	**S**	**C**
ICI	1.00	0.55*	0.47*	0.42*
PU	0.55*	1.00	0.83*	0.70*
S	0.47*	0.83*	1.00	0.79*
C	0.42*	0.70*	0.79*	1.00

R^2=65.63

Figure 6. Path Analysis of Research Models (Low Computer Self-Efficacy), * path significance: p < 0.01; n=47

Table 8. Factor Analysis of Research Model High Computer Self-Efficacy (CSE Indicator > 6.7 mean value)				
Construct Factors	**Factor Correlations**			
	ICS	**PU**	**S**	**C**
ICS	1.00	0.52*	0.46*	0.61*
PU	0.52*	1.00	0.71*	0.66*
S	0.46*	0.71*	1.00	0.83*
C	0.61*	0.66*	0.83*	1.00

R^2=64.62

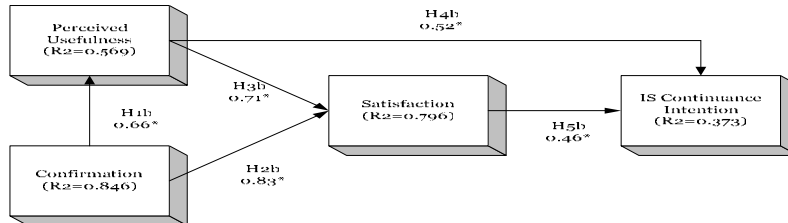**Figure 7. Path Analysis of Research Models (High Computer Self-Efficacy), * path significance: p < 0.01; n=5**

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