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Antecedences to continued intentions of adopting e-learning system in blended learning instruction: A contingency framework based on models of information system success and task-technology fit

Wen-Shan Lin [a,*], Chun-Hsien Wang [b,1]

[a] No. 580, Sinmin Rd., Department of Management Information Systems, National Chiayi University, Chiayi 600, Taiwan, ROC
[b] No. 580, Sinmin Rd., Department of Bio-industry and Agribusiness Administration, National Chiayi University, Chiayi 600, Taiwan, ROC

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ABSTRACT

The objective of this study is to propose a research framework that investigates the relation between perceived fit and system factors that can motivate learners in continuing utilizing an e-learning system in blended learning instruction. As learners have the face-to-face learning opportunity in interacting with lecturers, the study aims at investigating the critical features the e-learning system can provide in assisting learning. Both quantitative (survey) and qualitative (focus group interview) methods are applied in this paper. Results reveal that the information quality and task-technology fit influence the confirmation of system acceptance. Perceived usefulness and system satisfaction have major impacts on continuance intentions. Notions from contingency theory are used to interpret these findings.

1. Introduction

Blended learning instruction has been widely adopted by universities that utilize online learning platforms (Akkoyunlu & Soylu, 2008; Lim & Morris, 2008). The learning environment is not only available in face-to-face settings but also in contexts in which instructional materials are available electronically or through the Internet. In blended learning instruction, the online-learning system is regarded as a self-learning platform for learners to collaborate in learning. However, the literature regards as scarce the antecedences of the continued usage of the e-learning system. It is revealed that an e-learning platform facilitates collaborative learning, knowledge co-construction and relationship building (Njenga & Fourie, 2008). The present study views an e-learning platform as a medium that assists learners to gather/construct/share knowledge. Perceived task-technology fit and system success factor are selected as major antecedences in this study for investigating their links with continued to use intention.

This study takes the blended learning as the main theme. Blended learning combines two methods in teaching: face-to-face class teaching and e-learning based on the web-based computer teaching platform. Students can utilize the e-learning system for retrieving teaching-materials; get informed of the class-related information; transferring knowledge with respect to course works and related topics. This study introduces the concepts of task-technology fit, information system (IS) success model and contingency theory to investigate factors that keep learners utilizing e-learning system.

Perceived task-technology fit is applied in this study based on the model of task-technology fit (TTF) (Goodhue & Thompson, 1995). TTF is proven applicable in the case of blended learning instruction (Akkoyunlu & Soylu, 2008) and been referred as an important factor in mediating computer-assisted learning environment between technology adaptation, the e-learning environment in our case, for assisting learning (McGill & Hobbs, 2008). System success factor is applied based on DeLone & McLean's IS success model (2003). The IS success model has been widely tested in investigating user satisfaction in IS domain (Fornell, Johnson, Anderson, Cha, & Bryant, 1996; Petter & McLean, 2009). By introducing these constructs, it is aimed to link the e-learning system adaptation with the system success factors to e-learning system acceptance and continued to use intentions. Nevertheless, the contingent theory is applied to classify internal and external that may link with learning behavior. Factors that are relevant to influence IS success (e.g. as the e-learning system in this case) and perceived fit (e.g.

* Corresponding author. Tel.: +886 52732895; fax: +886 5 2840929.
E-mail addresses: wslin66@gmail.com (W.-S. Lin), chwang@mail.ncyu.edu.tw (C.-H. Wang).
[1] Tel.: +886 52732880.

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for achieving learning requirements) are denoted as possible internal contingencies; while the external contingencies are referred to concepts of perceived usefulness and e-learning system satisfaction. By doing this, we can have a broad picture of the relation between perceived fit and system factors that can motivate learners in sticking utilizing the e-learning system in blended learning instruction.

The objective of this study is to investigate how the antecedences of perceived fit and system success factors impact on learners in terms of e-learning system acceptance, satisfaction and continue to use intention. As learners have both the face-to-face teaching and computer-assisted learning opportunities through the use of e-learning platform in interacting with lecturers in blended learning instruction, the study aims at investigating the critical features the e-learning system can provide in assisting learning and motivate self-managed learning.

The background of the study is provided in the following section. In section three, the research model and underlying hypotheses are presented. The research methods and results are discussed in sections four and five, respectively. The conclusions and future research opportunities are addressed in the final section.

2. Theoretical background

Blended learning integrates the advantages of e-learning methods with aspects of traditional methods, including face-to-face interaction. Therefore, blended learning represents a method of instruction that brings together traditional, physical classes and elements of virtual education (Akkoyunlu & Soylu, 2008; Bonk & Graham, 2006). The blended learning plan referred in this study is presented (as shown in Fig. 1). This blended learning plan refers to a pedagogical practice that combines face-to-face instruction and online learning. Apart from receiving face-to-face teaching, learners can self-manage learning via utilizing computer platform for interacting with instructors as checking updated class-related information or knowledge and complete class-assigned tasks as submitting assignments online.

The importance of blended learning is well documented in various studies (So & Bonk, 2010). It facilitates knowledge co-construction, relationship building and project management. As well, it supports flexibility/effectiveness in work/communication. But it also derived a myriad of questions need to be answered (Njenga & Fourie, 2008). It is noted that it is important to have deep understanding of how people can learn well and how to have a successful design of technology-integrated learning environment (Bransford, Brown, & Cocking, 2002).

The literature indicates that learners' learning styles impact the perceived value of blended learning (Akkoyunlu & Soylu, 2008), learner variables, and instructional and motivational influence on learning outcomes (Lim & Morris, 2008). Studies suggest that knowledge construction and group collaboration have a determined effect on MBA students in web-based courses (Benbunan-Fich & Arbaugh, 2006), while presentation formats (animation, still graphics, text) have varying effects on students with diverse prior knowledge in a computer-based class (Lin, 2001). Research also shows that hedonic/utilitarian outcomes and peer pressure positively influence the intention of students with regard to participating in an online discussion forum (Yang, Li, Tan, & Teo, 2007). Based on the literature, the online learning system is regarded as a platform for constraining/sharing knowledge. Many researchers have attempted to investigate learner behavior and bridge the link between the learning environment (presentation and instructional methods) and learning performance. Other studies focus mainly on teaching or learning factors in explaining issues of online learning. To our knowledge, no study has considered both the e-learning system fit in terms of achieving learning tasks (as submitting course online and absorb course points) and the learners' perceptions of learning in relation to adoptive behavior with respect to the learning system. The motivations of the present research are as follows:

(1) To investigate the antecedences of continued usage in adopting e-learning system in the instructional format of blended learning,
(2) To test the influences of task-technology fit (in the sense of adopting e-learning platform for achieving learning goals) and IS success factors (in terms of information, knowledge and system quality) in relation to the confirmation of e-learning system acceptance,
(3) To examine the factors of external (perceived usefulness and e-learning system satisfaction) and internal contingencies (confirmation of e-learning system acceptance in terms of perceived fit and system success factors) that lead to the e-learning system acceptance and continuance to use intentions.

3. Literature review and research hypotheses

The research model (Fig. 2) integrates IS success model that addresses the factors in enhancing knowledge exchange within organizations (Wu & Wang, 2006) and task-technology fit model. It is conducted in an effort to investigate the relation between perceived fit and system factors to motivate learners in sticking utilizing the e-learning system in blended learning instruction.

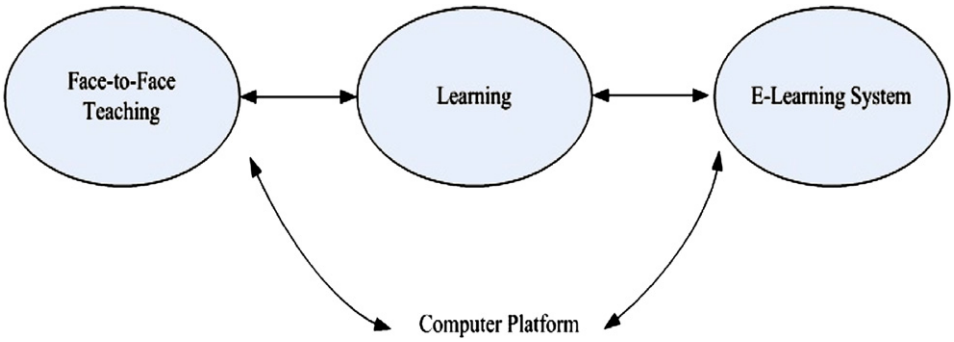


Fig. 1. Blended learning plan.

3.1. IS success model

The blended learning instruction integrates advantages of e-learning methods with aspects of traditional face-to-face teaching approach. In other words, blended learning brings together traditional, physical classes and elements of virtual education (Akkoyunlu & Soylu, 2008). Blended learning is popular because it utilizes diverse methods and is believed to enhance learners' learning outcomes (Lim & Morris, 2008). A study (Wu & Wang, 2006) expands upon the DeLone and McLean (2003) IS success model and reveals that system quality and knowledge/information quality have links with to KMS usage intentions. It justifies the appropriateness to apply DeLone & McLean's IS success model to test the e-learning system in the sense that it provides a platform for instructor and learners to interactively interact in learning (as share/change knowledge). Therefore, we hypothesized the following:

H1a. The extent of system quality in the e-learning system is positively associated with the confirmation of system acceptance,

H1b. The extent of knowledge or information quality in the e-learning system is positively associated with the confirmation of system acceptance.

3.2. Task-technology fit

The task characteristic is linked to the perceived task-technology fit (Goodhue & Thompson, 1995). A study conducted by Akkoyunlu and Soylu (2008) indicates that learners' views on the blended learning process, such as ease of use of the web environment, evaluation of the blended instruction, or the face-to-face teaching, affect learning in blended learning instruction. In our study, we assume that perceived fit for achieving learning requirements is related to confirmation of e-learning system acceptance (e.g. intention to use the e-learning system as a learning tool for knowledge sharing, gathering, analyzing or constructing) and perceived usefulness (e.g. it is easier to accomplish assignment, or be capable to make good use of the e-learning system). Therefore, we hypothesized the following:

H2a. Task-technology fit is positively associated with the confirmation of system acceptance,

H2b. Task-technology fit is positively associated with perceived usefulness.

Bhattacherjee (2001) and Bhattacherjee, Perols, and Sanford (2008) propose an IS continuance model by extending expectation-confirmation theory in modeling post-acceptance IS user behavior. They include the constructs of confirmation of system quality, perceived usefulness, and system satisfaction in this model. This study echoes the notion that learners who continue to use the e-learning system have a belief that adopting the system can improve learning. The theory of task-technology fit links IS usage with individual performance (Goodhue & Thompson, 1995) is proposed and been proved in different cases. As the task-technology fit model has been tested on a group support system at the organizational level (Zigurs & Buckland, 1998) and for individual acceptance level (Chang, 2010). With respect to e-learning system, we believe the acceptance of the online learning system is regarded as system acceptance in terms of the characteristics of the online learning system. Therefore, we hypothesized the following:

H3a. The confirmation of e-learning system acceptance is positively associated with system satisfaction,

H3b. The confirmation of e-learning system acceptance is positively associated with perceived usefulness.

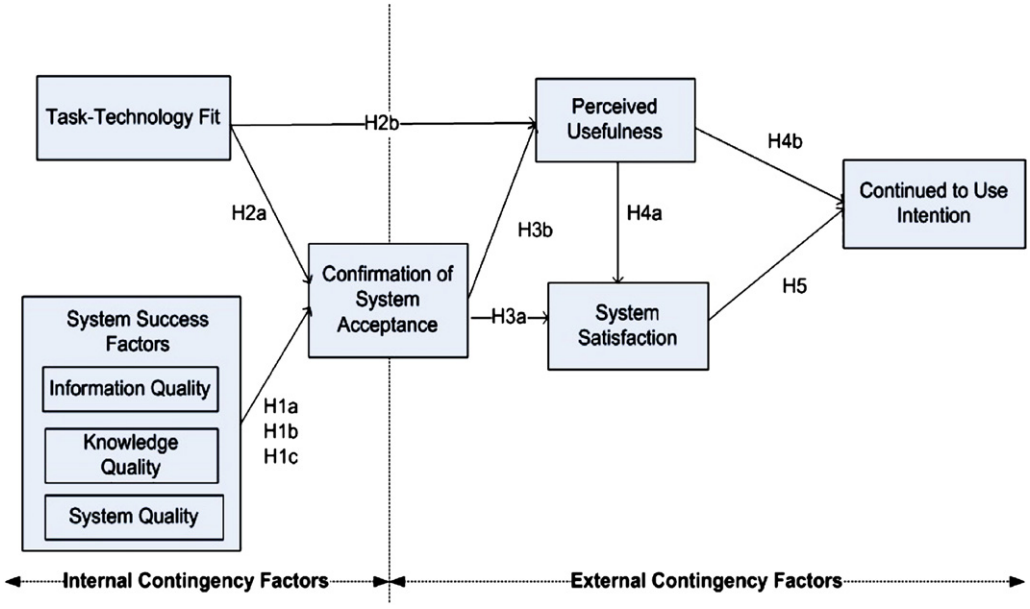


Fig. 2. Research model.

3.3. Perceived usefulness and system satisfaction

Bhattacherjee (2001) and Bhattacherjee et al. (2008) find that system satisfaction is linked to continuance intention. In order to test the dependent variable of continuance intentions on online-learning system, the theory is applied to test the relationship between perceived usefulness, system satisfaction and IS continuance intentions. Therefore, we hypothesized the following:

H4a. Perceived usefulness is positively associated with continuance intentions,

H4b. Perceived usefulness is positively associated with system satisfaction,

H5. System satisfaction is positively associated with continuance intentions.

3.4. Contingency theory

Contingency theory has been widely tested in the field of organizational studies that discussed how the fit or match between strategy and environment can influence organizational performance (Lee & Miller, 1996). In the context of organizational learning, researchers have found that epistemologies in terms of inter-organizational factors (learning beliefs of better performers, learning beliefs that fit together, and learning beliefs that are popular) and environmental contingencies affect organizational learning (Miller & Lin, 2010). In the information system domain, contingency theory has been applied to examine the success of IS planning (Bechor, Neumann, Zviran, & Glezer, 2010), the link between IT capabilities and firm performance (Stoel & Muhanna, 2009).

For computer-assisted learning, a contingent tutoring system was developed and exerted as a system that ensures that every learner receives sufficient support depending on their learning progresses from teachers to complete all learning tasks (Wood & Wood, 1999). This system was successfully implemented and tested in the teaching of algebra on young pupils. However, their study only considers the internal factors, such as the help-seeking behaviors, of learners. Our study takes both internal and external contingent factors that can fully investigate learning behavior. Factors that are relevant to influence IS success (e.g. as the e-learning system in this case) and perceived fit (e.g. for achieving learning requirements) are denoted as possible internal contingencies; while the external contingencies are referred to concepts of perceived usefulness and e-learning system satisfaction. By doing this, we can have a broad picture of the relation between perceived fit and system factors that can motivate learners in sticking utilizing the e-learning system in blended learning instruction. In another words, to find out the additional features the e-learning system can provide in assisting learning.

3.5. E-learning system continued to use intentions

As it is addressed above that the information system continuance model has been proposed (Bhattacherjee, 2001; Bhattacherjee et al., 2008) and been validated in e-learning related literature (Chiu & Wang, 2008; Lin, 2011) (Al-Somali, Gholami, & Clegg, 2009; Davis, Bagozzi, & Warshaw, 1989). It is denoted that learning by blended training for facilitating knowledge transfer has been expected to serve as an alternative to traditional training (Lee, 2010). Benbunan-Fich and Arbaugh (2006) also indicate that learners achieve higher perceptions of learning in as course where knowledge is transmitted in e-learning system. As learners have face-to-face opportunity to interact with instructors in the blended learning instruction, their intentions to continue to use the e-learning system should be oriented mainly by the fact that the system can bring critical benefits in enhancing learning. Therefore, our study presumes that perceived usefulness and system satisfaction (as the external contingencies) has links with the continued to use intentions. Based on the literature relevant in investigating IS post-adoptive behavior (Chang, 2010; Vatanasombut, Lgbaria, Stylianou, & Rodgers, 2008), our study mainly investigates the continued behavior in adopting e-learning system for knowledge gathering/construction/sharing and the suitability for learning.

4. Research method

In the followings, it is presented the applied research method in terms of research setting, data collection and survey instrument.

4.1. Research setting

The data were collected at a major university located in the south of Taiwan. At this university (the number of staff is about 800 and promoted the usage of e-learning system for more than five years), the e-learning system[2] (as represented in Fig. 3) provides assistances to students in a variety of majors, including engineering, education, management, literature, and agriculture. Lecturers (instructors) are free to adopt this system in teaching. Students can utilize the e-learning system for retrieving teaching-materials; get informed of the class-related information; transferring knowledge with respect to course works and related topics. The e-learning system is a platform for instructors to upload teaching material (e.g. power point files), present course summary, announce course schedule and conduct class management. For students, students can use the e-learning system for joining online discussion, sending e-mail for course instructor, interacting with course-mate and lecturers.

4.2. Data collection

A questionnaire was developed in English and then translated into Chinese. Eight postgraduate students who were majoring in management information systems proofread and amended the questionnaire in the pretest stage.

[2] For more details of the e-learning system this paper refers to, please check the file available at https://docs.google.com/present/view?id=dgwqdz53_70fwvf22gc&interval=5&autoStart=true.

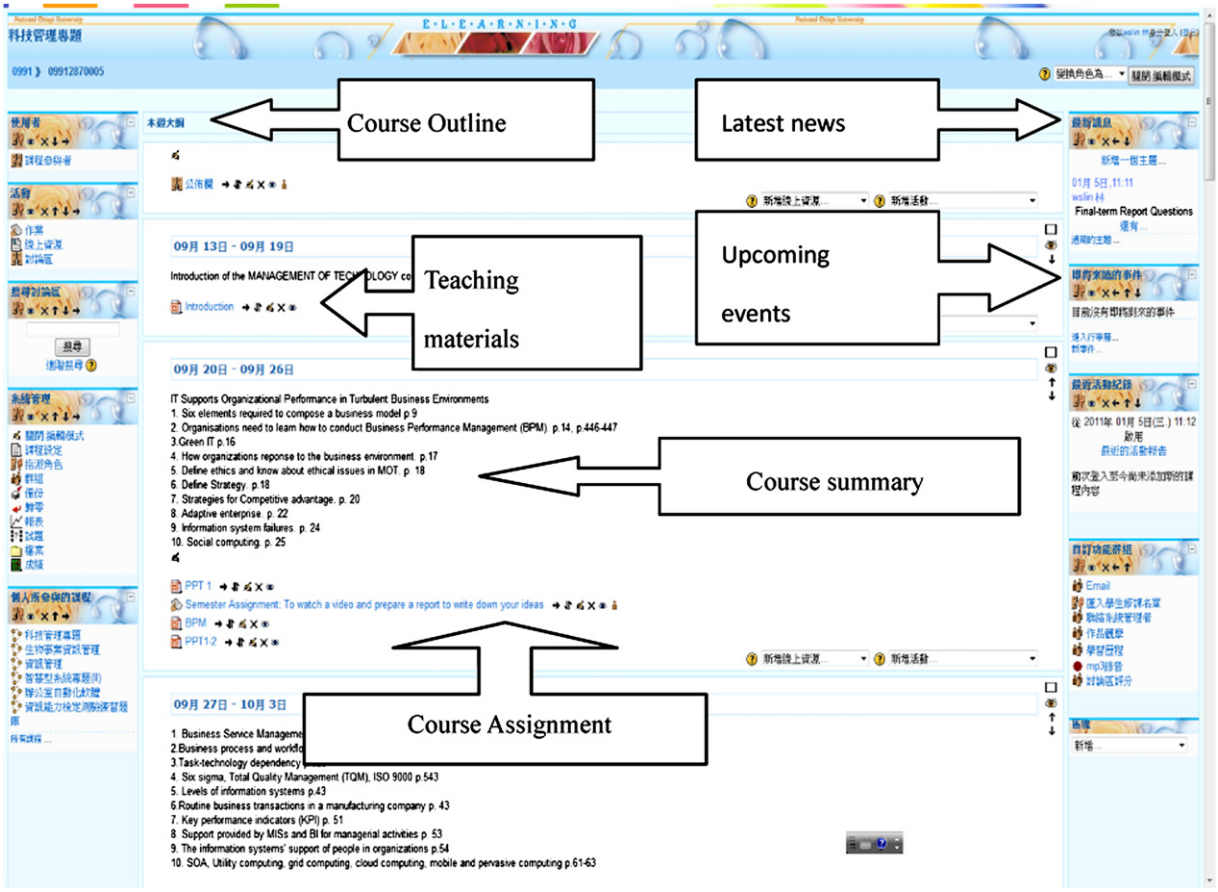


Fig. 3. The demo of e-learning system.

At the end of the fall semester of 2009, the formal version of the questionnaire was distributed in two classes of a computer fundamentals course led by the same instructor. The 110 students enrolled in these sections who had similar Internet access capability in classes and at home. Overall, 88 completed questionnaires were collected for a response rate of 80%. Table 1 provides a summary of the background of the participants.

The average age of respondents was 19.3 years, and the age range was from 19 to 22. Males represented 31.8% of the respondents. All respondents were undergraduate students. Therefore, this population represented the campus users of an e-learning system hosted by the university and was reflective of the major population of e-learning system users of interest in this study.

4.3. Survey instrument

All the measures of constructs in this research were adopted or adapted from relevant literature (see Appendix A for survey items). Items were measured on a 5-point Likert scale (ranging from 'strongly disagree' to 'strongly agree') when applicable.

The measurement of system and knowledge/information quality was adopted from the study of Wu and Wang (2006) but amended to suit the context of this study. The present study views an e-learning platform as a medium that assists learners to gather/construct/share knowledge. In terms of measurement, the concepts of knowledge and information quality have a certain level of relevancy. Therefore, the uploaded teachings, course notices, or the sharing of ideas between users are viewed as the knowledge contents exchanged in the e-learning system.

Based on the expectation-confirmation theory, the construct of the confirmation of system acceptance as expounded in the study of Liaw, Chen, and Huang (2008) has been adopted in this paper. Eight items adopted from studies (Chang, 2010; Liaw et al., 2008) are used to measure the perceived usefulness of and satisfaction with the e-learning system.

Table 1
Background of the survey participants.

Background	Major percentage	N
Experiences of years in utilizing NCYU online-learning system	96.6% of participants have used the system for 1–2 years	88
Ever submitted assignments online through the NCYU online-learning system	98.9% of participants have submitted assignments online	88
Experience of participating in the online discussion forum	90.9% of participants have participated in the online discussion board	88
Experience in retrieving the feedback given by the lecturer online	88.6% of participants have read the feedback given by the lecturer online	88
The perceived assistance obtained from the NCYU online-learning system	93.2% of participants think the online learning system is helpful	88

Table 2
Variable Definitions and Measurements.

Code	Measurement Construct	No. of tested variables	Sources
IQ	Information Quality	4	Wu & Wang, 2006
KQ	Knowledge Quality	5	Wu & Wang, 2006
SQ	System Quality	5	Wu & Wang, 2006
CSA	Confirmation of System Acceptance	7	Liaw et al., 2008
TTF	Task-technology Fit	8	McGill & Klobas, 2009; Schmitt et al., 2008
PU	Perceived Usefulness	8	Chang, 2010
SS	System Satisfaction	8	Liaw et al., 2008
CUI	Continued to Use Intention	7	Vatanasombut et al., 2008; Chang, 2010

With respect to the construct of task-technology fit, the measurements used to test user acceptance of online auction (Chang, 2010), academic environment (Schmitt, Oswald, Friede, & Imus, 2008), and learning management system (McGill & Klobas, 2009) are considered. Eight items are used to measure the perceived fit in terms of matching users' interests, the compatibility or the fulfillment of needs, etc. The dependent variable of continuance intention was measured with seven items adopted from Vatanasombut et al. (2008) and Chang (2010). We also included demographic information in this study as control variables for the effects of gender, age, the length of use of the e-learning system, and the experience of use of the online discussion forum. Table 2 summarizes the measurement codes used in this study.

5. Results

This study used structural equation modeling (SEM) implemented in partial least squares (PLS) for data analysis. SEM analysis was chosen over regression analysis because SEM can be used to analyze all of the paths in one analysis (Komiak & Benbasat, 2006). PLS is a latent structural equation modeling technique that utilizes a component-based approach to estimation (Karahanna, Agarwal, & Angst, 2006). This technique provides the analysis of both a structural model (assessing relationships among theoretical constructs) and a measurement model (assessing the reliability and validity of measures). PLS is a desirable research tool because it requires a small number of samples and places less restrictive demands on residual distribution (Cheung, Luo, Sia, & Chen, 2009; Chin, Marcolin, & Newsted, 2003). Compared to the use of linear structural relations (LISREL), PLS allows for the integration of variables from different disciplines (Kamis & Stohr, 2006). Information system researchers have used PLS to examine a wide variety of information system problems, including the impact of cognitive absorption on the acceptance of online learning (Saade & Bahli, 2005).

A two-step approach commonly used in SEM techniques was used to evaluate the fitness of the model. This approach involved first testing the fitness and the construct validity of the proposed measurement model by assessing discriminant validity and reliability. Subsequently, the nomological validity of the construct was tested through the structural model of the study. SmartPLS version 2.0 was used to assess the measurement model and the structural model.

5.1. Measurement model

The measurement model was assessed in terms of individual item loadings, reliability of measures, convergent validity and discriminant validity. All items loaded significantly on their latent construct ($p < 0.05$) and exceeded the minimum threshold of 0.4, as is recommended (McGill & Klobas, 2009). Reliability was assessed using composite reliability and Cronbach's alpha. All multi-item constructs met the guidelines for a composite reliability of greater than 0.70 (Hair, Black, Babin, Anderson, & Tatham, 2006) and a Cronbach's alpha of greater than 0.70 (Nunnally, 1978). Convergent validity was assessed using average variance extracted (AVE). All multi-item constructs met the guideline of average variance extracted of greater than 0.50 (Hair et al., 2006).

For the test of discriminant validity, each item should load more highly on its own construct than on other constructs. Moreover, the average variance shared between a construct and its measures should be greater than the variance shared by the construct and any other constructs in the model (McGill & Klobas, 2009). Two items measuring task-technology fit and two items for individually measuring perceived usefulness and system satisfaction with reverse meanings (to prevent the problem of multicollinearity) loaded too heavily on other constructs and consequently were excluded for further analyses.

Table 3 presents a summary of the reliability and convergent validity of the final scales used in this study. On the whole, the constructs exhibited the required internal consistency and reliability. Table 4 illustrates the construct inter-correlations and the square root of average variance extracted for each construct. In all cases, the square root of average variance extracted exceeded the corresponding construct inter-correlations thereby demonstrating discriminant validity (Chin, 1998).

Table 3
Descriptive results and internal consistency of model constructs.

Construct	Number of items	Mean	Standard deviation	Composite reliability	Cronbach's alpha	AVE
IQ	4	3.46	0.75	0.87	0.80	0.62
KQ	5	3.49	0.75	0.89	0.84	0.61
SQ	5	3.54	0.69	0.88	0.83	0.59
CSA	7	3.34	0.77	0.92	0.90	0.64
TTF	8	3.35	0.67	0.91	0.89	0.64
PU	8	3.40	0.72	0.92	0.91	0.64
SS	8	3.52	0.71	0.91	0.88	0.59
CUI	7	3.56	0.66	0.93	0.92	0.67

Table 4
Discriminant validity.

	CSA	CUI	IS	KQ	PU	SQ	SS	TTF
CSA	0.80							
CUI	0.57	0.82						
IS	0.75	0.53	0.79					
KQ	0.69	0.67	0.74	0.78				
PU	0.65	0.76	0.63	0.65	0.80			
SQ	0.59	0.68	0.57	0.65	0.64	0.77		
SS	0.65	0.80	0.52	0.64	0.74	0.71	0.76	
TTF	0.67	0.69	0.64	0.70	0.71	0.67	0.67	0.80

*The shaded numbers in the diagonal row are square roots of the average variance extracted.

5.2. Structural model

Bootstrap re-sampling was performed on the structural model to examine path significance levels ($N = 500$). Table 5 presents the results of the structural model. Fig. 4 and Fig. 5 shows the demo of PLS analysis and the standardized coefficients for each hypothesized path in the model and the R^2 for each dependent variable. The model explains 70.8 percent of the variance in terms of continuance intentions with respect to the online learning system at NCYU, which is indicative of a very strong explanatory power. Furthermore, the perceived task-technology fit and the confirmation of system acceptance explain 55.9 percent of the perceived usefulness. Also, the perceived usefulness and the confirmation of system acceptance explain 59.6 percent of the system satisfaction. The results reveal a high prediction rate in forecasting user continuance intention.

The influence of information quality of information success (H1a) was supported at the $p < 0.01$ level. Task-technology fit (H2a, b), confirmation of system acceptance (H3a, b), perceived usefulness (H4a, b), and system satisfaction (H5) were also supported. Task-technology fit to the confirmation of system acceptance (H2a) was found to be statistically significant at the $p < 0.05$ level, while confirmation of system acceptance (H3a, b) and perceived usefulness to system satisfaction (H4a) were supported at the $p < 0.01$ level. Also, task-technology fit to perceived usefulness (H2b), perceived usefulness to continuance intention (H4b), and system satisfaction to continued to use intention (H5) were found to be statistically significant at the $p < 0.001$ level. On the other hand, factors of knowledge quality and system quality were not significant in the model. Thus, H1b and H1c were rejected.

5.3. Interview results

To derive more insights from the participants of the e-learning system, eight postgraduate students from the graduate school of management of a major University in Taiwan were enrolled in an interview study as it is required as a compulsory assignment to accomplish. These eight subjects spent approximately fifteen weeks investigating issues of computer-mediated knowledge management and e-learning. The course setting was one of blended learning instructions. Students had experienced participating in the blended learning instruction. Students were able to find teaching materials online, check up-to-date class information, submit coursework online, receive clarifications on coursework assigned by the lecturer and sharing knowledge/information related to the course with course-mates. Interview subjects participated in a 50-minute interview in which they expressed their opinions about the online learning system adopted in the instruction.

Interview scripts were analyzed in order to identify critical factors in affecting learners to keep utilizing e-learning system operated by the University.

Student praised blended learning on the ground of:

- Perceived usefulness: “By checking the information posted in the e-learning platform makes it easier to follow the course contents as lecturers taught in the class.”
- Portability: “I can revise course materials when I am at home or at school.”
- Academic outcomes: “The e-learning platform provided by my University has been very useful and plays a crucial role on my studies.”
- System Satisfaction: “In general, using the e-learning system would give me a sense of satisfaction.”
- Overall, it is useful by utilizing the e-learning platform for assisting learning.

Table 5
PLS Results.

The hypothesis	Path coefficient	t-value
H1a: Information quality -> Confirmation of system acceptance	0.44**	3.64
H1b: Knowledge quality ->Confirmation of system acceptance	0.14	1.05
H1c: System quality ->Confirmation of system acceptance	0.1	1.09
H2a: Task-technology fit -> Confirmation of system acceptance	0.22*	2.06
H2b: Task-technology fit-> perceived usefulness	0.5***	5.23
H3a: Confirmation of system acceptance -> System satisfaction	0.3**	3.06
H3b: Confirmation of system acceptance-> Perceived usefulness	0.31**	2.74
H4a: Perceived usefulness-> System satisfaction	0.54**	5.97
H4b: Perceived usefulness-> Continued to use intention	0.38***	3.93
H5: System satisfaction -> Continued to use intention	0.53***	5.77

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

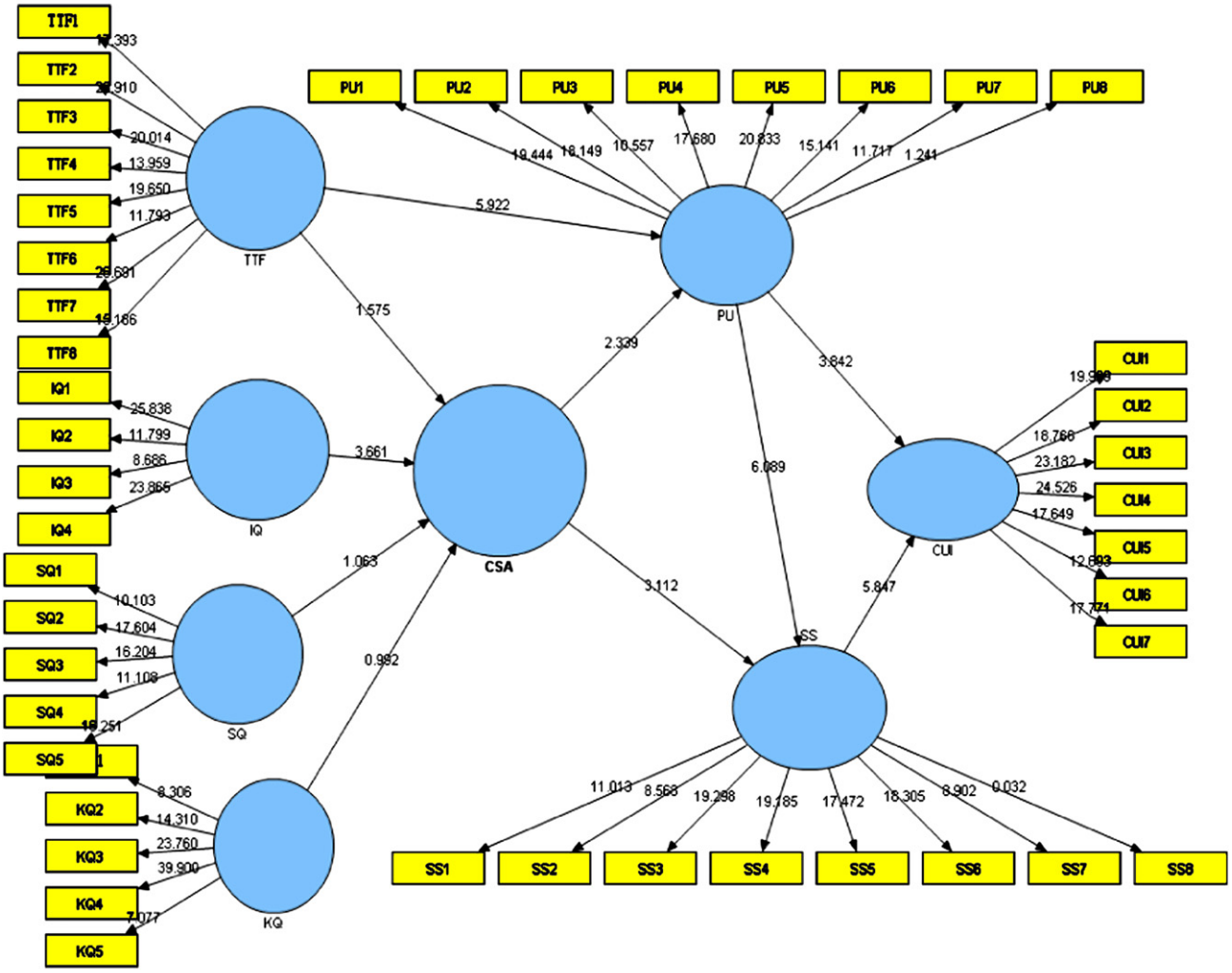
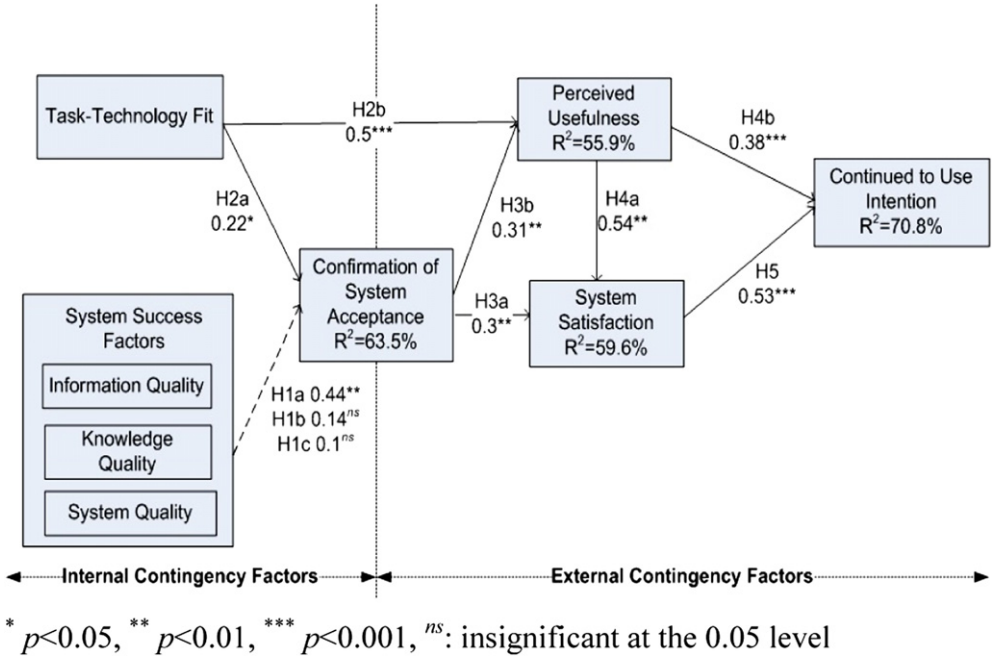


Fig. 4. The demo of PLS analysis.



$^{*}p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$, ^{ns}: insignificant at the 0.05 level

Fig. 5. Structural model results.

The most common complaints concerned:

- Not all instructors utilize the e-learning platform.
- Some lecturers use the e-learning platform only with an aim to make teaching materials available.
- Lecturers do not encourage us to share or exchange knowledge/ideas/thoughts online.
- The information posted in the e-learning platform is not updated.

Results reveal that subjects response positively in utilizing the e-learning system. As the course schedule and syllabus are announced in the first beginning of the semester and can be obtained online. Subjects feel it is easier to follow the course. Therefore, it is observed that the e-learning system provided by the university does have benefits in enhancing learning and improving learning performance subjectively. Subjects express that by adopting the e-learning system, it helps in self-managing gathering/constructing/sharing knowledge. The perceived fit in terms of fulfilling learning needs with regard to adopting the e-learning system contributes in keeping utilizing the system. However, since there is no other data been analyzed and presented in this paper. The observations should only be used to explain the results derived from the empirical study as presented earlier.

While comparing the blended learning course to other courses taken during the same semester that did not employ the e-learning system, subjects revealed that the influence of the instructors did affect their use of the learning system. For those courses that did not employ the e-learning system, subjects relied mainly on teaching contents received during face-to-face communication with instructors. For those courses in which the instructors partially adopted the e-learning system by making only the teaching materials (e.g., power point, or word documents) accessible and available online, subjects perceive differently on the impacts of learning. This reveals that the role played by instructors in terms of promoting the e-learning platform is influential on learners.

6. Discussion and conclusion

In this section, the discussions in terms of theoretical and practical contributions derived from this study are presented. Limitations and future research suggestions are given.

6.1. Theoretical contributions

This study adopts the IS success model, task-technology fit and contingency theories to investigate the continuance intentions of learners in blended learning instruction. The findings reveal that information quality is an important antecedence in affecting continuance intentions. This variable concerns receiving information about up-to-date course notices/teaching materials, sharing knowledge or ideas with group mates, and receiving assistance in preparing for exams. The perceived fit both in terms of utilizing the online learning system and supporting learning requirements influences the confirmation of system utilization. The results agree with the finding of McGill and Klobas (2009) that task-technology fit has impacts on the utilization of the learning system.

Furthermore, perceived usefulness and system satisfaction have high prediction rates in explaining the continuance intentions. Results reveal that McLean's IS success factors are applicable in ensuring the quality of the online learning system. Furthermore, both expectation-confirmation theory and the task technology should be taken into account for ensuring learners' needs. Moreover, the perceived usefulness in terms of assisting learning in the preparation of exams or assignments and in system satisfaction in terms of provided functions and presenting styles all have impacts on learners' continuance intentions. The results sustain the notion proposed by Bhattacherjee (2001) that perceived usefulness and satisfaction have impacts on IS continuance intention. Also, it echoes the findings revealed from a study that investigates continued usage intention of self-paced e-learning tools (Cho, Cheng, & Lai, 2009).

Drawing from the notion of contingency theory in terms of perceived fit, this study contributes to the literature by introducing both the internal and external factors in explaining learners in adopting e-learning system in blended learning instruction. Specifically, the factors with respect to the perceived fit in terms of usefulness/satisfaction as the e-learning system can enhance learning in gather/construct/share knowledge. It is important for both instructors and learners realize the importance and appropriateness in adopting computer in assisting learning. More importantly, the class-managing style of instructors and their behavior toward promoting the usage of the online learning system are influential in determining continuance intentions of learners.

6.2. Practical contributions

The online learning system has been widely adopted on university campuses and in organizations. The university campus is the focus of the present study as it is the primary place in which the dissemination of knowledge occurs. The usage of the online learning system is worthy of investigation. The blended learning environment provides the benefits of both face-to-face teaching and online instruction. Learners can access information anywhere and at any time. By revealing the factors affecting learner behavior, the present study contributes to the recognition of blended learning as an efficient, notable and influential teaching method.

This study reveals that the system quality in terms of information quality is not the only internal factor that has impacts on the perceived fit of learners. The internal factors of perceived usefulness/system satisfaction and the strategy adopted by the instructors all have impacts on learner behavior. Therefore, the university should not only invest in developing/maintaining the e-learning system, it should also promote the system both among lecturers and students. For lecturers, the university should formalize the usage of the online learning system and motivate staff to adopt the system by offering some incentives, e.g., organizing seminars for teaching the usage of the online learning system or adding credits in the reviews of teaching performance. For students, the university should perhaps offer e-learning learning programs in required subjects to assist self-learning or provide an orientation class for introducing the e-learning system and its functions. Notably, both lecturers and students concur on the adoption of the online learning system and agree on its positive effects on teaching and learning. Certainly, the acceptance rate of the learning system will be improved and a friendly learning environment for facilitating learning will be developed.

6.3. Limitations and future research suggestions

Learning impacts as real study scores or perceived impacts on learning are not included in this study. In future research, the learning impact in terms of learning grades and perceived learning achievements should be taken into account. Additionally, differing levels of adaptation with regard to the online learning system should be considered as a controlled variable in a variety of cases. These cases include: (1) there are instructors who actively manipulate the collaborative learning features, such as the online discussion forum and the submission of group work, (2) there are also some cases in which learners only passively adopt the system by merely retrieving the teaching materials available online, (3) lecturers or instructors who voluntarily use the online learning systems may also provide be able to provide insights in terms of investigating the subjective factors that motivate instructors actively adopt the blended teaching instruction and the impacts for teachers. Moreover, the same research model proposed in present study can be applied to test learners in different organizations as companies use online learning systems for knowledge management and employee training. By conducting this study, some other implications for organizations or teaching institutes can be revealed.

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Appendix A. Survey items

Items used to measure constructs
Note: those marked with * were dropped from the final analysis after measurement model development.
System Quality: How good the e-learning system is in terms of its operational characteristics (Wu & Wang, 2006)

1. This system is easy to use
2. This system is user friendly
3. This system is stable
4. The response time of the e-learning system is acceptable
5. This system has clear navigational tools and guidelines for assisting using

Knowledge and information Quality: How good the e-learning system is in terms of its output (Wu & Wang, 2006)

1. This e-learning system makes it easy for me to check the up-to-date course notices
2. This e-learning system makes it easy for me to check the up-to-date teaching materials
3. This e-learning system makes it easy for me to share ideas with my group mates
4. This e-learning system makes it easy for me to finish course works
5. The words and phrase in contents provided by the e-learning system are consistent
6. The knowledge or information provided from the e-learning system is available at a time suitable for its use
7. The knowledge or information provided from the e-learning system is important and helpful for my work
8. The knowledge or information provided from the e-learning system is meaningful, understandable, and practicable
9. The knowledge classification or index in the system is clear and unambiguous

Confirmation of the system acceptance (Liaw et al., 2008)

1. I intend to use the system as a learning tool
2. I intend to use the system for knowledge management
3. I intend to use the system for knowledge gathering
4. I intend to used the system for knowledge analysis
5. I intend to use the system for knowledge construction
6. I intend to use the system for knowledge sharing
7. I intend to use the system in future

Task-Technology Fit (McGill & Klobas, 2009; Schmitt et al., 2008)

1. This e-learning system match my interests
2. This e-learning system is compatible (suits) with all aspects of my study
3. I feel that my academic goals and needs are met by applying the e-learning system
4. Do you think the output from the e-learning system is presented in a useful format?*
5. Is the information from this e-learning system accurate?*
6. Does this e-learning system provide you with up-to-date information?
7. Do you get the information you need in time?
8. Does this e-learning system provide output that seems to be just about exactly you need?

Perceived usefulness of the e-learning system (Chang, 2010)

1. By using this e-learning system, it is easier to accomplish the assignments
2. I am able to learn how to make good use of this e-learning system
3. By using this e-learning system, I can improve my learning in the subject of computer fundamental
4. By using this e-learning system, I can upgrade the efficiency of my study
5. This e-learning system provides some good functions to help me complete my learning tasks
6. By using the function of the e-learning system to conduct my study shortens the time of my study preparation
7. By using the function of the e-learning system I can concentrate more on my other studies
8. For me using the e-learning system to prepare my study is not efficient*

Continuance to use intention (Chang, 2010; Vatanasombut et al., 2008)

1. I intend to continue use the e-learning system for knowledge gathering
2. I intend to continue use the e-learning system for knowledge construction
3. I intend to continue use the e-learning system for knowledge sharing
4. Next time I am willing to use the e-learning functions again to prepare the course works
5. I think the functions of the e-learning system are suitable for learners
6. I will recommend other people to use the e-learning system
7. Overall, I intend to continue use the e-learning system

System Satisfaction (Liaw et al., 2008)

1. I am satisfied with the e-learning system
2. I am satisfied with the speed of the e-learning system
3. I am satisfied with the functions provided by the e-learning system
4. I am satisfied with the quality of information available on the e-learning system
5. I am satisfied with the presentations methods of the e-learning system regarding the teaching materials
6. I can easily download the available teaching materials in the e-learning system
7. I have no problem in viewing the posted information in the e-learning system
8. I have encountered the problem in logging in the e-learning system*

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