Examining the integrated influence of fairness and quality on learners' satisfaction and Web-based learning continuance intention

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Abstract. *As with any other information system (IS), the success of Web-based learning depends largely on user satisfaction and other factors that eventually increase users' intentions to continue using the service (continuance intention). This research integrates the IS success model and fairness theory to construct a model for investigating the motivations behind learners' intentions to continue using Web-based learning. Our model theorizes that the three dimensions of quality (i.e. information, system and service) and the three dimensions of fairness (i.e. distributive, procedural and interactional) affect learners' satisfaction. We also argue that satisfaction and the three dimensions of fairness will influence learners' intention to continue using Web-based learning. The hypothesized model is validated empirically using data collected from 289 learners of a Web-based learning service. The results show that information quality, system quality, system use, distributive fairness and interactional fairness exhibit significant positive effects on satisfaction. Also, procedural fairness and satisfaction play significant roles in shaping learners' intention to continue using Web-based learning.*

Keywords: continuance intention, fairness, quality, satisfaction, Web-based learning

INTRODUCTION

As with any other information system (IS), the success of Web-based learning depends largely on users' intentions to continue using the service (continuance intention). The role of satisfaction as a predictor of continuance intention is critical and has been well-established in IS, marketing and the reference disciplines (see Oliver, 1980; Bhattacherjee, 2001; DeLone & McLean, 2003). In Web-based learning, individuals invest inputs (e.g. time, effort and money)

and receive outcomes (e.g. knowledge, grades, credits or degrees). According to Adams (1965), individuals seek a fair balance between inputs and outputs. Individuals become satisfied and motivated whenever they feel their inputs are being fairly rewarded (Adams, 1965). According to Martínez-tur *et al*. (2006), individuals have a fairness motive and judge their satisfaction levels using fairness as a fundamental base. Research has affirmed the importance of fairness considerations in the assessment of overall satisfaction with different types of services (Clemmer & Schneider, 1996; Martínez-tur *et al*., 2006).

The primary interface for Web-based learning is the Web site, a form of IS. As with most IS, the success of Web-based learning can be partially explained by DeLone & McLean's (1992) model of IS success. While the IS success model initially focused on the success of traditional IS, recent research has applied it to understanding Web applications (Negash *et al*., 2003; DeLone & McLean, 2004). Therefore, Web-based learning continuance intentions should consider the major constructs of the IS success model, which theorizes that information quality, system quality and service quality are fundamental determinants of an individual's satisfaction and usage of IS.

The IS success model and fairness theory have been widely studied by researchers in different fields. This research aims to integrate these two research streams to provide a theoretical model that predicts learners' satisfaction and intentions to continue using Web-based learning in a voluntary setting.

THEORETICAL BACKGROUND

Web-based learning refers to learning delivered through a Web browser over the public internet, private intranet or extranet (McCormack & Jones, 1998). Web-based learning is often called online learning and is a major subcomponent of the broader term e-learning or distance learning. The concept of continued behaviour can best be understood within a theoretical framework described in the literature on social exchange relationships (Teo & Lim, 2001). In the context of Web-based learning, the learner's decision of whether to remain in the relationship corresponds to continuance intentions. The learner's decision to remain in the relationship is of practical importance to the Web-based learning provider because customer turnover can be costly, given that it costs more to acquire new customers than to retain existing ones (Hart *et al*., 1990; Reichheld & Schefter, 2000).

Fairness is a fundamental basis for relationship maintainability in social exchange (Lind *et al*., 1993). The earliest influential theories of fairness (justice) were the rule of distributive justice (Homans, 1961) and the equity theory (Adams, 1965). Homans's (1961) simple formula for justice stressed the difference between the rewards people received for investments. Adams's (1965) equity theory theorizes that an individual's perception of the fairness of exchange relationships is determined by comparing the output/input ratio for oneself with that of referent others. Researchers have conceptualized three types of fairness: distributive, procedural and interactional. Distributive fairness involves resource allocation and the perceived outcome of exchange (Adams, 1965). Procedural fairness is concerned with the processes by

which outcomes are allocated or distributed among parties to an exchange (Thibaut & Walker, 1975). Interactional fairness refers to the perceived fairness of the interpersonal treatment received during the enactment of formal procedures (Bies & Moag, 1986).

In Web-based learning, we seek to determine the fairness of evaluations of learners' inputs, the procedures for evaluating their inputs, and the treatment by instructors during online interaction. Adams argued that people become demotivated, reduce input, and/or seek change whenever they feel their inputs are not being fairly rewarded. Martínez-tur *et al*. (2006) argued that individuals expect consumption experiences to be fair, and they engage in negative reactions (e.g. switching providers) when they believe that they have been subjected to unjust outcomes, procedures or interpersonal treatment. According to Seiders & Berry (1998), Web-based learning providers that fail to project an image of fairness cannot develop the level of learner confidence needed to establish loyalty (i.e. continued use). Research has shown the important role of fairness in explaining customer loyalty in service recovery (Chebat & Slusarczyk, 2005), withdraw intentions (Colquitt *et al*., 2001) and repurchase intentions (Clemmer & Schneider, 1996; Teo & Lim, 2001).

RESEARCH MODEL AND HYPOTHESES

The possible impact of the three dimensions of fairness and quality on learners' satisfaction and continuance intention is still unclear in the Web-based learning context. A theoretical model is proposed to address this issue (See Figure 1). Following prior research, we define fairness with three distinct dimensions: distributive, procedural and interactional. The basic assumption is that Web-based learning continuance intention is determined by distributive fairness, procedural fairness, interactional fairness and satisfaction. Satisfaction, in turn, is jointly determined by information quality, systems quality, service quality, system use, distributive fairness, procedural fairness and interactional fairness. Table 1 lists the definitions of the constructs in this theoretical model.

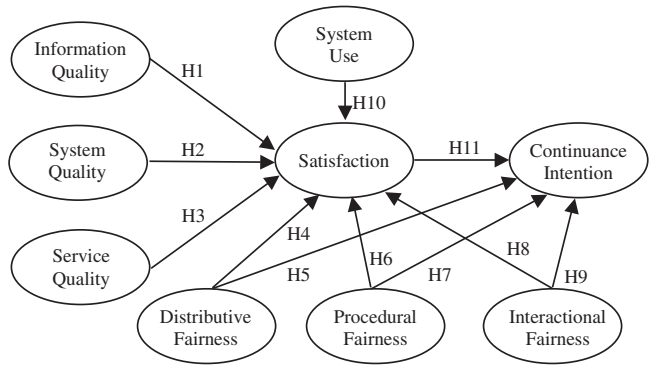

Figure 1. Research model for Web-based learning continuance intention.

Table 1. Definitions of the constructs

Constructs	Definitions	References	Items
Information quality	The accuracy, completeness, ease of understanding, and relevance of the online course materials	McKinney *et al*. (2002); DeLone & McLean (2003)	5
System quality	The learner's belief about the performance characteristics of Web-based learning systems or sites, including availability, ease of use, reliability, and response time	McKinney *et al*. (2002); DeLone & McLean (2003)	5
Service quality	The learner's perception of the overall support delivered by the Web-based learning system/site	Parasuraman *et al*. (1985); Pitt *et al*. (1995); Kettinger & Lee (1997)	5
System use	The frequency and time of use of the Web-based learning system/site	Moon & Kim (2001)	2
Distributive fairness	The learners' perceived fairness of the grades they receive	Folger & Konovsky (1989)	3
Procedural fairness	The learner's perceived fairness of the procedures that determine his/her course grade	Folger & Konovsky (1989); Moorman (1991)	4
Interactional fairness	The extent to which the learner feels having been treated fairly regarding his or her online interaction with the instructor throughout the Web-based learning process	Folger & Konovsky (1989); Moorman (1991)	4
Satisfaction	The learner's evaluation and affective response to the overall experience of Web-based learning	Oliver (1980); Oliver & Swan (1989)	3
Continuance intention	The subjective probability that the learner will continue using Web-based learning	Mathieson (1991); Bhattacherjee (2001)	3

Information quality

Individuals spend valuable time and effort in order to develop skills and knowledge, therefore high quality course materials are critical to their satisfaction with Web-based learning. Carr (2000) reported that a poorly designed course is one of the reasons for student dropout in distance learning. DeLone & McLean's (1992) IS success model suggests that higher levels of information quality result in increased user satisfaction. While the relationship between information quality and satisfaction has not been examined in Web-based learning research, some studies on IS success (Seddon & Kiew, 1996; McGill & Hobbs, 2003) have provided support for this contention. Chae & Kim (2001) indicated that information quality had a significant effect on user satisfaction with mobile internet services. Therefore, the following hypothesis is proposed.

H1 Information quality is positively related to learners' satisfaction with Web-based learning.

System quality

System quality has been represented in prior studies by ease of use (Seddon & Kiew, 1996; Rai *et al*., 2002). The technology acceptance model (Davis, 1989) implies that, other things being equal, a Web-based learning system perceived to be easier to use is more likely to induce a positive attitude, which is considered to be a satisfaction construct (Doll & Torkzadeh, 1988). According to the theory of reasoned action (Ajzen & Fishbein, 1980), an individual's attitude towards a behaviour is determined by his or her salient beliefs about the consequences of performing the behaviour. Arbaugh (2002) found that perceived ease of use was positively associated with student satisfaction with Web-based Master of Business Administration courses. Prior studies on IS success (Seddon & Kiew, 1996; Negash *et al*., 2003) have also provided support for the notion that system quality positively affected user satisfaction. Therefore, the following hypothesis is proposed.

H2 System quality is positively related to learners' satisfaction with Web-based learning.

Service quality

According to Oliver (1980), service quality is a performance perception which influences customer satisfaction through two mechanisms, directly via customer observation of good or bad service quality and indirectly via an input to the disconfirmation comparison (i.e. discrepancy between performance and expectation). Parasuraman *et al*. (1985) proposed that higher levels of service quality result in increased customer satisfaction. In recognition of the expanded role of the IS department and the importance of IS and e-commerce (EC), researchers have begun to include service quality as a measure of IS satisfaction/success in recent years. Prior studies (Zhu *et al*., 2002; Brown & Chin, 2004) indicated that service quality was significantly related to customer satisfaction. Therefore, the following hypothesis is proposed.

H3 Service quality is positively related to learners' satisfaction with Web-based learning.

Distributive fairness

While grades are indicative of students' acquisition of knowledge and skills in a particular content area (Strobino *et al*., 2002), grades received can also have substantial impact on students' satisfaction, future learning intentions and future performance within a subject. According to Kumar *et al*. (1995), distributive fairness is helpful in building good relationships between instructors and learners, which in turn will lead to learners' satisfaction and continuance intentions. While the influence of distributive fairness on learners' satisfaction and continuance intentions has not been explicitly examined in the Web-based learning research, support for the relationships can be found in other settings. For example, some studies have found that distributive fairness exerts a significant influence on satisfaction with one's job (Lind & Tyler, 1988; Moorman, 1991), service recovery (Smith *et al*., 1999)

and complaint handling (Tax *et al*., 1998). There is considerable evidence indicating that a higher level of distributive justice will lead to more favourable repurchase intentions (Oliver & Swan, 1989; Clemmer, 1993; Blodgett *et al*., 1997). Therefore, the following hypotheses are proposed.

H4 Distributive fairness is positively related to learners' satisfaction with Web-based learning.
H5 Distributive fairness is positively related to learners' intentions to continue using Web-based learning.

Procedural fairness

According to Seiders & Berry (1998), the grading process is an integral part of Web-based learning services; thus, instructors can enhance learners' satisfaction with Web-based learning by engaging in activities that enhance learner perceptions of procedural justice. Folger & Greenberg (1985) argued that the methods of determining outcomes may be more important than the actual outcomes. Lind & Tyler (1988) state that if individuals believe the procedures used to produce the outcomes are fair, they are likely to be satisfied with the outcomes, even if the outcomes are considered unfair. Researchers (Folger & Konovsky, 1989; Maxham & Netemeyer, 2002) have suggested that perception of procedural justice would enhance the probability of maintaining a long-term overall satisfaction between parties. Folger & Konovsky (1989) indicated that perception of procedural justice would build affective commitment. Prior research has found relationships between procedural fairness and satisfaction with variables such as pay (Folger & Konovsky, 1989), service recovery (Smith *et al*., 1999) and complaint handling (Tax *et al*., 1998). Some studies indicated that procedural fairness was negatively associated with turnover intentions (Brashear *et al*., 2005), while other studies found that procedural fairness had a positive effect on repurchase intentions (Clemmer, 1993). Therefore, the following hypotheses are proposed.

H6 Procedural fairness is positively related to learners' satisfaction with Web-based learning.
H7 Procedural fairness is positively related to learners' intentions to continue using Web-based learning.

Interactional fairness

Palloff & Pratt (1999) argued that interactions between learners and instructors played an important role in the online learning process. According to Folger & Cropanzano (1998), the way in which learners are treated during online interactions affects their perceptions about the fairness of Web-based learning process. It suggests a clear role for online instructors in relation to the development of learners' satisfaction and continuance intentions through acts with concern, respect and truthful manner. Prior studies (Tax *et al*., 1998; Smith *et al*., 1999; Maxham & Netemeyer, 2002) have demonstrated that positive perceptions of interactional justice significantly enhanced customer satisfaction. Blodgett *et al*. (1997) indicated that interactional

justice had a significant main effect on subjects' repatronage intentions, while Chebat & Slusarczyk (2005) found that interactional justice played a dominant role in shaping customer loyalty in service recovery. Therefore, the following hypotheses are proposed.

H8 Interactional fairness is positively related to learners' satisfaction with Web-based learning.
H9 Interactional fairness is positively related to learners' intentions to continue using Web-based learning.

System use

DeLone & McLean (2003) argued that 'use and user satisfaction are closely interrelated' and that 'positive experience with use will lead to greater user satisfaction.' Moreover, Benard & Satir (1993) indicated that chief executive officers' use of various functions and features of executive IS increase their satisfaction with the systems. According to a study by Gomez, Inc. (Pastore, 2001), consumers who use online banking more often to handle routine banking tasks are more satisfied with their bank. Therefore, the following hypothesis is proposed.

H10 System use is positively related to learners' satisfaction with Web-based learning.

Satisfaction

Affective response is known to be associated with intense states of arousal that lead to focused attention on specific targets and may therefore impact ongoing behaviour (Patterson & Spreng, 1997). Oliver (1980) theorizes that satisfaction has a positive effect on future intentions, both directly and indirectly via its impact on attitude. In the final step of satisfaction formation processes, satisfaction determines intentions to patronize or not to patronize the store in the future (Swan & Trawick, 1981). McGorry (2003) argued that student satisfaction with online learning courses is likely to determine whether the student takes subsequent courses. Chiu *et al*. (2005) reported that learners' satisfaction with Web-based learning was significantly associated with their continuance intentions. Therefore, the following hypothesis is proposed.

H11 Satisfaction is positively related to learners' intentions to continue using Web-based learning.

RESEARCH METHODOLOGY

Measurement development

All measurement items were adapted from the literature (See Table 1). A pre-test of the questionnaire was performed using six experts in the IS area to assess its logical consistency, ease of understanding, sequence of items and contextual relevance. The comments collected from

these experts led to several minor modifications of the wording and the item sequence. Furthermore, a pilot study was conducted involving 20 masters-level students who had taken a Web-based learning course. Comments and suggestions on the item contents and structure of the instrument were solicited. The questionnaire was further modified based on the comments and suggestions obtained. For all the measures, a seven-point Likert scale was adopted. For the first item of system use, anchor points range from extremely infrequent (1) to extremely frequent (7). For the second item of system use, anchor points are less than 1 h (1), 1–5 h (2), 5–10 h (3), 10–15 h (4), 15–20 h (5), 20–25 h (6) and more than 25 h (7). For the other measures, anchor points range from strongly disagree (1) to strongly agree (7).

Survey administration

Data were gathered from students of a Web-based learning service provided by National Kaohsiung Normal University (NKNU) in Kaohsiung, Taiwan. A total of 2500 emails with a hyperlink connecting to our Web survey were sent to learners who had taken at least one course offered by the NKNU Web-based learning program. Thirty randomly selected respondents were offered an incentive in cash of US$10. The first page of the questionnaire explained the purpose of this study and ensured confidentiality. When this survey was completed, 289 questionnaires were collected. Table 2 summarizes the demographic profile of respondents.

Data analysis

Our data analysis utilized a two-step approach as recommended by Anderson & Gerbing (1988). The first step involves the analysis of the measurement model, while the second step tests the structural relationships among latent constructs. The aim of the two-step approach is to assess the reliability and validity of the measures before their application in the full model.

Table 2. Profile of survey respondents ($n = 289$)

Measure	Items	Frequency	Percentage
Age	Average	31	
Gender	Male	131	45.3
	Female	158	54.7
Education	Undergraduate students	34	11.8
	Bachelor	121	41.9
	Master students	64	22.1
	Master	57	19.7
	PhD students	13	4.5
Number of courses taken	One	227	78.5
	Two or three	43	14.9
	Over four	19	6.6
Hours of internet use per week	Average	22	

Using LISREL, confirmatory factor analysis (CFA) was applied to assess the construct reliability and validity of the nine scales (information quality, system quality, service quality, system use, distributive fairness, procedural fairness, interactional fairness, satisfaction and continuance intention). Each item was modelled as a reflective indicator of its latent construct. The nine constructs were allowed to covary freely in the CFA model. Model estimation was done using the maximum likelihood approach, with the item correlation matrix as input. Table 3 presents the results of the CFA analysis.

For a measurement model to have sufficiently good model fit, the chi-square value normalized by degrees of freedom (χ^2/d.f.) should not exceed 3, Non-Normed Fit Index (NNFI) and Comparative Fit Index (CFI) should exceed 0.9 and Root Mean Square Error of Approximation (RMSEA) should not exceed 0.08. For the current CFA model, χ^2/d.f. was 1.69 ($\chi^2 = 800.96$; d.f. = 475), CFI was 0.97, NNFI was 0.96 and RMSEA was 0.049, suggesting adequate model fit.

Reliability was examined using the composite reliability values. As shown in Table 3, all the values were above 0.7, which is the commonly acceptable level for explanatory research. Additionally, the convergent validity of the scales was verified using two criteria suggested by Fornell & Larcker (1981): (1) all indicator loadings should be significant and exceed 0.7; and (2) average variance extracted (AVE) for each construct should exceed the variance because of measurement error for that construct (i.e. AVE should exceed 0.50). For the current CFA model, only one of the 34 loadings was slightly below the 0.7 threshold (see Table 3). AVE ranged from 0.58 to 0.91 (see Table 4), greater than variance because of measurement error. Hence, both the conditions for convergent validity were met.

Finally, the discriminant validity of the scales was assessed using the guideline suggested by Fornell & Larcker (1981): the square root of the AVE from the construct should be greater than the correlation shared between the construct and other constructs in the model. Table 4 lists the correlations among the constructs, with the square root of the AVE on the diagonal slope. All the diagonal values exceeded the interconstruct correlations; hence the test of discriminant validity was acceptable. Therefore, we conclude that the scales have sufficient construct validity.

The structural model was tested with the data collected from the validated measures. The overall model-fit indices were within accepted thresholds: χ^2/d.f. = 1.68 ($\chi^2 = 806.15$; d.f. = 479), CFI = 0.97, NNFI = 0.96 and RMSEA = 0.049. The significance of individual paths and the explanatory power of the research model are shown in Figure 2. The *R*-square value shows that distributive fairness, procedural fairness, interactional fairness and satisfaction account for 74% of variance in continuance intention.

DISCUSSION

Overall, the results provide partial support for the expected compensatory model of relationships among perceptions of quality, perceptions of fairness, satisfaction and intention to continue using Web-based learning. A summary of the results is shown in Table 5. A number of

Table 3. Summary of measurement scales

Construct	Measure	Mean	SD	Loading
Information quality (IQ) composite reliability = 0.90				
IQ1	The content of the course materials provided by the Web-based learning site is complete.	5.04	1.17	0.86
IQ2	The content of the course materials provided by the Web-based learning site is easy to comprehend.	5.10	1.17	0.88
IQ3	The content of the course materials provided by the Web-based learning site is timely.	4.87	1.18	0.77
IQ4	The course materials provided by the Web-based learning site are well represented with text and graphics.	4.76	1.23	0.71
IQ5	The content of the course materials provided by the Web-based learning site is relevant to the topic.	5.50	0.90	0.78
System quality (SQ) composite reliability = 0.90				
SQ1	The user interface of the Web-based learning site is well designed.	4.90	1.12	0.75
SQ2	The Web-based learning site can quickly load all the text and graphics.	4.66	1.28	0.75
SQ3	It is easy to navigate the Web-based learning site.	5.24	1.00	0.87
SQ4	The Web-based learning site functions well all the time.	5.17	1.11	0.77
SQ5	The Web-based learning site provides quick responses to my requests.	4.67	1.25	0.84
Service quality (SEQ) composite reliability = 0.92				
SEQ1	I feel comfortable using the functions and services provided by the Web-based learning site.	5.04	1.12	0.84
SEQ2	The Web-based learning site provides the services I need.	5.08	1.10	0.83
SEQ3	The Web-based learning site provides reliable service.	5.08	1.15	0.80
SEQ4	The Web-based learning site can meet the specific needs of each learner.	4.48	1.24	0.80
SEQ5	The Web-based learning site provides the service on time.	4.80	1.19	0.80
System use (SU) composite reliability = 0.74				
SU1	How frequently do you use the Web-based learning site?	5.26	1.23	0.87
SU2	How many hours do use the Web-based learning site every week?	3.92	1.25	0.63
Distributive fairness (DF) composite reliability = 0.97				
DF1	The grade I received was fair considering my effort.	5.06	1.28	0.96
DF2	The grade I received was fair considering my performance.	5.06	1.29	0.96
DF3	The grade I received was fair considering the amount of time I spent.	5.01	1.34	0.94
Procedural fairness (PF) composite reliability = 0.92				
PF1	The instructor collected accurate information necessary for making the grading decisions.	4.52	1.34	0.93
PF2	The instructor generated standards so the grading decisions could be made with consistency.	4.47	1.28	0.92
PF3	The instructor heard the concerns of all students affected by the grading decisions.	4.10	1.44	0.79
PF4	The instructor explained his grading decisions to students.	4.03	1.44	0.77
Interactional fairness (IF) composite reliability = 0.95				
IF1	The instructor showed concerns for my rights as a student.	5.13	1.10	0.90
IF2	The instructor treated me with dignity and respect.	5.01	1.13	0.91
IF3	The instructor showed concern to my questions or problems.	5.15	1.10	0.94
IF4	The instructor provided me with timely feedback to my questions.	4.98	1.11	0.86

Table 3. Cont.

Construct	Measure	Mean	SD	Loading
Satisfaction (SA) composite reliability = 0.91				
SA1	I think Web-based learning is a good idea.	5.63	1.04	0.85
SA2	My decision to use Web-based learning is a wise one.	5.60	1.09	0.91
SA3	I am pleased with the experience of using Web-based learning.	5.48	1.09	0.88
Continuance intention (CI) composite reliability = 0.96				
CI1	I intend to continue using Web-based learning in the future.	5.56	1.17	0.93
CI2	I will continue using Web-based learning as much as possible in the future.	5.41	1.21	0.93
CI3	I will continue using Web-based learning in the future.	5.45	1.20	0.96

Table 4. Correlations and AVE

		Construct								
Construct	AVE	IQ	SQ	SEQ	SU	DF	PF	IF	SA	CI
IQ	0.64	**0.80**								
SQ	0.64	0.70	**0.80**							
SEQ	0.68	0.76	0.80	**0.83**						
SU	0.58	0.50	0.46	0.46	**0.76**					
DF	0.91	0.49	0.51	0.56	0.31	**0.95**				
PF	0.73	0.53	0.56	0.63	0.25	0.64	**0.86**			
IF	0.82	0.52	0.56	0.61	0.41	0.59	0.66	**0.91**		
SA	0.78	0.63	0.64	0.65	0.48	0.59	0.50	0.60	**0.88**	
CI	0.88	0.61	0.56	0.60	0.49	0.51	0.48	0.52	0.80	**0.94**

Diagonal elements (in bold) are the square root of the average variance extracted (AVE). Off-diagonal elements are the correlations among constructs.

IQ, information quality; SQ, system quality; SEQ, service quality; SU, system use; DF, distributive fairness; PF, procedural fairness; IF, interactional fairness; SA, satisfaction; CI, continuance intention.

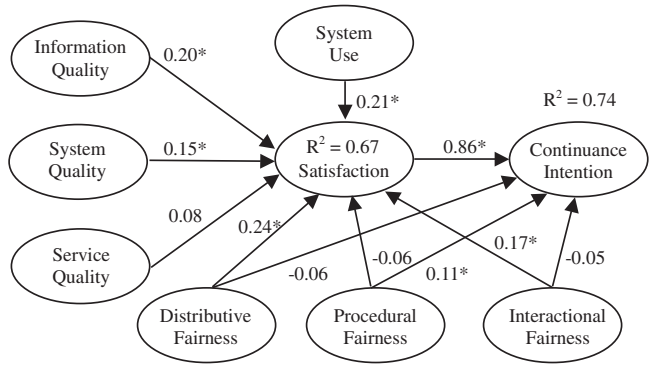

Figure 2. SEM analysis of research model. *P-value < 0.05.

Table 5. Results of hypothesis testing

Hypotheses		Results
H1:	Information quality is positively related to learners' satisfaction with Web-based learning.	Supported
H2:	System quality is positively related to learners' satisfaction with Web-based learning.	Supported
H3:	Service quality is positively related to learners' satisfaction with Web-based learning.	Not supported
H4:	Distributive fairness is positively related to learners' satisfaction with Web-based learning.	Supported
H5:	Distributive fairness is positively related to learners' intentions to continue using Web-based learning.	Not supported
H6:	Procedural fairness is positively related to learners' satisfaction with Web-based learning.	Not supported
H7:	Procedural fairness is positively related to learners' intentions to continue using Web-based learning.	Supported
H8:	Interactional fairness is positively related to learners' satisfaction with Web-based learning.	Supported
H9:	Interactional fairness is positively related to learners' intentions to continue using Web-based learning.	Not supported
H10:	System use is positively related to learners' satisfaction with Web-based learning.	Supported
H11:	Satisfaction is positively related to learners' intentions to continue using Web-based learning.	Supported

findings are worth further discussion. First, continuance intention is primarily explained by satisfaction. Further regression analyses indicated that satisfaction alone accounts for 64.9% of the variance of continuance intention. Other regressions that attempt to explain continuance intention include information quality, system quality, service quality, distributive fairness, procedural fairness, interactional fairness and system usage. These factors provided a small increase (0.03) in explanatory power of the regression variate, thereby reconfirming the strong role of satisfaction as mediator between perceptions of quality and fairness and continuance intention.

Second, the impact of service quality on satisfaction is not significant. From the literature survey, we found that empirical findings on the influence of service quality on user satisfaction have been mixed. For example, Negash *et al*. (2003) found that the path coefficient between service quality of Web-based customer support systems and user satisfaction was –0.051; they proposed that one possible explanation for the insignificant relationship is that the Service Quality (SERVQUAL) instrument does not apply to the IS field. Landrum & Prybutok (2004) found that service quality of the library staff and facility had a significant influence on user satisfaction with a path coefficient of 0.232. Therefore, a possible explanation for the insignificant relationship could be that service quality may become an important variable for measuring the overall success of the Web-based learning or IS department, as opposed to individual sites/systems (DeLone & McLean, 2003).

Third, procedural fairness does not have a significant and positive effect on satisfaction. We performed additional LISREL analyses, which indicated that the path coefficient of procedural fairness increased from –0.06 to 0.17 ($P < 0.05$) by removing distributive fairness and interactional fairness from the research model. This finding implies that when the impacts of distributive fairness and interactional fairness are taken into account, individuals put more

emphasis on outcomes and interpersonal treatment than on decision-making procedures when evaluating the feeling of satisfaction.

Ultimately, we want to determine whether the three dimensions of fairness contribute significantly to the IS success model. In order to examine this question, we performed hierarchical regression tests to explore the roles of the three dimensions of fairness in explaining satisfaction. The *R*-square value shows that information quality, system quality, service quality and system use together account for 51.3% of the variance of satisfaction. The *R*-square of satisfaction increased 0.074 by including the three dimensions of fairness as additional independent variables, which is significant at the 0.001 level of significance. These results confirm that the inclusion of the three dimensions of fairness does contribute to the *R*-square of satisfaction. In other words, the three dimensions of fairness help to explain satisfaction. Based on these results, we can conclude that the IS success model is improved by including the three dimensions of fairness when the behaviour studied involves individuals' inputs and outputs. It seems appropriate to suggest that creating individuals' perceptions of fairness is as important as creating perceptions of quality; moreover, it is a primary means of enhancing individuals' feeling of satisfaction. IS success model researchers are strongly advised to look further into the relationships between these constructs and explore them both conceptually as well as empirically.

Fourth, the influence of procedural fairness on continuance intention is significant, whereas the influences of distributive fairness and interactional fairness are not significant. Procedures are viewed as more enduring than outcomes (Folger & Greenberg, 1985) and stronger indicators of future behaviour (Kumar *et al*., 1995). For this reason, learners in our study put more emphasis on the procedures that produce grades than on the outcomes and learner–instructor interaction as they evaluate their continuance intention. Our results suggest that procedural fairness plays a very specific role, because it is the only dimension of fairness that has a direct effect on continuance intention. Therefore, we conclude that distributive fairness and interactional fairness affect continuance intention indirectly through satisfaction.

A fifth finding concerns the system use construct. As can be seen from Figure 2, system use contributes to satisfaction with a path coefficient of 0.15. The coefficient is encouraging because the relationship between system use and satisfaction has rarely been empirically examined in IS success model-based studies. This finding implies that high frequency of system usage creates positive experience, as well as familiarity with the system's functions and features; in turn, this would provide greater user satisfaction.

Finally, future research is needed to address factors influencing learners' intention to continue using Web-based learning. For example, values play a central role in human cognitive structures, and thus values provide a powerful basis for understanding human behaviour. Expectancy-value theorists have argued that individuals will tend to do tasks that they positively value and avoid tasks that they negatively value (Atkinson, 1957). Eccles *et al*. (1983) link individuals' choice, persistence and performance to expectancy for success and subjective task value. Eccles *et al*. (1983) defined different components of subjective task value: attainment value (importance), intrinsic value (interest), utility value (usefulness of the task) and cost. Attainment value is the personal importance of doing well on the task. Intrinsic value is the enjoyment the individual gets from performing the activity, or the subjective interest the indi-

vidual has in the subject. Utility value is how well a task relates to current and future goals, such as career goals. Also, cost is conceptualized in terms of the negative aspects of engaging in the task (e.g. performance anxiety and fear of failure), the amount of effort that is needed to succeed, and the loss of opportunities resulting from making one choice rather than another. An interesting issue for future research is to examine whether attainment value, intrinsic value, utility value and cost will influence learners' continuance intentions.

CONCLUSIONS

Both the IS success model and fairness theory have been widely studied in different fields. In the organizational justice and marketing literature, fairness is strongly associated with organizational citizenship, complaint handling, service recovery and work outcomes. Information technology research has looked at the relationship between dimensions of quality and success of EC, IS and Web-based systems. Our study has combined these research streams by placing learners' satisfaction and continuance intention into a context of information quality, system quality, service quality, system use, distributive fairness, procedural fairness and interactional fairness. Future researchers, Web-based learning providers and IS managers will find our proposed fairness and quality model a fertile ground for further refinement and development in understanding how to motivate and maintain usage of Web-based learning.

Although these findings are encouraging and useful, the present study has certain limitations. First, whether our findings could be generalized to all types of Web-based learning is unclear. This study focuses on Web-based learning for university education. Factors influencing continuance intention of university students might be different from those of organizational employees. Further research is necessary to verify the generalizability of our findings. Second, the results may have suffered self-selection bias. Our sample comprised only active participants of Web-based learning courses, whereas individuals who had already ceased to participate in Web-based learning might have different perceptions about the influence of dimensions of quality and fairness; thus, the results should be interpreted as only explaining continuance intention of current users of Web-based learning. Whether the results can be generalized to non-participants or to disaffected users will require additional research. Third, our research data – comprised of learners' responses – were cross-sectional and did not present an opportunity to examine the long-term trend of these hypothesized relationships. Therefore, the effects of the determinants in our research model may change with increasing user experience over time. Further longitudinal studies are recommended to validate our research model in this regard. Finally, the usage of the Web-based learning service is currently voluntary (under users' full volitional control). Because the findings may not be generalized to a mandatory setting, further research is necessary to verify the differences between the voluntary and mandatory settings.

Understanding why individuals continue to use a Web-based learning service or IS will continue to be a pertinent topic. This study provides an initial step by outlining a meaningful bridge between the dimensions of fairness and quality and intention to continue using Web-based learning or IS.

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