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Abstract

Marketers are constantly faced with designing an appropriate level of marketing stimulus at which a potential consumer can experience a sensation. Potential consumers generally are constrained with time and energy to explore new products and services. This study attempts to investigate the effects of a system trial as a marketing stimulus on potential consumers' beliefs. Using a web-based e-learning system, the examination reveals that targeted consumers with or without system trial experience present differences in their determinants of behavioral intentions and beliefs. Potential consumers with system trial experience form a higher perception of usefulness, their intention to use e-learning for distance education purpose is more strongly affected by system functionality, their intention to use e-learning as a supplementary learning tool is more strongly affected by perceived usefulness, and their perception of ease of use is also more strongly influenced by system response. Without system trial, potential consumers' self-efficacy plays a more important role but only to the extent of forming a higher perception of ease of use. These findings enhance our understanding of marketing information goods to potential consumers.

Keywords: Trialability, Internet marketing, E-learning, Consumer behavior

1. Introduction

The information service and software market in Taiwan has experienced a steady growth for the past several years and the trend will continue in the foreseeable future. Based upon the report by the Institute of Information Industry (Taiwan), the market growth is driven mostly by the following five factors: (1) optimistic economy, (2) enriched digital content, (3) business globalization, (4) e-Taiwan plan, and (5) e-learning needs. The software markets cross straits show a similar growth trend as well (Taiwan Economic Daily News, 2004-02-07).

Traditionally, marketers as agents of change attempt to find ways to influence consumers use or purchasing behavior. One of the employed methods is for consumers to experiment with the product on a limited basis and make evaluation before use or purchasing. For example, some of the common practices are: (1) giving out trial-size samples of consumer goods, (2) providing limited trial of durable goods, (3) introducing rental programs for PC, and (4) encouraging test-drive of the latest auto models. These practices are designed to make consumers aware of the new products and at the same time reduce the risk perceived by prospective buyers. The costs associated with these such as producing and delivering trial samples sometimes are significant.

Information service and software marketing has similar but different aspects due to the so-called information economics. For example, to market a new software product, companies may provide customers with a test version having a three-month expiration date, a free version handling only a limited numbers of variables, or a guest account to use for a web-based system with limited functionalities. Furthermore, the Internet extends the time and

place convenience for consumers to try out the new product. Although additional development costs may be required, the marginal costs of distribution or delivery are trivial or near-zero (Nejmeh 1994). Software companies more than likely will leverage this cost advantage to a greater extent in accelerating new product introduction in order to capitalize on the growth markets. Therefore, it becomes vital to investigate the effects of the trial. This study used a web-based system to evaluate the effects of system trial on consumers' beliefs and intentions regarding e-learning use. In particular, the following research questions guided the study:

1. Do the potential consumer groups with or without system trial experience have similar beliefs and use intentions regarding the software product?
2. Do the relationships between consumers' behavioral intentions to use an e-learning system and determinant factors differ for trial and non-trial groups?

2. Literature Review

2.1 Research Model

In understanding consumer behavior, theory of reasoned action (TRA) has been used to explain the relationship among attitude, intention, and actual behavior (Ajzen and Fishbein 1980). Based on TRA, technology acceptance model (TAM) was developed as a parsimonious model to understand the information technology acceptance (Davis et al. 1989). The belief-intention structure has since been widely applied in IT adoption studies. In addition, diffusion of innovations (Rogers 1985) was also an important perspective in explaining consumer behavior (Hanna and Wozniak 2001). Derived from the above theories, an e-learning acceptance model as shown in Figure 1 was proposed and empirically supported (Lee and Pituch 2002). Other than the core constructs of perceived usefulness (PU) and perceived ease of use (PEOU), the model modified and extended TAM as follows: (1) The acceptance criteria were categorized into behavioral intentions to use the e-learning system as a supplementary learning tool (IU1) and as a distance education method (IU2); (2) External variables were identified: namely, system characteristics and individual factors. The system characteristics contain functionality, interactivity, and response while the individual factors include self-efficacy and Internet experience. System functionality (SF) is a consumer's opinion or perception of system functions related to learning and relative advantage as to time and place in learning. System interactivity (SI) is a consumer's opinion or perception of the e-learning system's ability in enabling interactions between teacher and students, and among students themselves. System response (SR) is the degree to which a consumer perceives whether the system response is fast/slow, consistent, and reasonable in requesting a system service (Bailey and Pearson 1983). For the individual factors, self-efficacy (SE) is defined as one's self-confidence in his or her ability to perform certain learning tasks using an e-learning system (Bandura 1977). Internet experience (IE) is the extent to which a prospective consumer uses the Internet (Tan and Teo 2000). The e-learning acceptance model accounted for approximately 65.3%, 63.8%, 47.9%, and 60.3% of the outcome variances of IU2, IU1, PU, and PEOU perspectively. In the context of e-learning, the potential consumers are the students or learners.

2.2 The Influence of Trialability

Trialability has been reported to influence consumer acceptance of new products. Rogers (1995) identified five innovation characteristics as influencing adoption behavior. These characteristics are relative advantage, compatibility, complexity, trialability, and observability. Trialability is "the degree to which an innovation may be experimented with on a limited basis" (p. 243). In the information technology adoption, trialability has been found

to influence adoption behavior (e.g., Agarwal and Prasad 1997; Moore and Benbasat 1991; Tan and Teo 2000). The limited cost associated with trialability also results in its influence on electronic commerce adoption (Kendall et al. 2001). Moreover, companies offering trial versions of software products enjoy price premiums (Gallaugher and Wang 2002). In relation to the trialability across time, Rogers stated that earlier adopters of an innovation perceive trialability as more important than do later adopters. Trialability was also found to influence pre-adoption attitude but not on post-adoption attitude (Karahannna et al.1999). As potential consumers have limited time and energy to explore new products, scant research has focused on the effects of trialability on their cognitive and affective response under these constraints. Therefore, this study attempts to investigate the micro-level effects of a system trial on potential consumer beliefs and intentions.

3. Methodology

This study used a quasi-experiment design in which subjects in one single college in Taiwan were categorized into the non-trial and trial groups. The choice of a single institution would control the effects from organizational level variables so that micro level effects would more likely be detected. There were 13 classes selected from a total of 22 computer classes in one semester. These computer classes of Management Information System Department, Healthcare Administration Department, and Pharmacy Department were selected from the stratified population (higher education versus continuing education division) using cluster random sampling. All students in the selected computer classes were expected to participate. Since this study required system demonstration and/or system trial, the survey was conducted at the computer lab as a group for each class. There were 7 classes (higher education 3, continuing education 4) in the non-trial groups and 6 classes (higher education 3, continuing education 3) in the trial group. Of the 326 members in the non-trial group, there were 298 participants completed the survey with a response rate of 91.4%. For the trial group, 259 of the 321 class members completed the trial and filled out the survey with a response rate of 80.7%. Under the assumptions that potential consumers have time constraint, the non-trial group students were given a one-hour live demonstration of an e-learning system, whereas the trial group was given a 40-minute live demonstration of the same system and 30-minute to individually practice with it using a guest account. The e-learning system used is the Cyber University at National Sun Yat-sen University, Taiwan. The trial group was given a less thorough demonstration in order to allocate time for the system trial. The time used for both groups was considered adequate in comparison with the one-hour demonstration of a word processor (Davis et al. 1989) or the 45-minute experiment session in investigating the animation effects (Zhang 2000). The survey instrument was the same for both groups. Briefly, the instrument used a seven-point Likert scale, where “1” means strongly negative opinion and “7” means strongly positive opinion to measure respondent perceptions and intentions.

For Research Questions 1, inferential statistics such as t tests (using SPSS 10.0) were used to determine which factor means differed significantly between these two groups. For Research Questions 2, multi-group Structural Equation Modeling (SEM) approaches (Byrne 1998; Joreskog and Sorbom 1993; Kline 1998) using LISREL 8.50 were performed to evaluate the effects of the trial group in comparison with the non-trial group. As an antecedent to a multi-sample path analysis, a factor loading invariance across groups was conducted first by testing the significance of the chi-square differences between two confirmatory factor analysis (CFA) models: one with constraining the factor loadings to be the same across both groups and the other without constraints. Then a series of multi-sample SEM was performed to test and identify the differences in path coefficients between these two groups.

4. Findings and Discussion

Examining the factor means of the two groups as shown in Table 1, the trial group has a significantly higher perception of usefulness than the non-trial group ($t = -2.13$, $p = 0.03$). There are no significant differences in all the other factor means between the two groups. The result indicates that system trial enables trial group students to form a more concrete usefulness perception. In addition, the factor means are ranging from 4.74 to 5.84 for the non-trial group and from 4.71 to 5.70 for the trial group indicating that both groups are positive in their beliefs and intentions to use regarding the e-learning system. This result shows consistency across both groups and therefore would relieve some of the concerns that the results may be by chances with such a short stimulus.

To further evaluate the effects of system trial on model relationships, multi-sample SEM were performed to compare the structural equation models over the non-trial and trial groups. As shown in Table 2, first a single group CFA was performed for each of the two groups. Then in the multiple-group CFA step, the difference in fit between a baseline model that allowed all factor loadings to vary across the two groups and a factor loading invariance model that constrained the factor loadings to be the same for these groups provides support for the more restrictive model. The difference in the fit of these models is not statistically significant, $\chi 2$difference (50, $N = 557$) = 55.57, $p > .05$. With the overall fit indicators providing support for the invariant factor loading model, this measurement model was used to test the difference in the path coefficients of the structural model for the two groups.

In the multiple-group SEM stage, the first model tested path invariance by constraining all structural paths, reflecting the relationships among constructs, to be the same across both groups. The model indicated an acceptable model fit, $\chi 2/df = 1.46$, CFI = .977, NNFI = .974. However, the modification indices indicated that the chi-square would decrease 7.686 (the highest) if the path from SF to IU2 were estimated separately for both groups. A second model was specified accordingly and tested. The fit of this model was acceptable, $\chi 2/df = 1.44$, CFI = .978, NNFI = .975, and this model was more consistent with the data than the initial model, $\chi 2$difference (1, $N = 557$) = 7.81, $p < .05$. For this second model, the modification indices indicated that the chi-square would decrease 6.394 (the highest) if the path from PU to IU1 were estimated separately for each group. This third model was specified and tested. The model fit was acceptable, $\chi 2/df = 1.43$, CFI = .978, NNFI = .975, and this third model had better overall fit than the second model, $\chi 2$difference (1, $N = 557$) = 6.48, $p < .05$. For this third model, the modification indices indicated that the chi-square would decrease 4.146 if the path from SE to PEOU were estimated separately for each group. This fourth model was specified and tested. The model fit was acceptable, $\chi 2/df = 1.43$, CFI = .979, NNFI = .976, and this fourth model had better overall fit than the third model, $\chi 2$difference (1, $N = 557$) = 4.24, $p < .05$. For this fourth model, the modification indices indicated that the chi-square would decrease 7.325 if the path from SR to PEOU were estimated separately for each group. This fifth model was specified and tested. The model fit was acceptable, $\chi 2/df = 1.41$, CFI = .979, NNFI = .976, and this fifth model had better overall fit than the fourth model, $\chi 2$difference (1, $N = 557$) = 7.42, $p < .05$. Finally, the modification indices for this fifth model were all small and did not suggest any further refinements to the model.

The effects of system trial on the path model relationships are presented in Table 3. The direct effects found to be the same across both groups are shown in the common metric column. The values shown in the non-trial and trial columns are the standardized path coefficients estimated separately for each group. Four path coefficients were different between the two groups. First, self efficacy had a stronger influence on the perception of ease of use for the non-trial group (0.513, significant) than for the trial group (0.274, significant). Secondly, system functionality predicted intention to use IT for distance education purpose for the trial group (0.259, significant) but not for the non-trial group (0.083, insignificant).

Thirdly, system response influenced perceived ease of use for the trial group (0.229, significant) but not for the non-trial group (0.026, insignificant). Lastly, perceived usefulness predicted intention to use for supplementary learning more strongly for the trial group (0.351, significant) than for the non-trial group (0.177, significant). The multi-sample SEM path model for both trial and non-trial groups is illustrated in Figure 2. The first result indicated that, without experiencing system trial, self confidence of using the e-learning system is more important for students to form a higher perception of ease of use. The second finding showed that system functionality would impact students' intention to use the e-learning system for distance education purpose only after experiencing system trial. Since intention to use is a predictor for actual use (Szajna 1996), this result implies that, via system trial, potential consumers' opinion and perception of system functionality will then influence their intention and eventually lead to actual use. The third finding indicated that system response experienced in the system trial would influence students' perception of ease of use whereas it would not just by observing the demonstration. The fourth finding revealed that users' perception of usefulness after experiencing system trial would have a stronger effect on their use intention. Since usefulness is impacted by system characteristics (functionality, interactivity, response), which indicated that system trial would enable system characteristics to have a stronger influence on use intention for supplementary learning purpose. The above results further point out that the stronger effects of trialability on belief-intention structure are mainly through the system characteristics.

5. Limitations of the Study

This study may have certain limitations. The use of student subjects from one single institution may limit the generalization of the results to other universities and K-12 educational institutions. It may also limit the generalizability of the findings to other e-learning population such as corporate training and government, although the problem should be minimal since the results from prior IT usage studies do not show systematic differences between those employing student subjects and the one employing organizational users (Bhattacherjee and Premkumar 2004). As such, this research needs to be replicated to further examine the robustness of this finding across a wide range of samples and technologies.

6. Implications for Practice

This study has important implications in marketing information service and software products, especially for electronic commerce providers. The results demonstrate that the availability of system trial will increase usefulness perception and enable system characteristics to better influence beliefs and use intentions. Most importantly, since trialability is the degree to which the real product features can be experimented with on a limited basis, it will build realistic user expectations as opposed to other marketing gimmicks designed to inflate users' expectation which will likely lead to user dissatisfaction and eventual usage discontinuance. This responds to Mathieson's (1991) claim that external factors need to be sought out to yield "specific information that can better guide system development" (p. 173). Therefore, the emergent electronic commerce providers (e.g. e-trades, e-banks) and software developers, in consideration of the noticeable effects and the near-zero marginal cost of distribution or delivery, should equip their IT products with trialability as a cost-effective marketing stimulus. In the e-learning perspective, the implication to educators or corporate trainer is that a system trial will significantly improve the e-learning adoption, which is vital to the success of virtual universities or online-degree programs. On the other hand, without system trial, potential consumers' self confidence plays a more important role but only to the extent of forming a higher ease of use belief.

7. Implications for Research

This research focuses on the very front-end in the continuum from the initial product exposure to use/purchase of consumer adoption behavior. The unique attribute of this kind of research is that potential consumers have limited time and efforts for the initial exposure. Unlike other prior studies that either empirically tests the traditional static models of IT adoption (Davis et al. 1989) or provides empirical evidence to support that user beliefs and attitudes do change dynamically over time (Bhattacherjee and Premkumar 2004; Karahanna et al. 1999), this study uses a quasi-experiment design to investigate the effects of two different treatments (demonstration/trial, demonstration) as marketing stimuli on consumer beliefs and intentions. Rather than comparing models over two populations, this study uses multi-group SEM method which can be viewed as analogous to the incorporation of a categorical variable (trial versus non-trial group). Our research model is derived from theories and has been empirically tested (Lee and Pituch 2002) and the incorporation of trialability is based on a review of related literature. Although the inclusion or exclusion of parameters from the tentative list should be based on theories, they are still subject to whether the amount of treatment (trial time) reaches the noticeable threshold level. Therefore, this study attempts to seek the simplest model that still fits the data. More research needs to be conducted to further confirm the validity of the model.

In addition, the finding of this study revealed that consumer beliefs and intentions vary across two levels of treatments under the time and effort constraints for initial exposure. As a result, it suggests future directions in beliefs and intentions change studies. Future experiment studies with multiple treatment levels will be needed in order to provide a broader picture of how beliefs and intentions of consumers may vary with different treatment levels (length of trial, depth of trial functionality). If possible, those studies should seek the just noticeable threshold level that can produce detectable effects on consumer beliefs and intentions or the shortest trial time that produces the maximal effects. This information will be beneficial to electronic commerce provider or software developer to better market their IT products.

In summary, this study reports a preliminary empirical evidence to support trialability as an important factor for information product adoption. Moreover, trialability increases the likelihood of software adoption mainly through system characteristics. Therefore, given that a trial is available, system characteristics are vital external variables that can be manipulated or enhanced by the interest parties so that potential consumers will have stronger beliefs and intentions. In other words, system developers need to provide trialability together with sound system characteristics to better influence potential consumers' adoption behavior. Though the purpose of this study is not to find out the just noticeable threshold level of stimulus, it appears that system trial can be used as one that will produce detectable differences in potential consumer beliefs and use intentions.

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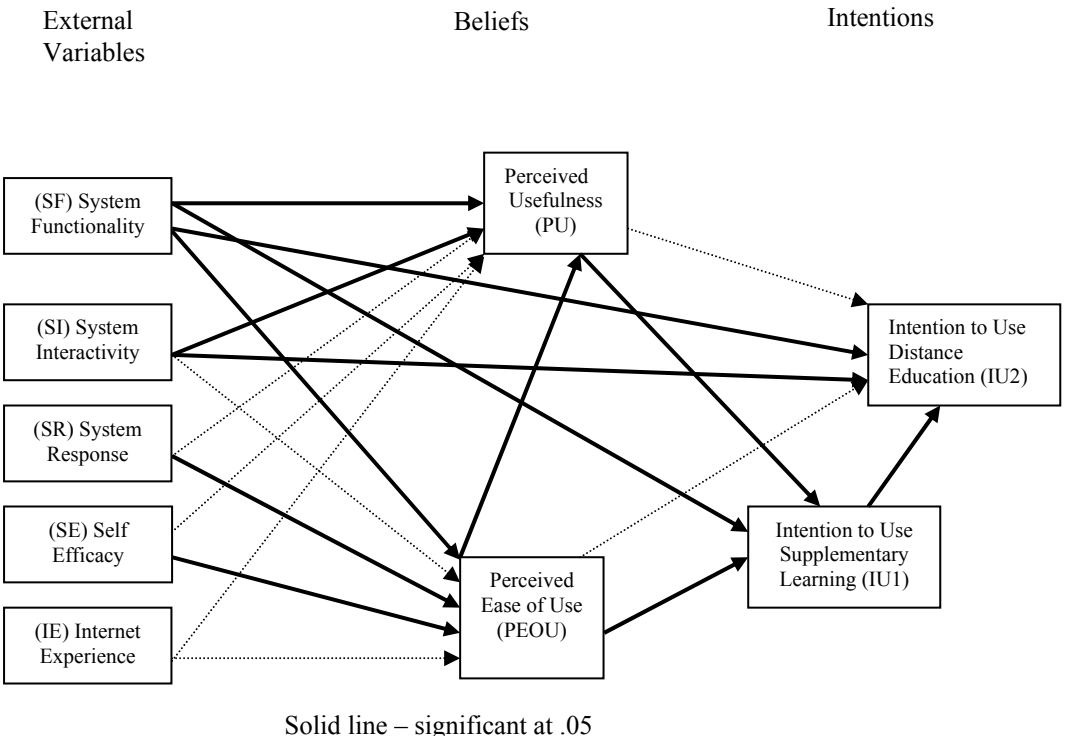

Figure 1. E-learning Acceptance Model (Lee and Pituch 2002)

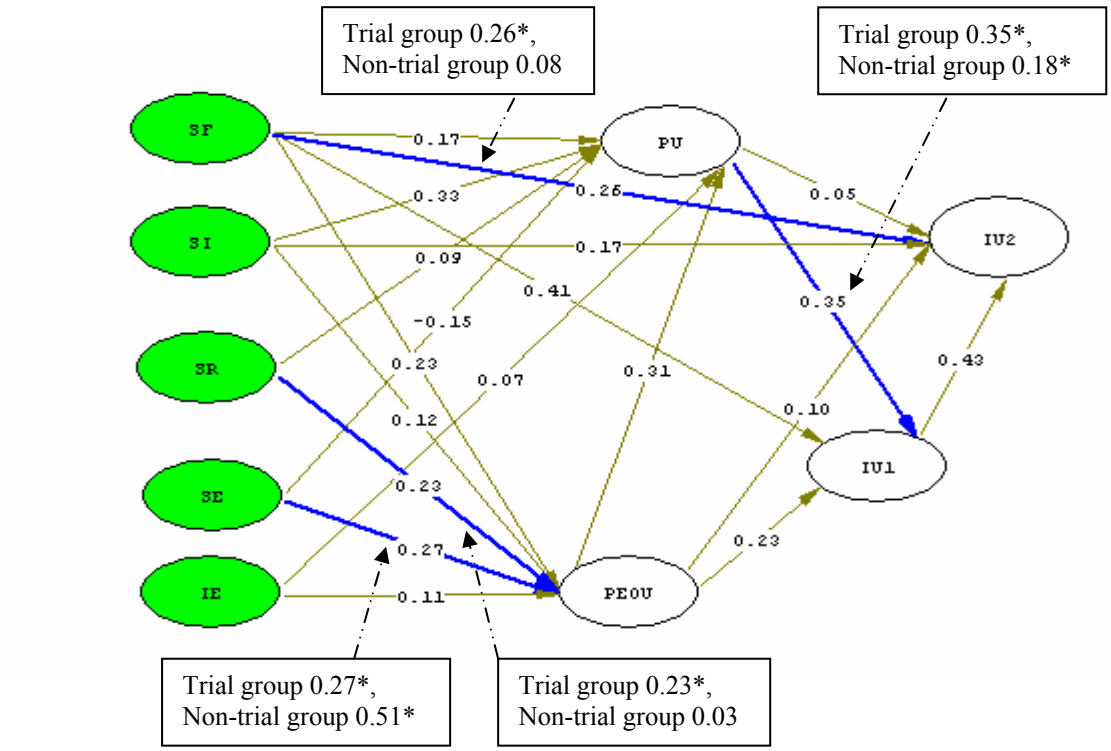

Figure 2. Multi-group SEM Results for Trial and Non-trial Groups

Table 1. Differences in Factor Means Between the Non-trial and Trial groups

	Non-trial		Trial			
Factors	*M*	*SD*	*M*	*SD*	*t* value	Prob.
IU1	5.13	1.09	5.11	1.13	1.27	.90
IU2	5.34	1.05	5.20	1.21	1.50	.13
PU	4.76	0.92	4.93	0.98	-2.13	.03*
PEOU	4.97	1.10	5.04	1.07	-0.78	.44
SF	5.84	0.98	5.70	1.00	1.64	.10
SI	4.89	1.09	4.87	1.11	0.27	.79
SR	4.74	0.95	4.80	1.00	-0.69	.49
SE	4.75	1.15	4.71	1.15	0.44	.66
IE	4.93	1.25	5.11	1.28	-1.69	.09

Note. * $p < .05$.

Table 2. Multi-group SEM Analyses for the Non-trial and Trial groups

Model	*N*	χ^2	*df*	χ^2/df < 3.0[a]	χ^2_{diff}	df_{diff}	CFI > .90[a]	NNFI > .90[a]
Single Group CFA								
Non-trial group	298	344.01*	216	1.59			0.974	0.934
Trial group	259	300.08*	216	1.39			0.982	0.977
Multiple Group CFA								
Baseline (no constraints)	557	644.09*	432	1.49			0.978	0.951
Factor Loading Invariance	557	699.66*	482	1.45	55.57	50	0.977	0.974
Multiple Group SEM								
1. Paths Invariance	557	706.27*	485	1.46			0.977	0.974
2. Free SF->IU2	557	698.47*	484	1.44	7.81*	1	0.978	0.975
3. Free PU->IU1	557	691.99*	483	1.43	6.48*	1	0.978	0.975
4. Free SE->PEOU	557	687.76*	482	1.43	4.24*	1	0.979	0.976
5. Free SR->PEOU	557	680.34*	481	1.41	7.42*	1	0.979	0.976

[a] Recommended values. * $p < .05$.

Table 3. Multi-group SEM Results for Trial and Non-trial Groups

			Standardized Direct Effects	
Outcome	Determinant	Common Metric	Non-trial	Trial
Perceived Ease of Use	System Functionality	0.232*		
	System Interactivity	0.125*		
	System Response		0.026	0.229*
	Self-efficacy		0.513*	0.274*
	Internet Experience	0.111*		
Perceived Usefulness	Perceived Ease of Use	0.307*		
	System Functionality	0.173*		
	System Interactivity	0.328*		
	System Response	0.092		
	Self-efficacy	-0.151*		
	Internet Experience	0.070		
Intention to Use 1	Perceived Usefulness		0.177*	0.351*
(Supplementary tool)	Perceived Ease of Use	0.234*		
	System Functionality	0.412*		
Intention to Use 2	Intention to Use 1	0.431*		
(Distance Education)	Perceived Usefulness	0.053		
	Perceived Ease of Use	0.103*		
	System Functionality		0.083	0.259*
	System Interactivity	0.172*		

Note. N = 557. * $p < .05$.

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