

FACTORS IMPACTING CORPORATE E-LEARNERS' LEARNING FLOW, SATISFACTION, AND LEARNING PERSISTENCE

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ABSTRACT

This study aimed to investigate the structural relationships among teaching presence, cognitive presence, usage, learning flow, satisfaction, and learning persistence in corporate e-learners. The research participants were 462 e-learners registered for e-lectures through an electronics company in South Korea. First, the sense of teaching presence, sense of cognitive presence, and usage affect flow. Second, the sense of teaching presence, sense of cognitive presence, usage, and flow affect satisfaction. Third, the sense of teaching presence, sense of cognitive presence, usage, flow, and satisfaction affect learning persistence. Fourth, learning flow intermediates the sense of teaching presence, sense of cognitive presence, usage, and satisfaction. Fifth, satisfaction intermediates the sense of teaching presence, cognitive presence, usage, flow, and persistence. We confirmed that learning flow significantly intermediated among sense of teaching presence, sense of cognitive presence, and satisfaction but not between usage and satisfaction. In addition, satisfaction intermediated among sense of teaching presence, sense of cognitive presence, usage, flow, and learning persistence. These findings demonstrate the importance of sense of teaching presence, sense of cognitive presence, and usage for e-learners. We expect that the results will contribute to the formation and improvement of fundamental learning strategies for successful e-learning.

KEYWORDS

Corporate e-learning, sense of teaching presence, sense of cognitive presence, usage, learning flow, satisfaction

1. INTRODUCTION

In an information society, where knowledge is a core resource, as the importance of human resource development increases incrementally, many enterprises emphasize employee education in order to improve their employee capabilities. Moreover, as people acknowledge the benefits of e-learning—namely, that they can overcome time and space constraints through use of the Internet and other information and communication technologies—e-learning rapidly has become diffused and generalized. However, regardless of such quantitative growth, it can be difficult to actively engage online learners. Achieving flow in the e-learning process is challenging because e-learning differs from traditional education, which is conducted in a separate and private space. Thus, online learners may not be motivated to continue due to low learning satisfaction. As advocates have called for investigation of the e-learner's experience in the e-learning process with the aim of improving its quality, researchers have sought to understand the sense of presence and its role in e-learning.

Sense of presence is expressing not what exists in the physical environment, but rather what one experiences and perceives (Witmer & Singer, 1998). Sense of teaching presence refers to a learner's perception regarding a general teaching phenomenon, along with aspects of designing and systemizing instruction (Arnold & Ducate, 2006). Sense of cognitive presence is defined as the degree of consistent and confirmed meaning in a learner's reflection and discourse (Garrison & Anderson, 2007). The current study did not adopt the notion of sense of social presence, but did adopt senses of teaching presence and cognitive presence as effective variables for learning outcomes.

First, this study attempted to clarify the cause and effect relationships among sense of teaching presence, sense of cognitive presence, flow, satisfaction, and persistence, within an integrated view. Despite the

importance of sense of teaching presence, sense of cognitive presence, and usefulness for e-learners, the research investigating their effects on learning outcomes from an integrated view remains insufficient. Previous studies related to successful e-learning investigated simple correlation or effects between two variables rather than integrating the variables related to learning persistence. For example, studies have examined the relationship between teaching presence and satisfaction (Wu & Hiltz, 2004) as well as the effect of cognitive presence on satisfaction and presence (Kang, 2005), of teaching presence on persistence (Shin, 2003), of usage on satisfaction and persistence (Roca, Chiu, and Martinez, 2006), of usage on persistence (No, Lee & Chung, 2008), of flow on satisfaction (Kim, 2005), of cognitive presence on satisfaction and achievement (Kang, 2005), and of flow on satisfaction and achievement (Kang, 2006). Since learning outcomes in cyber-environments, such as satisfaction and learning persistence, are complex phenomena affected by assorted variables (Willging & Johnson, 2004), observers should consider the relevant variables' causal relationships with an integrative structural view.

Second, previous studies on the relationships among flow, satisfaction, and persistence, using SEM, have not addressed important variables in predicting successful e-learning. Joo, Kim, and Park (2009) did not include the sense of teaching presence in e-learning but did suggest the necessity of investigating it. Kim (2006) investigated the relationships among usefulness, ease of use, and behavioral and attitudinal flow but did not include the outcome variables of flow. Chiu, Hsu, Sun, Lin, and Sun (2005) investigated the relationships among usefulness, satisfaction, and persistence with the intermediation effect of satisfaction but did not include the teaching and cognitive sense of presence prior to looking at usefulness and outcome variables. Moreover, the results of previous studies are somewhat contradictory. Thomas' (2000) investigation of the effects of students' social networks on learning persistence in a university setting found that the relationships among social networks, scholastic integration, social integration, grades, flow in objectives, flow in educational organization, and learning persistence were not significant. In research investigating the relationships among satisfaction, confidence, flow, and intention to repurchase on 615 e-learners in various institutional settings, Lee (2006) showed that flow does not affect the persistence to purchase.

The purpose of this study is to explain the relationships among the sense of teaching presence, usage, and learning outcomes, which facilitate learner flow in corporate e-learning, by integrating all the variables in a single structural model. Based on a review of the previous literature, we established research hypotheses and hypothetical research models of corporate e-learning. First, the sense of teaching presence, sense of cognitive presence, and usage affect flow. Second, the sense of teaching presence, sense of cognitive presence, usage, and flow affect satisfaction. Third, the sense of teaching presence, sense of cognitive presence, usage, flow, and satisfaction affect learning persistence. Fourth, learning flow intermediates the sense of teaching presence, sense of cognitive presence, usage, and satisfaction. Fifth, satisfaction intermediates the sense of teaching presence, cognitive presence, usage, flow, and persistence. Based on a review of the previous literature, we established research hypotheses and hypothetical research models of corporate e-learning. These are shown in Figure 1.

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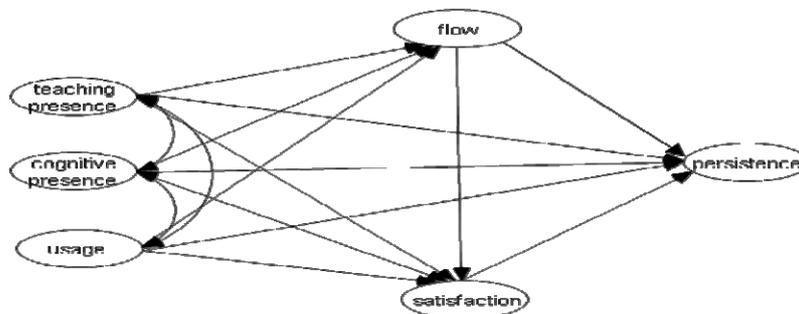


Figure 1. Hypothetical Research Model of Corporate e-Learning

2. METHOD

2.1 Subjects

We chose to investigate a single enterprise for the consistency of its registration system and learning management system. We issued a survey to 462 participants to measure sense of teaching presence, cognitive presence, usage, learning flow, satisfaction, and learning persistence. Male participants numbered 375 (81.2%), and females, 87 (18.8%). The participants' ages ranged from 24 to 54. Their job statuses were as follows: 29.5% staff, 21.4% deputy section chiefs; 17.3% section chiefs, 15.1% deputy department heads, 7.4% department heads, and 9.2% other.

2.2 Research Instrument

To measure the sense of presence, we used the validated instrument designed specifically for measuring sense of presence by Garrison, Cleveland-Innes, and Fung (2004), extracting only the sense of teaching presence and sense of cognitive presence. The sense of cognitive presence is measured by eight items. For both variables, the inter-item consistency had a Cronbach's α of .94. We removed the second item in one duplicated items out of the 13 items measuring sense of teaching presence. Thus, the final measurement used 12 items for sense of teaching presence and 8 for sense of cognitive presence. The construct reliability of sense of teaching presence was .99, and the average extracted variance was .99. The construct reliability for sense of cognitive presence (the reliability of the dormant variable) was .95, and the average extracted variance was .91. We measured usage by extracting items from Davis' (1989) Technology Acceptance Model instrument. Usage consisted usefulness and ease of use. Usefulness and ease of use consisted of four items each. Inter-item consistency had a Cronbach's α of .87 calculated for usefulness and .86 for ease of use. The construct reliabilities of usefulness and ease of use were both .99, and the average extracted variance was .97. We used 9 items from the Flow state scale instrument validated by Martin and Jackson (2008) to measure learning flow. The inter-item consistency for learning flow items had a Cronbach's α of .83 for participants in high school gym class and .84 for those in high school music class. The construct reliability was .99, and the average extracted variance was .99. To measure this variable, we revised Shin's (2003) measurement instrument for corporate settings. The instrument consists of 8 items rated on a 5-point Likert scale. The inter-item consistency had a Cronbach's α of .96, the construct reliability in the current study was .99, and the average extracted variance was .99. The instrument measuring learning persistence consisted of 4 items. The construct reliability in the current study was .97, and average extracted variance was .99.

2.3 Research Procedure

To collect data, we conducted an online survey for e-learners enrolled in courses at Enterprise A. We selected Enterprise A because it uses the same registration and management systems, learning service, and evaluation and grade generation systems for its various sub-branches. We administered the survey the week prior to the e-learners completing the four-week course. The main instructional methods were lectures given by the instructor, delivered by video. To investigate the causal relationship between sense of teaching presence and sense of cognitive presence in corporate e-learning, we established the hypothetical research model shown in Figure 2 (see Section 1.5) and the statistical model in Figure 1. As seen in the statistical model, we established each mathematical dormant variable using index variables from the research model.

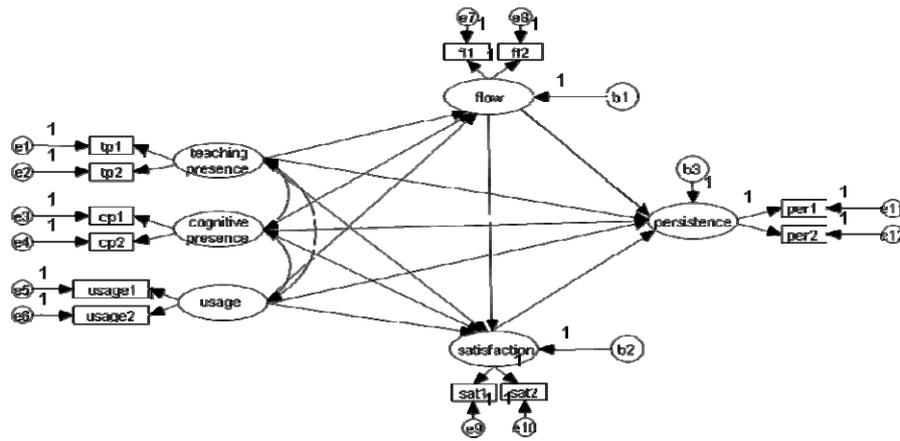


Figure 2. Statistical Model of Corporate e-Learning

In establishing the model, we used an item parcel method to avoid overweighting on the measurement model, since there are single-factor measurement variables in exploratory factor analysis results among sense of teaching presence, sense of cognitive presence, usage, learning flow, satisfaction, and learning persistence. To determine the prediction method for the statistical model, we examined multivariate normal distributions of 8 variables of the SEM, using AMOS 6.0. As a result, we were able to satisfy the conditions of skewnesses and kurtoses for single variables. We predicted the model fitness and parameters using a Maximum Likelihood Estimation (MLE) procedure, given that the multivariate normal distribution assumption was satisfied. We evaluated the model fitness through CMIN, TLI, CFI, and RMSEA.

3. RESULTS

The variable means ranged from 3.55 to 4.22, standard deviations from .66 to .73, skewnesses from .12 to .67, and kurtoses from .10 to .30. This satisfied the basic assumptions of SEM, as the skewnesses of the measurement variables were less than 3, and their kurtoses were less than 10. Therefore, the variables satisfied the basic assumptions of a multivariate normal distribution for SEM examination.

Since the initial fitness of the structural model was TLI = .977, CFI = .986, and RMSEA = .068 (.054-.082), we confirmed that the fitness index of the initial structural model indicated it was a good model. Accordingly, we examined the direct effects among sense of teaching presence, sense of cognitive presence, usage, flow, satisfaction, and learning persistence. The results were as follows: sense of teaching presence on flow was $\beta = .413$ ($t = 8.200, p < .05$); sense of cognitive presence on flow, $\beta = .411$ ($t = 6.174, p < .05$), and usage on flow, $\beta = .122$ ($t = 2.027, p < .05$). Second, the effects of sense of teaching presence on satisfaction, $\beta = .109$ ($t = 2.091, p < .05$); cognitive presence on satisfaction, $\beta = .272$ ($t = 4.054, p < .05$); and usage on satisfaction, $\beta = .144$ ($t = 2.550, p < .05$). Third, the effects of sense of teaching presence on learning persistence, $\beta = .136$ ($t = 12.687, p < .05$); and cognitive presence on learning persistence, $\beta = .797$ ($t = 12.687, p < .05$). The effect of usage on learning persistence was not statistically significant. The initial structural model of this study reveals the significant fact that removing the paths between sense of cognitive presence and learning persistence, between usage and learning persistence, and between learning flow and learning persistence did not affect the model fitness. Accordingly, we established the simple model seen in Figure 3, in which we removed the paths mentioned.

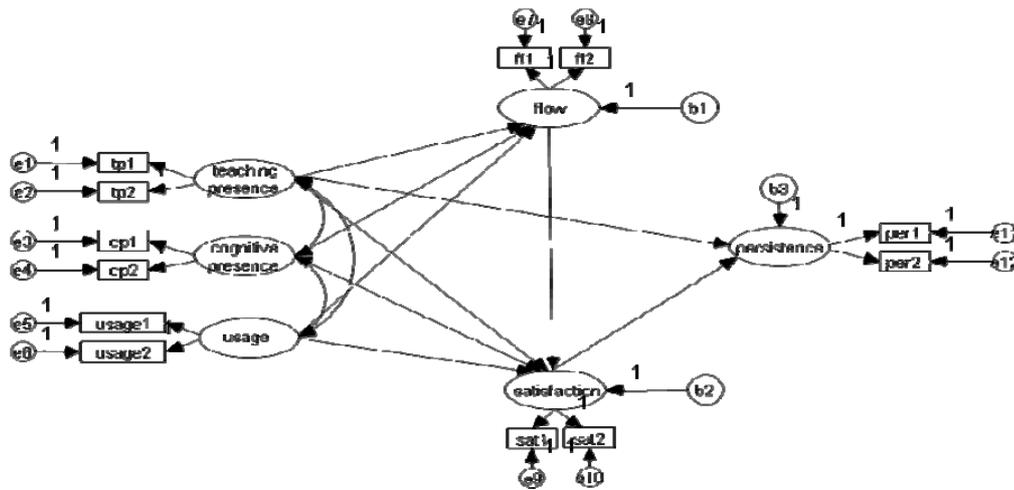


Figure 3. Revised Research Model of Corporate e-Learning

Because the initial structural model and revised model have hierarchical relationships, we conducted a chi-square test to determine whether there was a statistically significant difference between the two. The result showed no difference between the models in their goodness of fit ($CMIN_D = 5.389, p = .145$). Accordingly, although there was no difference in goodness of fit between the models, we selected the revised model and estimated the goodness of fit and parameters, since the revised model was simpler. <Table 1> shows the results of the revised structural model’s goodness of fit. By confirming the goodness of fit index, we confirmed that the model fitness was good ($CMIN_D = 5.389, p = .145$).

Table 1. Examination Results of Fitness of Corrected Model (n = 462)

	CMIN	df	TLI	CFI	RMSEA (90% Confidence Interval)
Corrected Structural Model	126.815	42	.978	.986	.066 (.053~.080)
Initial Structural Model	121.426	39	.977	.986	.068 (.054~.082)

As seen in <Table 2>, the model’s overall fitness index appeared similar to the initial structural model, but the absolute fitness index value χ^2 (chi-square) was 5.389 higher. The fitness indices were statistically significant; all the fitness indices of the revised structural model satisfied the fitness criteria. In addition, the sense of teaching presence and satisfaction had significant effects on learning persistence. <Table 2> summarizes the direct model effects.

Table 2. Direct Model Effects

Direct effect		Non-standardization	Error	of	C.R.	p	Standardization
Flow	← Teaching presence	.40	.05		8.22	*	.41
	Cognitive presence	.42	.07		6.18	*	.41
	Usage	.14	.07		1.97	*	.12
Satisfaction	← Teaching presence	.11	.05		2.01	*	.11
	Cognitive presence	.27	.07		3.84	*	.26
	Usage	.19	.07		2.73	*	.16
	Flow	.46	.06		7.14	*	.44
Persistence	← Teaching presence	.14	.04		3.65	*	.16
	Satisfaction	.75	.04		17.92	*	.83

* $p < .05$

These results of this study show as followings: first, the sense of teaching presence, sense of cognitive presence, and usage had significant effects on learning flow. Second, sense of teaching presence, sense of cognitive presence, and usage had significant effects on satisfaction. Third, satisfaction also had significant effects on learning persistence. Also, learning flow had significant effects on satisfaction, and satisfaction had significant effects on learning persistence. Fourth, we found that sense of teaching presence, sense of cognitive presence, and usage had significant effects on satisfaction by intermediating learning flow. Fifth, sense of teaching presence, sense of cognitive presence, and usage were found to have significant effects on learning persistence by intermediating satisfaction. This shows the possibility that learning flow has significant effects on learning persistence by intermediating satisfaction. Accordingly, the Sobel test was applied to examine the significance of the indirect effects. <Table 3> displays the indirect effect analysis of the variables affecting learning outcomes.

Table 3. Direct and Indirect Effects of the Modified Model (n = 462)

Relevant variables		Total effect	Direct effect	Indirect effect
Flow	← Teaching presence	.40	.40*	-
	Cognitive presence	.42	.42*	-
	Usage	.14	.14*	-
Satisfaction	← Teaching presence	.30	.11*	.18*
	Cognitive presence	.46	.27*	.19*
	Usage	.25	.19*	.06
	Flow	.46	.46*	-
Persistence	← Teaching presence	.22	.14*	.08*
	Cognitive presence	.20	-	.20*
	Usage	.14	-	.14*
	Flow	.35	-	.35*
	Satisfaction	.75	.75*	-

*p < .05

4. DISCUSSION

Based on the research results, we find the following: First, we confirmed that sense of teaching presence, sense of cognitive presence, and usage have significant effects on learning flow in corporate e-learning. The significant effects between teaching and cognitive presence on learning flow are consistent with previous research findings (Barfield, Zeltzer, Sheridan, & Slater, 1995; Wang & Kang, 2005). The significant effect of usage on learning flow is also consistent with previous research results (Kim & Oh, 2005).

Second, we confirmed that sense of teaching presence, sense of cognitive presence, usage, and flow have significant effects on satisfaction in corporate e-learning. The significant effects of teaching presence (Garrison & Cleveland-Innes, 2005; Wu & Hiltz, 2004; Shin, 2003) cognitive presence (Joo, Kim, & Park, 2009; Kim, 2008), usage (Chiu, Hsu, Sun, Lin & Sun, 2005; Roca, Chiu, & Martinez, 2006), and flow on satisfaction (Shin, 2006) are consistent with previous research results.

Third, we confirmed the significant effects of sense of teaching presence and satisfaction on learning persistence in corporate e-learning. The significant effect of teaching presence on learning persistence is consistent with previous research findings (Shin, 2003). The significant effect of satisfaction on learning persistence is consistent with previous studies that reported if learners are satisfied with overall aspects, such as the instructor, teaching method, process, and learning environments, they are likely to continue their learning after completing the course. On the other hand, in this study, sense of cognitive presence, flow, and usage did not directly affect persistence. This finding is not consistent with previous studies, which reported

opposite results (Joo, Kim, & Park, 2009). This suggests the possibility that the sense of cognitive presence does not directly affect learning persistence. Further, findings on the effect of usage on persistence is not consistent with previous studies (No, Lee, Chung, 2008). Although previous studies (Chiu, Hsu, Sun, Lin, & Sun, 2005; Roca, Chiu, & Martinez, 2006) did not observe direct effects of usage on learning persistence, they reported that usage significantly affects learning persistence by intermedating satisfaction. Then, the findings regarding the effect of learning flow on learning persistence are also not consistent with previous studies, which reported opposite results, namely, that flow does affect persistence in sports environments (Kim & Lee, 2008). These results likely differ due to the environmental distinction: Flow in a sports environment means that participants are deeply engaged in attitudes or behavioral aspects of the sport rather than in cognitive processes.

Fourth, satisfaction intermediated among sense of teaching presence, sense of cognitive presence, usage, learning flow, and learning persistence. These results mean that when learners' perceived sense of teaching and cognitive presence improve, they can experience flow. Accordingly, learners' overall satisfaction improves, and learning persistence in taking relevant courses increases even after the students complete the current course. This finding is consistent with the previous research results (Chiu, Hsu, Sun, Lin, & Sun, 2005).

The suggestions and contributions from the current research results are as follows: First, e-learning designers, therefore, should increase learners' sense of teaching presence by providing them with opportunities to ask questions about class content as part of the learning process, in order to confirm what the learners know and to correct any misunderstandings. Educators should also encourage each learner's persistent participation by managing his or her learning process through e-mail, short message services, or a webpage. Second, to increase the sense of cognitive presence, e-learning designers should structure learning content appropriately, allow learners themselves to generate new knowledge, and develop systems to help learners manage their learning resources and time. Third, e-learning designers, therefore, must improve usage by providing practical cases closely related to the students' work, so learners can feel that the system is very useful and easy for them to use. Fourth, e-learning designers, therefore, should improve usage by devising strategies to raise flow in the learning process, improve learning outcomes, avoid distractions for learners, and consider the learners' convenience so that they are not hindered in their studies. Fifth, thus, e-learning designers, should increase learner satisfaction by emphasizing strategies that use the e-learning design and management elements, learners' interest in the learning process, and a systematic educational process to improve the quality of educational content and to avoid inconveniences for learners.

The limitations of the study and our suggestions for further research studies are as follows. First, the results of this study have a limited generalizability: we used 462 participants, all employees of Enterprise A in South Korea, who received an employment insurance refund of the course cost. Future studies should investigate whether different e-learning settings or cyber-universities produce the same results. Second, since we expect that the perceived degree of a sense of cognitive presence differs for individual learners, further research is needed to investigate various motivational variables, rather than simply reflect learner characteristics. Third, we administered the study to reflect corporate e-learning characteristics, after removing sense of social presence and focusing on sense of teaching presence and sense of cognitive presence. However, future studies should consider the sense of social presence that learners experience in e-learning environments, because successful learning occurs through the integration of the three: sense of teaching presence, sense of cognitive presence, and sense of social presence. Fourth, we removed learning achievement from the learning outcome variable because learners received the employment insurance refund from Enterprise A only if they gave more than 70% correct answers. Therefore, we decided that it would be somewhat difficult to explain learning achievement as a learning outcome. However, since achievement is an important variable for measuring learning outcomes, further studies should include achievement as a learning outcome variable. The ultimate purpose of corporate educational training is not a better grade but to improve employees' performance through their application of the knowledge and skills obtained in e-learning. We suggest future research include studies on learning transfer or Return On Investment.

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