International Journal of Smart Home
Vol.7, No.6 (2013), pp.49-58
http://dx.doi.org/10.14257/ijsh.2013.7.6.05

Structural Relationship among Affective Characteristics, Cognitive Characteristics, Students' Participation, and Course-retaking Intention in E-learning Environment

Dae-sik Kang[1] and Jeong-kyoum Kim[2],[1]

[1]*Department of Education at Chungnam National University,79 Daehakro, Yuseong-gu, Daejeon, 305-764, South Korea*
[2]*Department of Education at Chungnam National University, 79 Daehakro, Yuseong-gu, Daejeon, 305-764, South Korea*
breakwind@cnu.ac.kr, jgkim426@cnu.ac.kr

Abstract

The purpose of this study is to verify the structural relationship among affective characteristics, cognitive characteristics, students' participation, and course-retaking intention in e-learning environment. Web survey was conducted from one university in Korea and 210 students participated in this survey who already took e-learning courses. A hypothetical model was proposed, which was composed of affective characteristics, cognitive characteristics as a extraneous variable, and students' participation, course-retaking intention as endogenous variables. Also, students' participation has been suggested as a intervening endogenous variable. The results of this study through structural equation modeling analysis are as follows: First, affective characteristics affect students' participation, course-retaking intention. Second, cognitive characteristics affect students' participation but doesn't course-retaking intention. Third, students' participation mediated between affective characteristics and course-retaking intention. But it doesn't mediate between cognitive characteristics and course-retaking intention. Implications based on research results are as follows: Affective characteristics of the learners should be considered for students' participation and course-retaking intention.

Keywords: *affective characteristics, cognitive characteristics, students' participation, course-retaking intention*

1. Introduction

The advent of rapid development of information and communication technology has resulted in dramatic paradigm shift of education. Moreover, changes of lifelong learning policy of Korean government have encouraged university learning system of Korea put more effort into being adapted to the new surroundings. As of today, total 17 4-year cyber universities are run and even in non-cyber universities, learning management system has been established according to government's university informatization policy, providing e-learning service to students. In specific, conventional non-cyber university has offered not only face to face learning but also blended learning and e-learning service to obtain comparative advantage by being able to be adapted in rapidly changing university educational environment. As the number of students who prefer e-learning courses, the average number of

[1] Corresponding author

ISSN: 1975-4094 IJSH

them has been increased by more than 1.5 times from 82.4 courses in 2010 to 139.6 courses in 2011 [1].

While the number of e-learning offered by non-cyber universities has been increased, there has been little systematic study on why university students have course-retaking intention for e-learning service. On top of that, it is necessary to explore those factors that influence on learners' course-retaking intention from ones who already experienced e-learning in order for continuous offering expansion of e-learning. Having those issues, this study started on the hypothesis that learners' psychological characteristics may be closely related with course-retaking intention. Most of the studies related with e-learning course-retaking intention have been focused on quality factors of e-learning. In specific, those studies have pointed out how the quality of e-learning had influence on learners' satisfaction and academic achievements [2]. Other studies have found quite a number of learners' psychological characteristics in e-learning environment. The results of them showed that psychological characteristics such as learners' motivation, attitude, expectation, self-efficacy, and so on were factors that influenced on learning satisfaction and achievements [3-5].

As previous studies have confirmed, a successful operation and expansion of e-learning should be supported based on understanding of learners' psychological characteristics as well as high quality of learning service; it is necessary to design a class where learners' psychological characteristics should be reflected especially in e-learning environment. However, previous studies related with learners' psychological characteristics have focused on partial variables of learners' characteristics [6]. As such, this study presumes learners' affective characteristics, cognitive characteristics, and learning participation as endogenous variables related with course-retaking intention in higher education e-learning environment. Also, this study seeks to discover structural relationship of how learning participation, a variable of instructional process, can mediate affective characteristics, cognitive characteristics, and course-retaking intention to suggest implications to improve quality of higher education e-learning service.

2. Literature Review

2.1. Learners' Affective Characteristics

The more learners' cognitive characteristics are such as self-efficacy, registration motivation, and learning attitudes, the more learners participate in the courses, eventually retaking similar courses in e-learning environment. Self-efficacy is a term to refer expectation or belief that learners themselves have for their academic performance competence, as a driving force for learning and performing new knowledge and technology to adapt to new environment [7]. In specific, learners with high self-efficacy tend to participate in learning aggressively as they expect high performance result by promoting positive emotion [8]. Similar in e-learning environment, learners' with high self-efficacy was confirmed to have high participation in learning, learning satisfaction, and course-retaking intention [9, 4]. In addition, a registration motivation can be defined as a will to participate in learning by learners themselves to achieve academic goals. Also, learning attitudes refer to learners' responding tendency including usefulness of the course that they are taking, their joyfulness, and positive feelings. It was said that registration motivation of the course and positive learning attitudes can lead learners' participation and influence on course-retaking intention [10]. In particular, more effective learning can be expected for the learners' with registration motivation and positive attitudes in e-learning environment as their learning processes are controlled by informational technology [11].

2.2. Learners' Cognitive Characteristics

To promote learners' effective learning, not only affective characteristics but also cognitive characteristics should be considered such as self-regulated learning ability and learning preparation. First of all, a self-regulated learning ability is one that learners' use in their learning activities by making use of cognitive strategies to achieve their learning goals [12]. In specific, self-regulated learning ability is one of the crucial factors to affect learning participation and course-retaking intention as learners' self-directed learning is critical in e-learning environment in which learning control is mostly focused on learners. Second, learning preparation refers to the extent that learners are ready to perform their learning successfully in a variety of learning environments [13]. It is required for e-learning learners to possess background knowledge of it, computer using ability, and online communication technology and so on in e-learning environment. Therefore, learners with high learning preparation show high learning satisfaction and achievement [14]. To sum it up, learners with high cognitive and affective characteristics in e-learning environment show that they participate in courses aggressively and tend to retake the course. As such, this study assigns learning participation as a mediator variable.

3. Methodology

3.1. Participants

Participants were located from adult learners of H University in D city of Korea. Most of them were office workers, who were not able to attend class but took online class. They were from different age groups ranging from 20 to 60. Data were collected from the students who took e-learning classes in fall 2012 through web survey during two weeks, one week before and after the closing of the course. 210 questionnaires were selected and analyzed for this study except 28 responses regarded as unreliable to continue.

3.2. Measurement Tools

Each measurement tool of variables set for this study was confirmed questionnaires in its validity and reliability through a pilot study, consisting of 5 Likert scales. Also, to acquire content validity, selected measurement tools were evaluated and revised by 10 experts of educational engineering. In addition, reliability of the measurement tools was verified through a method of internal consistency. Table 1 shows the information of each measurement tool.

Table 1. Information of Measurement Tools of Each Variable

Variables		Contents of measurement	Cronbach's α	References
Affective characteristics	Self-efficacy	Self-confidence of understanding about learning contents	.653	[15]
		Self-confidence of academic achievements		
		Self-confidence of memory techniques		
		Self-confidence of doing assignment		
	Learning	Usefulness of e-learning	.802	[11]

	attitudes	Joyfulness of e-learning		
		Positive feelings of e-learning		
		Assistance for e-learning		
	Registration motivation	To experience new e-learning	.805	[16]
		To save time and cost		
		To obtain new knowledge		
		To participate in community activities		
Cognitive characteristics	Self-regulated learning ability	Proactiveness of learning activities	.710	[17]
		Management of learning schedule		
		Checkup of learning process		
		Arrangement of surroundings		
	Learning preparation	Preparation of learning in advance	.615	[18]
		Checkup of e-learning notice		
		Joyfulness of problem solving		
		Learning motivation		
Learning participation		Participating in course aggressively	.711	[16]
		High participation in course		
		High participation in community		
Course-retaking intention		Intention of recommending e-learning	.781	[19]
		E-learning course-retaking intention		
		E-learning related course taking intention		

3.3. Statistics

Data were analyzed with SPSS Windows 18.0 and AMOS 18.0. SPSS Windows 18.0 produced average of each measurement domain, SD, frequency, percentage, validity and reliability (Cronbach's α), and correlation analysis. Also, raw data of each variable was used as an input of AMOS 18.0 to analyze structural relationships. To verify validity of the model, various indexes were used, which have been generally adopted in other studies, such as x^2, Normed Fit Index(NFI), Incremental Fit Index(IFI), Turker-Lewis Index(TLI). At the last stage, standardized direct, indirect, and total effects among variables of the finally selected study model were analyzed through verification of the model by calculating various validity indexes.

4. Research Results

4.1. Correlation among Variables and Descriptive Statistics

The Table 2 below shows the mean, standard deviation, and correlation analysis result of self-efficacy, learning attitude, registration motivation, self-regulated learning ability, learning preparation, learning participation, and course-retaking intention. Correlation among variables showed statistically significant positive relationships.

Table 2. Correlation among Variables and Descriptive Statistics

Measurement Variables	1	2	3	4	5	6	7
1. Self-efficacy	1						
2. Learning attitude	.591**	1					
3. Registration motivation	.537**	.739**	1				
4. Self-regulated learning ability	.502**	.518**	.552**	1			
5. Learning preparation	.490**	.301**	.383**	.589**	1		
6. Learning participation	.508**	.576**	.561**	.705**	.456**	1	
7. Course-retaking intention	.524**	.709**	.755**	.522**	.380**	.615**	1
M	3.49	3.48	3.47	3.70	4.00	3.55	3.68
SD	0.80	1.14	0.94	0.81	0.72	1.19	0.90

**p<.01

4.2. Analysis of structural Relationships among Variables

4.2.1. Analysis of Normal Distribution and Multicollinearity: One of the popular model estimation techniques in structural equation modeling is maximum likelihood estimation (MLE). MLE presupposes a normal distribution on continuous variables typically. Thus, this study verifies skewness and krtosis to confirm its normal distribution. The results show that all variables have normal distribution and multivariate normality as considering there are no cases that have test of bivariate normality and multivariate abnormality. On top of that, there might be a problem in multicollinearity if the correlation among variables is great. Normally, once the results of correlation among variables is over .80, a corrective measurement should be made; however, there is no correlation over .80 among variables but most of them is over .30 as in Table 2, resulting in an interpretation that there is no problem in multicollinearity. Also, for those variables used, their tolerance in regression analysis was as high as over 0.4 at least, resulting in an interpretation that there is no problem in multicollinearity[20].

4.2.2. Verifying Research Model's Goodness of Fit: The indexes used to verify research model's goodness of fit were x^2, IFI, NFI, and TLI. A model can be considered as good when the values of IFI, NFI, and TLI are over .90 [20]. According to the results of the analysis, all indexes were generally on the extent of acceptability except x^2, considered as a relatively satisfactory model.

Table 3. Results of Indexes to Verify Research Model's Goodness of Fit

Suitability Index	x^2/df	p	IFI	NFI	TLI
value	4.808	.000	.961	.952	.912

4.2.3. Evaluation and Analysis of Research Model: Significance of parameter estimated value was reviewed to evaluate structural model. 4 paths of 5 ones were statistically significant in this model as shown in Table 4. To sum it up, learners' affective characteristics in e-learning environment has direct effects on learning participation and course-retaking intention, while learners' cognitive characteristics has effect on learning participation without significant effect on course-retaking intention.

Table 4. Standardized Estimates

Path	Estimate	S.E.	C.R.
Affective Characteristics → Learning Participation	.271	.064	3.526***
Affective Characteristics → Course-retaking Intention	.803	.067	13.220***
Cognitive Characteristics → Learning Participation	.562	.176	6.524***
Cognitive Characteristics → Course-retaking Intention	-.103	.181	-1.545
Learning Participation → Course-retaking Intention	.187	.083	2.993**

***p<.001, **p<.01

Also, the analysis of direct and indirect effects among variables of the model is provided in Table 5. First of all, what the indirect effects between endogenous variables and extraneous variables in variable relationships and the value of R^2 means is that model is established with validity as learners' affective characteristics has an indirect effect on course-retaking intention with learning participation as a mediation. Second, the value of R^2 of outcome variables, course-retaking intention, was .745, leading to accounting 74.5% of the model. The result of the structural relationship is as Figure 1.

Table 5. Standardized Direct Effect, Indirect Effect, Total Effect

Extraneous Variables	Endogenous Variables	Direct Effect	Indirect Effect	Total Effects	R^2
Course-retaking	Affective Characteristics	.803***	.051*	.853***	.745

Intention	Cognitive Characteristics	-.103	.105	.002	
	Learning Participation	.187**	-	.187***	
Learning Participation	Affective Characteristics	.271***	-	.271***	.577
	Cognitive Characteristics	.562***	-	.562***	

***p<.001, **p<.01, *p<.05

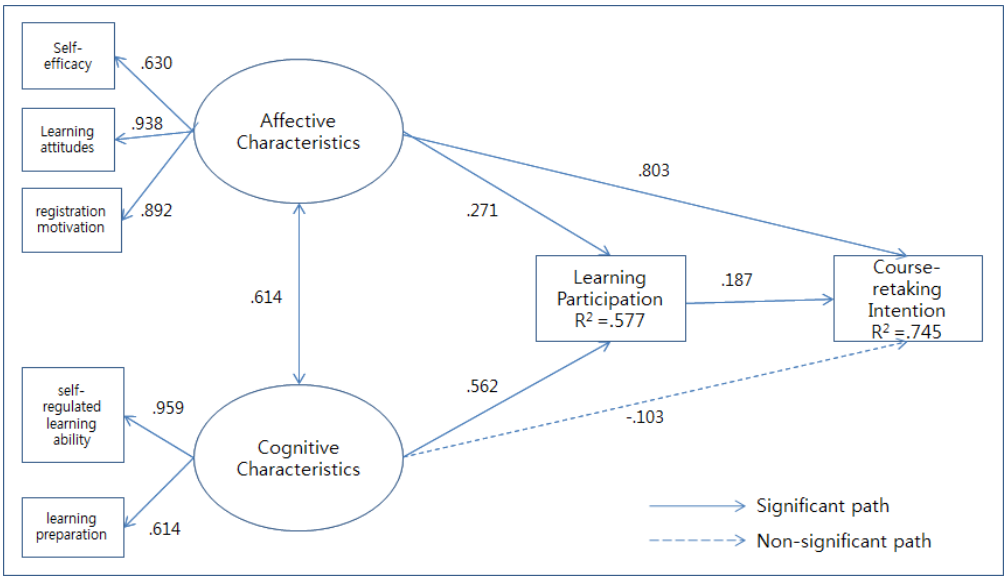

Figure 1. Structural Relationship

5. Conclusion

The results of this study include as follows: First, learners' affective characteristics has direct effects on learning participation (β=.271, p<.001) and course-retaking intention (β=.803, p<.001). Therefore, it is necessary to create course strategy to meet learners' interest and learning expectation to boost learning participation and course-retaking intention. Second, while learner's cognitive characteristics has direct effects on learning participation (β=.562, p<.001), it has no effect on course-retaking intention (β=.-103, p>.05). To promote learning participation, it is desirable to post the notice in advance to let them have enough time to prepare the course. Third, learning participation is mediated between affective characteristics and course-retaking intention (β=.051, p<.05). Thus, it is considered that learners with self-efficacy and positive learning attitudes tend to participate in learning process aggressively and eventually have course-retaking intention.

The results of this study give a few implications. According to them, learners' self-efficacy, learning attitudes, and motivation for learning participation are very important factors to promote both learning participation and course-retaking intention. These results suggest there are relationship between learners' emotional experiences and learning results in e-learning

environment. Therefore, for the successful management of e-learning, we need instructional design strategies to induce learners' self-efficacy, learning attitudes, and motivation for learning participation. The self-efficacy can be regarded as learners' self-confidence to their learning success. To heighten learners' self-efficacy, their perception of abilities and experience of success should be provided during the course of class. Also, first of all, instructors have to make learners to know why they must learn during course orientation or in the course of learning. It is difficult to correct the e-learning contents in the middle of course in the e-learning environment different from face-to-face education in which real-time interaction is possible. Consequently, when instructors design e-learning class in the beginning, they must prepare a systematic instructional design strategy.

According to the results of this study, the learners' affective characteristics, consisting of self-regulated learning ability and learning preparation, have an direct effect on learning participation, but do not on course-retaking intention. We can expect that because learners decide their own learning process by themselves in e-learning environment, the higher ability of self-regulated learning ability they have, the higher learning participation they will show, and the bigger learning effect they will have. However, if learners don't control the course of class or don't learning preparation, the result cannot be related to learning.

The suggestions for the following study on the basis of this study are as follows: first, it is difficult to generalize the result of this study, because of the students studied were selected from the e-learning learners of only one university. Therefore, to elevate the possibility of generalization of the result, it is necessary to enlarge the subject of study from the learners of various universities in the following study. Second, although in this study, learners' both affective characteristics and cognitive characteristics were presented as a characteristic factor affecting their course-retaking intention, but in the following study, investigation about the systematic relationship is necessary through adding or changing the sub-factors of learners' affective characteristics and cognitive characteristics, and it is also necessary to examine the correlation with social characteristics factors as a learner's characteristics factor overall.

References

[1] Korea National IT Industry Promotion Agency, e-Learning Industry Status Survey, **(2011)**.
[2] D. U. Bolliger and T. Martindale, “Key Factors for Determining Student Satisfaction in Online Courses”, International journal of e-learning, vol. 3, no. 1, **(2004)**, pp. 61-67.
[3] D. S. Kang, J. K. Kim and H. I. Chong, “The Structural Relationship among affective characteristics, learning presence, learning flow, learning satisfaction in Distance Education”, The Journal of Educational Information and Media, vol. 17, no. 1, **(2011)**, pp. 133-152.
[4] A. Y. Wang, M. H. Newlin and T. L. Tucker, “A discourse analysis of online classroom chats: Predictors of cyber-student performance”, Teaching of Psychology, vol. 28, no. 3, **(2001)**, pp. 221-225.
[5] K. S. Jung and Y. S. Choi, “Brain Wave and User Profile based Learning Content Type Recommendation in Interactive e-Learning”, IJSH, vol. 6, no. 3, **(2012)**, pp. 33-40.
[6] M. G. Moore and G. Kearsley, “Distance education: A system view”, Belmont, CA: Wadsworth Publishing Company, **(1996)**.
[7] A. Bandura, “Self-efficacy: Toward a unifying theory of behavioral change”, Psychological Review, vol. 84, no. 2, **(1997)**, pp. 191-215.
[8] J. E. Turner, J. Husman and D. L. Schallert, “The importance of students’ goals in their emotional experience of academic failure: Investigating the precursor and consequences of shame”, Educational Psychologist, vol. 37, no. 2, **(2002)**, pp. 79-89.
[9] Y. J. Ju, N. A. Kim and H. K. cho, “Relationship between Self-Efficacy, Online Task Value and Self-Regulated Learning, and Satisfaction and Achievement in Cyber Education”, The Journal of Educational Information and Media, vol. 14, no. 3, **(2008)**, pp. 115-135.
[10] M. N. Choi and H. R. No, “Effect of the Registration Motivation and Learning Satisfaction on Persistent Intention in E-learning Courses of University”, Journal of Educational Technology, vol. 27, no. 4, **(2011)**, pp. 653-673.

[11] M. R. Kim and J. S. Kim, "Analysis of Students' Attitude and Satisfaction Level toward Afterschool e-Home Study", The Korea Contents Society, vol. 7, no. 10, **(2007)**, pp. 44-58.
[12] D. H. Schunk and B. J. Zimmerman, "Self-regulation of learning and performance issues and educational applications", Hillsdale, NJ: Lawrence Erlbaum Associates, **(1994)**.
[13] R. Watkins, "Ends and Means: E-learning study skills and strategies", Distance Learning, vol. 1, no. 3, **(2004)**, pp. 24-26.
[14] J. K. Kim, "The Relationship between the Learner's Perception of a Sense of Community and Learning Readiness and Learning Effectiveness in the Online Learning Environment", Journal of Learner-Centered Curriculum and Instruction, vol. 9, no. 1, **(2009)**, pp. 73-92.
[15] V. Venkatesh and F. D. Davis, "A theoretical extension of the technology acceptance model: Four longitudinal field studies", Management Science, vol. 46, no. 2, **(2000)**, pp. 186-204.
[16] W. J. Choi and J. G. Shin, "The Study on Relationships of Learning Situation, Learning Participation Motivation, and E-learning Effectiveness", The Korean Journal of Human Resource Development, vol. 13, no. 2, **(2011)**, pp. 87-104.
[17] P. R. Pintrich, D. A. F. Smith, T. Garcia and W. J. McKeachie, "Reliability and predictive validity of the MSLQ". Educational & Psychological Measurement, vol. 53, no. 3, **(1993)**, pp. 801-810.
[18] M. Mcvey, "How to be a successful distance learning student: Learning on the Internet", New York: Prentice Hall, **(2001).**
[19] N. Shin, "Transactional presence as a critical predictor of success in distance learning. Distance Education", vol. 24, no. 1, **(2003)**, pp. 69-86.
[20] G. S. Kim, Amos 16.0 Structural Equation Model. Seoul: Hannarae, **(2007)**.

Authors

Jeong-kyoum Kim, he received B.A., M.A., and Ed. D degrees in Education from Chungnam National University, Korea in 1988, 1990, and 1997 respectively. He is a professor at Chungnam National University, Department of Education. His research interests include instructional design, educational technology.

Dae-sik Kang, he received B.S. degrees in Literature and Culture of Japanese from Chungnam National University, M.A. degrees in Japanese Education from Chungnam National University, and ABD in Educational Technology from Chungnam National University, He is a lecturer at Chungnam University. His research interests include instructional design, e-learning ecology.