Journal of Digital Convergence
Vol. 16. No. 6, pp. 1-8, 2018

ISSN 1738-1916
https://doi.org/10.14400/JDC.2018.16.6.001

A Comparative Study on the Precedents of E-learning Use of the Internet among S. Korea, Vietnam, and Singapore

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e-러닝 사용 선행요인에 대한 3개국 비교연구-한국, 베트남, 싱가폴

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Abstract This study examined the major precedent variables that could affect e-learning users' attitudes in two highly-networked countries and a sharply-spreading country in East Asia, namely South Korea, Vietnam, and Singapore. This research also reviewed why e-learners were using the Internet for their study and unveiled cross-national differences in antecedents of online activities, motivations, intention to use, and enhancement in performance among three countries. This paper could see if there were any differences in precedents of e-learning among the countries by ANOVA. Plus, the study uncovered that what precedents impacted the follow-ups of e-learning by regression analysis in each country. The paper found out that differences in social and cultural aspect influenced on the precedents and the follow-ups of e-learning among the countries. For example, Korean learners had stronger utilitarian motivations for e-learning while the Vietnamese and the Singaporean did not. Korean and Singaporean learners were more strongly influenced to visit e-learning sites by their friends and lecturers than the Vietnamese.

Key Words : e-learning, Comparative study, Precedent, Follow-ups, User attitude

요 약 이 논문의 목적은 첫째 온라인에서 학습활동을 하는 e-러닝 이용자의 사후 태도에 영향을 미치는 선행요인을 파악하고, 어떤 요인들이 사후태도에 주로 영향을 미치는가를 파악하는 것이다. 둘째, 한국, 베트남, 싱가폴의 e-러닝 사용자들을 조사 대상으로 하여 3개국 간에 사회적, 문화적, 지리적 차이에 따라 e-러닝과 관련된 선행요인과 사후태도에 유의한 차이가 있는가를 파악하는 것이다. 이 논문에서는 ANOVA 기법을 사용하여 e-러닝 선행요인에 차이가 있는지 확인했으며, 회귀분석을 통하여 3개 국가별로 어떠한 선행요인이 e-러닝 후행요인에 영향을 주는지 밝히고, 국가간 차이를 확인하였다. 분석결과 국가간에 선행요인에 차이가 있었으며, 각 국가별로 e-러닝 후행요인에 영향을 미치는 선행요인도 차이를 발견할 수 있었다. 발견된 국가별 차이점은 각국의 e-러닝 사업 실무자에게 의미있는 시사점을 제공할 수 있다. 향후 조사대상을 초중고생에까지 확대 연구할 수 있을 것이다.

주제어 : e-러닝, 비교연구, 선행요인, 후행요인, 이용자 태도

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Received April 4, 2018
Revised April 30, 2018
Accepted June 20, 2018
Published June 28, 2018

1. Introduction

Among the extensive online activities through the Internet, the e-learning, using a variety of education contents through the Internet, is a major domain of the Internet applications due to several prominent advantages like reduced tuition fee, easy and convenient access to education contents, dramatic time-saving, studying with pleasure, and elimination of temporal and spatial constraints.

As the Internet service has penetrated people's everyday life, especially for young generation, e-learning has become a major activity. According to the survey on the purpose of using the Internet by KISA, education & learning was number five online activity coming after homepage management, leisure activities, getting information or data, and communication for South Korean over the age of three accessing the Internet, which was number two main activity for under the age of 20[19]. As the educational contents have become more customized for their age group and their objectives of studying, with arising learners' curiosities and joyfulness, the range of educational use of the Internet is extending to a diversity of fields of education such as schools, universities, career development research institutes, lifelong education, and companies.

The majority of Internet usage survey has been focused on what people are doing through the Internet, how they are doing online activities, and who online users are. Some research have given attention to why Internet users are doing online activities and what factors affect their e-learning use of the Internet[11-13,16]. A few multinational comparative research have done in e-commerce, Internet shopping, and online education[1,5,8,14].

This study examines the major precedent variables that affect e-learning students with focusing on the Internet use in two highly-networked countries and a sharply-spreading country in East Asia, namely South Korea, Vietnam, and Singapore. This research also reviews why e-learners are using the Internet for their study and unveils cross-national differences in antecedents of online activities, motivations, intention to use, and enhancement in performance among three countries. The final purpose of the study is to uncover the precedent factors of e-learning use of the Internet and to find out cross-national or culture-specific and Internet use-specific variations if exist.

2. Review of Prior Studies

2.1 Demographics

Some previous studies and surveys used demographics such as age, gender, major, education level, and income to analyze Internet use for commerce, study, financial transaction, and entertainment[1,18,19]. Based on the KISA survey in 2017, gender, age, education, occupation, and region are main demographics that had an effect on the Internet usage[19].

Gender was one of demographics impacting the online activities and attitudes of the Internet use[10,18]. A significant difference in volition of educational web use by gender was found that male showed higher intention to use than female[18]. In online banking activity, Male users had more longer Internet banking experience than female and male had significantly higher economic, hedonic, and informational motivation than female[10].

Major of students may be the meaningful demographic precedent of e-learning use of the Internet. Yim and John(2008) uncovered in their paper that major was a factor affecting intention of education use of the Internet. Choi and Jahang(2009) examined that age is one of the factors impacting e-commerce use of the Internet and unveiled that younger users tended to access shopping and entertainment sites more frequently than older ones.

2.2 Antecedents

Internet use period has been considered a main antecedent of all kinds of internet activities[1,10,18].

Users with longer experience had intention of using Internet banking services and positive attitude on their banks[10].

The frequency of e-learning use of the Internet and the amount of spending time of e-learning use may be antecedents influencing some motivations such as perceived convenience, easiness of use, and joyfulness, which could also have effects on some follow-ups like concentration and performance. Yim and John(2008) uncovered that the frequency in accessing the Web for e-learning and spending time on e-learning Web sites had been related to activities through the Internet.

Internet skill for Internet user could be somewhat difficult work such as using security softwares, downloading and up-loading files, decompressing files, attaching files to email, installing and setting applications, using cloud storage, and so on. As most of Internet and mobile applications include user-friendly interfaces, perceived skill may be an alternative measurement instead of the actual skills for specific tasks as an antecedent of the Internet use[1,18].

2.3 Motivations

Some research showed that motivations of internet use for individual purposes such as e-commerce and e-learning were convenience, enriched information, easiness of use, time and money saving, social influences, and joyfulness[2,6,7,9,12,13,16,18]. John(2010) found out four critical constructs that university students accessed the Internet for their schoolwork, which were value and usefulness, pleasure of study, social influence, and convenience and easiness[7]. John(2012) presented a process of determining motivation factors and suggested a list of major factors that users perceived while accessing the web sites to do transactions through the Internet[9].

3. Methodology

3.1 Sample

The survey data was gathered in major cities of S. Korea, Hanoi Vietnam, and Singapore during August of 2014 through July of 2016. Undergraduate and graduate students who have e-learning experience were asked to participate in the survey. A total of 498 students in the three countries were surveyed about their use of the Internet for study. The sample had 6.49 years of experience of e-learning use of the Internet. The major of respondents were art, humanities & literature(12.7%), social science(48.3%), and Technology and Engineering(39.0%). The nationality of participants were S. Korea(38.6%), Vietnam(36.5%), and Singapore(24.9%). They visited webs for study 12.17 times a week and spent 12.88 hours a week.

3.2 measurement

3.2.1 Demographics and Antecedents of E-learning

Demographics Each respondent was asked to check his/her gender, school year, and major. Major was categorized into three areas like humanities, social science, and technology and engineering.

E-learning experience Respondents were asked how many years they have accessed e-learning Web sites.

E-learning activities The paper chose two main activities found in many research surveys on e-learning and economic transactions through the Internet[7,10]. Respondents were asked to report how many hours a week they stayed at e-learning sites and how many times a week they accessed the Internet for e-learning.

Perceived skill Perceived skill in using their devices and the Internet was gained by two items: “I think myself to be very proficient in e-learning use of the Internet” and “I think myself to be very proficient in the use of computer and mobile devices”, which were measured on a 5-point Likert-type scale.

3.2.2 Motivations of E-learning

The items used in the study to measure motivation instruments were adopted questions and factors in prior research papers related to constructs on Internet use[3,7,9,15].

Some of motivation instruments were modified for the purpose of this study and respondents were questioned to indicate their agreement and disagreement with given question items.

To measure motivations, 21 items were categorized into four motivation groups; three utilitarian motivations (perceived usefulness, enriched information, and easiness of use), an environmental motivation (social influence from friends, lecturers, and mass media), and a psychological motivation (study with joyfulness and curiosity or enthusiasm for study). All items were measured on a 5-point Likert-type scale.

3.2.3 Follow-ups of E-learning

While developing instruments on follow-ups of precedents, the study referred to prior research on attitudes toward Internet use[1,7,9,18]. Follow-ups instruments used in this paper contain question items measuring concentration, intention to use, and enhancement in performance. All items were measured on a 5-point Likert-type scale.

Two items measured concentration on study while using e-learning. Three items measured intention of using e-learning sites.

Five items measured studying performance from e-learning, which are scholastic achievement, speediness of schoolwork, the number of materials e-learners refer to through the Internet, increasement in knowledge on topics of study, and stay informed about schoolwork.

3.3 Procedure

The study takes three steps to attain the objectives of the paper. First, an explanatory factor analysis was used to find out precedent constructs that have an influence on e-learning users' follow-ups.

Secondly, this paper conducts descriptive analysis of four antecedents, five e-learning motivations, three follow-ups (concentration, intention, and performance), and two types of e-learning activities (spending time on e-learning and frequency in accessing the Web for e-learning) in three countries. Using ANOVA, this paper clarifies whether there are any significant differences in means of precedents and follow-ups constructs relating to e-learning among three countries.

Third, this paper makes a hierarchical regression analysis to unveil the differences in the relationships between precedents and follow-ups among three countries.

In hierarchical regression analyses, Variation Inflation Factor(VIF) score of independent variables are checked to see if any multicollinearity problem exists.

3.4 Validity and Reliability

3.4.1 Validity and Sample Adequacy

Based on prior research on Internet usage, this paper conducted factor analysis after dividing 21 items on motivations into five concepts to enhance their conceptual validity. During the factor analysis, factors with Eigenvalue of at least 1.0 were used to access the number of factors to extract. To get a simpler factor structure resulted in each factor representing a distinct construct, the extract method used in this analysis was Principal Component analysis with VARIMAX rotation with Kaiser Normalization.

This study examined Kaiser's measure of overall sampling adequacy and each indicator's sampling adequacy. The KMO is a means to show the degree to which the indicators of a construct belong together. KMO measure with less than 0.5 is unacceptable. Table 1 shows the KMO on antecedents, motivations, and follow-ups of this analysis.

Table 1. Validity and Sample Adequacy

Precedents	Eigen value	KMO	Bartlett
Antecedents			
Perceived skill	1.926	0.500	965.360**
Motivations			
Convenience	2.139	0.644	388.107**
Enriched materials	2.133	0.709	454.466**
Easiness of use	2.429	0.737	818.530**
Social influence	1.943	0.646	336.007**
Joyfulness	2.996	0.785	1038.039**
Follow-ups			
Concentration	1.221	0.500	336.007**
Intention	2.050	0.648	424.130**
Performance	2.753	0.797	722.145**

Note: ** p<0.01

To identify and evaluate the factor solution, this study ran the Bartlett's test which is useful to examine whether or not the correlation matrix is appropriate for factoring. As Table 1 shows, the Bartlett's test statistics on antecedents, motivations, and follow-ups were highly significant for this data set respectively.

3.4.2 Internal Reliability

To access the internal reliability of antecedents, motivations, and follow-ups identified from the explanatory factor analysis, coefficients of Cronbach alpha which shows the degree of internal consistency of the constructs were calculated. As Table 2 shows, all coefficient alpha values exceeded 0.7000 which means factors are considered to be internally consistent.

Table 2. Internal Reliability

factors	Mean	s.d.	Crombach Alpha
Antecedents			
Perceived skill	4.207	0.824	0.962
Motivations			
Convenience	3.909	0.580	0.730
Enriched materials	3.944	0.601	0.792
Easiness of use	4.103	0.739	0.881
Social influence	4.000	0.650	0.700
Joyfulness	4.080	0.589	0.826
Follow-ups			
Concentration	3.373	0.657	0.836
Intention	3.915	0.743	0.767
Performance	4.063	0.507	0.790

4. Findings

4.1 Descriptive Result

Table 3 shows a result of descriptive analysis of four antecedents, five e-learning motivations, three follow-ups in each country. First, a series of ANOVA on precedents of experience and skill showed that the Korean sample had the longest Internet experience (mean = 9.01 years) at 0.01 significant level.

On e-learning activities, Korean and Vietnamese e-learners had significantly higher frequencies in studying through the Internet than Singaporean e-learners. There was significant difference in staying time at e-learning sites that Korean and Singaporean e-learners spent more time studying through the Internet than Vietnamese ones.

Secondly, the result of ANOVA on motivations revealed that Korean e-learners had the strongest motivations in enriched study materials at 0.01 significant level and social influence.

Third, on follow-ups factors, the result of ANOVA showed that Korean and Singaporean e-learners had significantly higher intention to use afterwards at 0.01 significant level and obtained higher performance than Vietnamese learners.

Table 3. Means and ANOVA Results

factors	S. Korea	Vietnam	Singapore
Antecedents			
Experience	9.01b**c**	3.25a**c**	7.93a**b**
Learning time	16.47b*	9.97a*c**	13.33b**
Learning frequency	14.00c**	13.68c*	9.56a**b*
Perceived skill	4.52b**	3.49a**c**	4.68b**
Motivations			
Convenience	4.55b**c**	3.87a**c**	3.53a**b**
Enriched materials	4.50b**c**	3.69a**c**	3.83a**b**
Easiness of use	4.54b**	3.50a**c**	4.40b**
Social influence	4.28b**c*	3.69a**c**	4.13a*b**
Joyfulness	4.14b**c**	3.68a**c**	4.42a**b**
Follow-ups			
Concentration	3.33b*c**	3.13a*c**	3.63a**b**
Intention	4.03b**	3.57a**c**	4.17b**
Performance	4.29b*c*	3.81a*c**	4.15a*b**

Note: * p<0.05 ** p<0.01
Column means with a,b,c indicate that means differ significantly from those in other groups.

4.2 Effects of Precedents on Follow-ups

The scores of Variance Inflation factor(VIF) of each precedent were calculated to see if the multicollinearities exist among the independent variables to each dependent ones. As the score of VIF of easiness of use in motivational block was over 10, which was eliminated from further analysis.

4.2.1 Concentration on study

South Korean e-learners: No variables in demographics group was significant in predicting the concentration of learners. Perceived skill(b=-0.201) at

0.01 level and learning time(b=0.083) at 0.05 level in antecedents significantly affected the concentration. All factors except joyfulness in motivations block were significant at 0.01 level in foreseeing the concentration of e-learners.

Vietnamese e-learners: No precedents in demographics group was significant in predicting the concentration of learners like Korean ones. The only significant antecedent was learning frequency(b=-0.324) at 0.05 level. All factors in motivations block were significant in forecasting the concentration of e-learners. To sum up, e-learners who had higher motivations of convenience and social influence showed higher concentration.

Singaporean e-learners: No precedents in demographics group was significant in predicting the concentration like Korean and Vietnamese ones. The only factor in antecedents group significantly influencing the concentration was perceived skill(b=-0.382) at 0.01 level. Joyfulness(b=0.752 p<0.01) was the only motivational factor that had an impact on e-learners' concentration. In brief, e-learners who had higher skill showed lower degree of concentration. The more joyfulness e-learners felt while studying, the higher concentration they had.

Table 4. Regression Analysis on Concentration

Precedents	S. Korea	Vietnam	Singapore
Demographics			
Gender	0.018	-0.075	-0.015
Major	-0.003	-0.120	-0.014
Antecedents			
Experience	0.023	-0.104	0.182
Learning time	0.083*	0.258	-0.027
Learning frequency	0.085	-0.324*	0.091
Perceived skill	-0.201**	0.112	-0.382**
Motivations			
Convenience	0.530**	0.339**	0.212
Enriched materials	-0.343**	-.303**	-0.299
Social influence	-0.266**	0.285**	0.186
Joyfulness	-0.045	-0.343**	0.752**
R square	0.869	0.315	0.489

Note: * p<0.05 ** p<0.01

4.2.2 Intention to use

South Korean e-learners: The significant demographic precedent was gender (b=0.016, p<0.01). Learning frequency(b=-0.119, p<0.01) was the only one significant antecedents. All variables except enriched materials in motivations group were significant in forecasting the e-learning intention. In sum, e-learners with lower learning frequency, and motivations of lower convenience and higher social influence and joyfulness expressed higher intention to use e-learning.

Vietnamese e-learners: Gender was the significant demographic precedent like Korean ones. The significant antecedents were learning time at 0.05 level and perceived skill(b=0.428) at 0.01 level. The only significant motivational precedent was joyfulness(b=0.573, p<0.01). To be clear, e-learners who had higher perceived skill and hedonic motivation showed higher intention to use. The impact of perceived skill cast light upon intention to use. The fact that e-learning users with lower level of skill showed lower intention to use e-learning may lead e-learning business to build different strategies for them in Vietnam.

Singaporean e-learners: No variable in demographics was significant in predicting the e-learning intention. All factors in antecedents block were significant in foretelling the intention. Convenience(b=0.414 p<0.01) and joyfulness(b=0.869 p<0.01) were the motivational factors that had an impact on e-learners' intention to use. In short, e-learners in Singapore who perceived higher convenience and had hedonic motivation expressed higher intention to use.

Table 5. Regression Analysis on Intention

Precedents	S. Korea	Vietnam	Singapore
Demographics			
Gender	0.106**	-0.348**	-0.012
Major	-0.048	-0.054	-0.008
Antecedents			
Experience	-0.033	-0.028	-0.263**
Learning time	0.003	-0.297*	-0.340**
Learning Frequency	-0.119**	0.023	0.243**
Perceived skill	0.004	0.428**	-0.282**
Motivations			
Convenience	-0.805**	-0.081	0.414**
Enriched materials	-0.058	0.050	-0.242
Social influence	0.587**	0.017	-0.021
Joyfulness	0.157**	0.573**	0.869**
R square	0.952	0.503	0.703

Note: * p<0.05 ** p<0.01

4.2.3 Performance enhancement

South Korean e-learners: Gender was the significant demographic precedent in foretelling the performance enhancement of learners. Experience and learning frequency in antecedents block were factors significantly affecting the performance enhancement. All factors in motivations block were significant at 0.01 level in foreseeing the performance enhancement of e-learners.

Vietnamese e-learners: No factors in demographics group was significant in foretelling the performance enhancement of learners. All factors in antecedents and motivations block significantly impacted the performance at 0.05 level. In summary, e-learners with higher motivations of enriched materials, social influence, and joyfulness obtained higher performance. Pus, e-learners who higher skill stayed more time at e-learning sites earned higher performance.

Singaporean e-learners: Gender was the significant demographics like Korean ones. Experience and learning time in antecedents block had an effect on performance. The more joyfulness e-leaners had, the higher performance they got.

Table 6. Regression Analysis on Performance

Precedents	S. Korea	Vietnam	Singapore
Demographics			
Gender	0.157**	-0.047	0.186*
Major	-0.082	-0.056	0.045
Antecedents			
Experience	-0.069**	-0.179**	-0.275**
Learning time	-0.005	0.561**	-0.296**
Learning Frequency	-0.175**	-0.519**	0.086
Perceived skill	0.031	0.485**	0.066
Motivations			
Convenience	-0.840**	-0.216**	0.347
Enriched materials	0.133**	0.532**	-0.379
Social influence	0.306**	0.197**	-0.119
Joyfulness	-0.115**	0.439**	0.803**
R square	0.963	0.527	0.526

Note: * p<0.05 ** p<0.01

5. Conclusion

This explanatory study aimed at indicating cross-national determinants influencing e-learning users' attitude, identifying precedents of e-learning use of the Internet in each country, and ensuring whether differences and similarities in the pattern of e-learning use exist or not. For the purpose of this research, a survey was performed in each country, which consisted of three groups of precedents and a group of follow-ups, which were put into statistical analysis.

Even thought Internet users access to educational contents without any limit of geographic distance, this paper made sure that differences and similarities in social and cultural aspects impacted on e-learning in each country. For example, Korean learners had a stronger utilitarian motivation for e-learning while the Vietnamese and the Singaporean did not. Korean and Singaporean learners were more strongly influenced to visit e-learning sites by their friends and lecturers than Vietnamese ones. On the other hand, respondents in three countries showed the similarity that e-learners who had higher joyfulness expressed higher intention to use and higher enhancement of performance.

The paper discovered that major different factors pertinent to e-learning use of the Internet impacted on e-learners in each country. This exploratory research deserves attention both from researchers and practitioners who might be interested in e-learner behaviors which could have implications for their business and further studies on Web-based education. This study suggests insights into cross-national understanding of e-learner behavior and activity. This paper makes a contributions to suggesting a cross-national approach to e-learner behavior, and an identification and cross-national comparison of precedent factors that have effects on e-learner behavior. This paper has some limitations. This research measured factors from only online education attitudes. Further study may measure synergy of inline and offline education through investigating student behaviors with the combination of e-learning and offline learning.

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