Impact Factors on Using of E-learning System and Learning Achievement of Students at Several Universities in Vietnam

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Abstract. The industrial revolution 4.0 opens many opportunities for online learning and leads to the need to study, entertain, and work anywhere and anytime. Recently, e-learning systems become vital for any university to increase the educational quality and to provide students useful and high quality learning resources. However, how to encourage the e-learning usage and to improve the learning achievement of students through e-learning system is still a challenged task. From previous researches, a research model has been proposed and it is evaluated by Cronbach alpha analysis, EFA, CFA, and Structural Equation Modeling (SEM) techniques on SPSS and AMOS software. Based on quantitative analysis from 356 valid samples, the results showed that 5 factors positively impacted on the e-learning usage are: University support (0.367), Computer competency of students (0.274), Infrastructure (0.195), Content and design of courses (0.145), and Collaboration of students (0.118). Besides, learning achievement is influenced by 2 factors, including: E-learning usage (0.446), and Collaboration of students (0.129). Finally, some managerial suggestions are made to improve the efficiency of e-learning usage and to increase the learning achievement of university students in Vietnam.

Keywords: E-learning · Information system · Usage · Learning achievement
University · Vietnam

1 Introduction

Recently, e-learning systems had been implemented in many schools all over the world at both university and high school level to support learning and teaching processes. In US, there are 5.8 millions of students who registered the online courses and the number is increasing annually during last decade (EdTech 2016). Therefore, e-learning becomes a powerful tool for supporting online and distance programs.

In Vietnam, IT infrastructure of educational institutions was invested recently and upgraded frequently. By 2010, the project "Edunet" completed successfully to equip all educational institutions (from primary schools to universities) with high speed Internet connection (MOET 2016). So, a lot of universities in Vietnam are ready for deploying

e-learning systems and modern ICT applications for education. Taking advantages of new technologies of industrial revolution 4.0, such as: cloud computing, internet of thing, virtual reality…, e-learning systems open opportunities to turn traditional university into modern one, which combine traditional and online method.

E-learning systems bring many benefits for universities, such as: ubiquitous, flexible, rich content, fast updated, easy to monitor the learning progress, convenient, cost saving, time saving… However, ensuring the success of an e-learning system is a difficult task (Pham and Huynh 2017). In fact, some problems of e-learning system implementation are realized, such as: the high rate of failure of e-leaning projects, the low acceptance and low satisfaction of e-learning users, ineffectiveness of e-learning systems on learning achievement… Therefore, there is a need for doing research to identify factors affecting on the success of e-learning system, especially on user acceptance and learning achievement. In Vietnam, there is a few researches in this topic, but it is necessary to do more researches for supporting the success of e-learning projects and to improve the educational quality of higher educational institutions as the goal of Ministry of Education and Training in recent years.

In general, the main objectives of this research include: (1) identify and measure the impact of some factors on students' e-learning usage and learning achievement of several universities in Vietnam; and (2) suggest managerial implications for improving students' e-learning usage and learning achievement through e-learning system. The structure of the paper is as follows: Sect. (2) Main concepts and Literature review; Sect. (3) Research model and hypotheses; Sect. (4) Research results; Sect. (5) Discussion and Conclusions.

2 Main Concepts and Literature Review

2.1 E-commerce and E-business

E-commerce is defined as a trading, selling and buying products or services on the Internet of computer networks (Rosen 2000). E-commerce may include online or offline payment process, and delivering paid products in digital form through the internet or in traditional form in the real world (WTO 1998).

E-business refers to a broader concept of e-commerce, which includes not only trading process, but also all business activities, such as: manufacturing, logistics, research & development, customer service, collaboration, internal operation activities… (Turban et al. 2015).

2.2 E-learning

E-learning is a specific form of e-business in education, which focuses on learning and teaching processes, such as: training, knowledge sharing and collaboration.

E-learning is defined as learning or training process, which is prepared, transferred and managed using various ICT tools locally or globally (Masie 2016). E-learning is a

learning method using Internet communication through interaction between instructor and students with suitable designed learning materials and contents (Resta and Patru 2010).

In this research, e-learning is understood as a learning method through the Internet for some formal educational programs, which are managed by Learning Management System (LMS), to ensure the interaction, collaboration and to satisfy the learning demand of learners at any time, and in any place (Nguyen et al. 2014).

2.3   The Success of E-learning System

Seddon (1997) proposed 3 aspects to evaluate the success of an Information System, including: (1) System quality (relevance, timeliness, accuracy); (2) Perceptual measures (perceived usefulness, user satisfaction); and (3) Benefits (individual, organizational, social). In the IS success model of Delone and Mclean (2003), beside the above factors, Service quality is added to evaluate the support of system supplier.

E-learning is also an information system, so the success of e-learning system could be evaluated similar to any other information system. The success of e-learning system may include: project success, technology acceptance, users' satisfaction, learning achievement, and knowledge transferring… In this research, the success of e-learning focused on e-learning usage and learning achievement of students.

According to Pham and Huynh (2017), learning achievement of students through e-learning system could be determined by independent variables, such as: Computer Self Efficacy, Ease of Use, Perceived Usefulness, Face to Face Interaction, Email Interaction, and Social Presence.

2.4   E-learning Usage: TAM and UTAUT

In order to know the impact factors of e-learning usage, 2 foundation theories should be used, including: Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT).

Technology Acceptance Model (TAM) is developed by Davis et al. (1989) based on Theory of Reasoned Action (TRA) of Fishbein and Ajzen (1975). TAM tried to explain human behavior in acceptance of using an information system. In TAM, there are 2 main factors affecting on the acceptance of a new technology, including: perceived usefulness, and perceived ease of use. In which, the usefulness is also affected by the ease of use. Venkatesh and Davis (2000) suggested an extension of the Technology Acceptance Model (TAM2), which explored the determinants to perceived usefulness and perceived ease of use.

Unified Theory of Acceptance and Use of Technology (UTAUT) proposed by Venkatesh et al. (2003) to explain the intention and behavior of using an information system. UTAUT includes: performance expectancy, effort expectancy, social influence, facilitating conditions. Some demographic factors, such as: gender, age, experience, and voluntariness of use, have indirect impacts on the intention and using behavior (Venkatesh et al. 2003). An extend version of UTAUT (UTAUT2) is also suggested by Venkatesh et al. (2012). In UTAUT2, 3 new factors have been added, including: convenience, exchange value, and habit.

2.5   Related Researches

Some related researches in the success of e-learning system could be summarized in the following Table 1.

Table 1. Summary of related researches

Authors	Topic	Impact factors
Nguyen (2015)	Structural Equation model for the success of IS project	Habit, social influence, ease of use, project quality (information, system, and service), project goal, and project features.
Laily et al. (2013)	Critical success factors for e-learning system in IT Telkom Bandung using SEM	✓ Computer competency ✓ Collaboration ✓ Content ✓ Access ability ✓ Infrastructure
Martínez-Caro (2011)	Impact factors on effectiveness of e-learning: an analysis on Manufacturing Management courses	✓ Prior experience ✓ Flexibility ✓ Job status ✓ Blended e-learning ✓ Students interaction ✓ Interaction between students and lecturers
Shee and Wang (2008)	Criteria for evaluating web-based e-learning system: approach from learners' satisfaction and applications	✓ User interface ✓ Community of learning ✓ Content ✓ Individualization
Wang (2008)	Evaluating the success of e-commerce system: a confirmation of Delone & Mclean model	✓ Information quality ✓ System quality ✓ Service quality
Selim (2007)	Critical success factors for the acceptance of e-learning: confirmatory factor model	✓ Teacher attitude toward technology ✓ Teaching style ✓ Computer competency of learner ✓ Collaboration of learner ✓ Content and design of course ✓ Access ability ✓ Infrastructure ✓ School support
DeLone and McLean (2003)	An updated information system success model	✓ Information quality ✓ System quality ✓ Service quality
Soong et al. (2001)	Critical success factors for online courses	✓ Human factors (time effort, skills) ✓ Technology capability of students and teachers ✓ Mindset about online learning. ✓ Collaboration ✓ Perception about IT infrastructure and support

3   Research Model and Hypotheses

3.1   Research Model

From the above researches, the research model of Selim (2007) and Laily et al. (2013) are selected to suggest a model for evaluating e-learning usage and learning achievement of e-learning system in Vietnam. The reason is that these models covered all aspects of an e-learning system, including: human factors (teachers, students), technology factors (infrastructure, access ability), and learning related factors (content, support, collaboration). In the research of Selim (2007), the impact of various factors on e-learning usage is evaluated, but its impact on learning achievement is not considered. In the research of Laily et al. (2013), there is a lack of some important factors, such as: teacher skills, university support. Therefore, in the proposed research model, a combination of the 2 researches above is necessary. In general, there are 7 factors affecting on e-learning usage and learning achievement of students, and e-learning usage also has an effect on the learning achievement through e-learning system. The proposed research model could be summarized in the following Fig. 1.
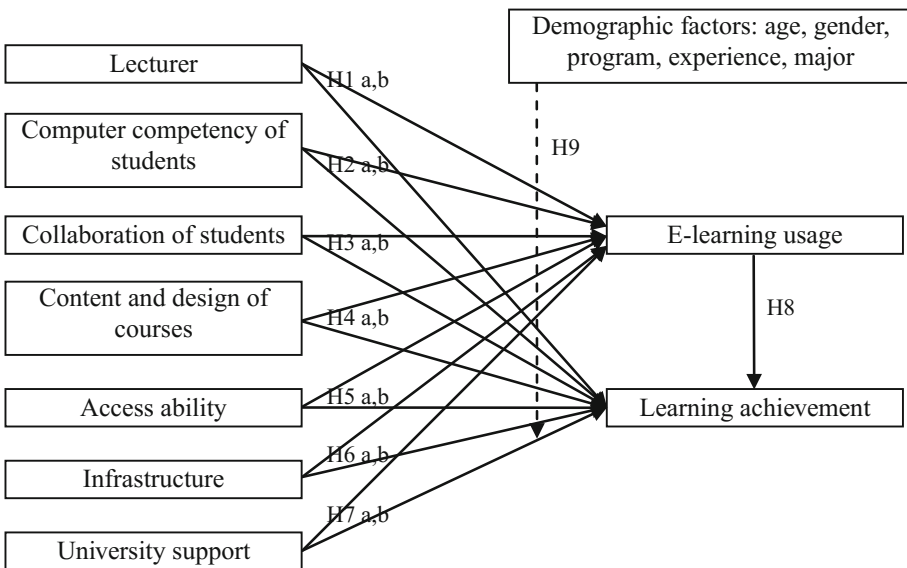

Fig. 1. The proposed research model

3.2   Hypothesis Statements

Lecturer: E-learning is a student-centered method, so, the interaction, evaluation and collaboration between lecturers and students are very important. Harasim (1995) showed that e-learning helps to increase the interaction between students and lecturers in comparison with traditional methods. Moreover, the fear of students in participating

in-class discussion is disappeared on e-learning environment (Owston 1997). Selim (2007) said that lecturer should pay attention to high speed interaction and proper support for solving problems of students in using e-learning system. Besides, lecturers should equip themselves with technological knowledge and skills to be active in online interaction with students. Therefore, hypothesis H1a and H1b could be stated as follows:

> H1a: Lecturer has a positive impact on e-learning usage of student
> H1b: Lecturer has a positive impact on learning achievement of student on e-learning.

Computer competency of students: According to Soong et al. (2001), computer competency of students has a positive impact on the using of e-learning system. Selim (2007) also showed that computer competency and prior experiences of students have positive impacts on e-learning usage. Besides, Laily et al. (2013) confirmed the positive impact of computer competency on learning achievement of learners through e-learning system. Therefore, hypothesis H2a and H2b could be stated as follows:

> H2a: Computer competency of students has a positive impact on e-learning usage of students.
> H2b: Computer competency of students has a positive impact on learning achievement of students on e-learning.

Collaboration of students: are active learning activities and interactions between students through e-learning system. Selim (2007) showed that collaboration between learners leads to the more using of e-learning system. Besides, collaboration also has a positive impact on the learning achievement of students (Laily et al. 2013). Therefore, hypothesis H3a and H3b could be stated as follows:

> H3a: Collaboration of students has a positive impact on e-learning usage of students.
> H3b: Collaboration of students has a positive impact on the learning achievement of students on e-learning.

Content and design of courses: is the perception of learners about the richness, the update of learning content and the easiness and the convenience of course design. Previous researches (Laily et al. 2013; Selim 2007) showed that content and design of course have positive impacts on the use of e-learning, and on the learning achievement of students. Therefore, hypothesis H4a and H4b could be stated as follows:

> H4a: Content and design of course have a positive impact on the e-learning usage of students.
> H4b: Content and design of course have a positive impact on the learning achievement of students on e-learning.

Access ability: is the easiness in accessing the e-learning system. Selim (2007) showed that technology access ability could be seen through the easiness in connecting to the Internet and browsing the e-learning website in the university campus. This ability allows students to use e-learning system easily and to increase the learning

achievement through e-learning. Therefore, hypothesis H5a and H5b could be stated as follows:

> H5a: Access ability has a positive impact on the e-learning usage of students.
> H5b: Access ability has a positive impact on the learning achievement of students on e-learning.

Infrastructure: Selim (2007) showed that the effectiveness of ICT infrastructure in the school, the consistent and reliability of the local network will lead to the more using of e-learning system. Laily et al. (2013) also confirmed that infrastructure has a positive impact on the learning achievement of students. Therefore, hypothesis H6a and H6b could be stated as follows:

> H6a: Infrastructure has a positive impact on the e-learning usage of students.
> H6b: Infrastructure has a positive impact on the learning achievement of students on e-learning.

University support: The support from school is realized as a critical success factor for e-learning system (Benigno and Trentin 2000; Govindasamy 2001). The support from the university could include: library service, supporting department, computer room, help desk service… Selim (2007) showed that technical support from the school will help to increase the use of e-learning system, so, it will lead to a better learning achievement. Therefore, hypothesis H7a and H7b could be stated as follows:

> H7a: University support has a positive impact on the e-learning usage of students.
> H7b: University support has a positive impact on the learning achievement of students on e-learning.

Besides, previous studies showed that the e-learning usage of students could have a positive impact on the learning achievement of students (Laily et al. 2013; Pham and Huynh 2017). Therefore, hypothesis H8 could be stated as follows:

> H8: The e-learning usage has a positive impact on the learning achievement of students on e-learning.

Moreover, according to Venkatesh et al. (2003), demographic factors including: age, gender, experience… may have impacts on the relationships between independent variables and dependent variables in UTAUT model. In this research, the impact of some demographic factors, such as: age, gender, experience, program, and major, on the e-learning usage and learning achievement of students will be examined. Therefore, hypothesis H9 could be stated as follows:

> H9: Demographic factors (age, gender, experience, program and major) have impacts on the relationships between independent factors and the e-learning usage, and the learning achievement of students on e-learning.

4   Research Results

4.1   Data Collection and Analysis Process

Data was collected by a survey using convenient sampling. The questionnaires were delivered using Google Docs, E-mail, E-learning forums, and hard copies to respondents who have used E-learning at several universities in Vietnam. A total of 423 answered questionnaires were received. After removing invalid answers (never use e-learning, the same answer for all questions, lack of information…), there are 356 valid samples, which will be used for quantitative analysis. The data were then analyzed by Cronbach alpha analysis, EFA, CFA, and Structural Equation Modeling (SEM) techniques with the application of SPSS and AMOS (Table 2).

Table 2. Percentage of validated sample

University	Count	Percentage (%)
Bach Khoa University (VNU-HCM)	93	26.1%
Fulbright University in Vietnam	94	26.4%
HCMC Open University	81	22.8%
HCMC University of Economics	88	24.7%
Total	356	100%

4.2   Descriptive Statistics

The descriptive statistics of samples could be summarize in the following Table 3.

Table 3. Descriptive statistics of sample by demographic factors

Factors	Values	Frequency	Percentage (%)
Gender	Male	195	54.8%
	Female	160	44.9%
Age	18–26 years old	246	69.1%
	27–35 years old	80	22.5%
	36–45 years old	26	7.3%
	>45 years old	4	1.1%
Educational level	University	239	67.1%
	Post-graduate level	117	32.9%
Learning program	Regular program	333	93.5%
	Second-degree/distance program	23	6.5%
Major	Technology-Engineering	115	32.3%
	Economics-Management	169	47.5%
	Social sciences-Art-Humanity	72	20.2%

(*continued*)

Table 3. (*continued*)

Factors	Values	Frequency	Percentage (%)
Intake	<=2011	14	4.0%
	2012	22	6.2%
	2013	20	5.6%
	2014	54	15.2%
	2015	133	37.4%
	>=2016	92	25.9%
Experience of using e-learning	<=1 year	153	43.0%
	1–2 years	183	51.4%
	2–3 years	13	3.7%
	>=3 years	7	2.0%

4.3   Cronbach Alpha Analysis

The reliability of measurement scales is evaluated by Cronbach's Alpha analysis. The scale is considered reliable if the Cronbach Alpha >0.6, and item-totall correlation must >0.3 (if not, it should be removed) (Nguyen and Nguyen 2011). The analysis results showed that the Cronbach Alpha of all measurement scales >0.6. However, variable SIC2 has item-total correlation <0.3 (0.110), so it should be removed. This removal helps to increase the Cronbach alpha coefficient of this factor to 0.757. All other measurement scales are satisfied the criteria and could be used for EFA.

4.4   Exploratory Factor Analysis (EFA)

Exploratory Factor Analysis (EFA) helps to evaluate convergent and discriminant value of the measurement scale. KMO and Bartlett test in EFA showed that the hypothesis of a correlation between variables could be rejected (Sig = .000). The KMO coefficient = 0.902 (>0.5) showed that EFA could be used. The analysis results showed that at Eigenvalue >=1, with "Principal Axis Factoring" method, and "Promax" rotation method with Kaiser Normalization, there could be 10 factors extracted from 45 observed variables, and the extraction variance is 58.82%. After removing 9 variables, which have low loading factor coefficient (<0.3), or were loaded in several factors, there are 9 factors and 36 remaining variables. The final result has total extraction variance = 60.09% (>50%), KMO = 0.877 (>0.5) and Bartlett test is significant (Sig. <0.05), and it could be used for confirmatory factor analysis.

4.5   Confirmatory Factor Analysis

From the above analysis, there are 9 factors extracted, which are suitable with the research model. To test the fitness of the model with market data, CFA is often used. In which, Chi-square (CMIN); CMIN/df (degree of freedom); Comparative Fit Index (CFI), Tucker & Lewis Index (TLI), RMSEA (Root Mean Square Error

Approximation) should be examined. If the values of GFI, TLI, CFI $\geq$ 0.9; CMIN/df $\leq$ 3; and RMSEA $\leq$ 0.08, the model is considered to be fit with the market data (Nguyen 2013). The first CFA result showed that the above criteria are not satisfied. From the table of Standardized Regression Weights, removing some variables with low weights to ensure the convergent value of scales. After removing 9 variables, the above criteria are satisfied. The final result is summarized in the following Fig. 2.

The above results showed that Chi-square/df = 1.811 (<2), GFI = 0.904, TLI = 0.946, CFI = 0.956 (>0.9), and RMSEA = 0.048 (<0.08). Therefore, the model is fit with the sample data. Evaluate the convergent value: In the table of Standardized Regression Weights, the minimum weight is 0.549 (>0.5), and P-value <0.05, so all constructs are convergent. Evaluate the discriminant value: According to Nguyen and Nguyen (2011), if the correlation coefficients between all variables <1, these variables are discriminant. The analysis results showed that the maximum correlation coefficient is 0.728 (<1), so, all variables are considered to be discriminant.
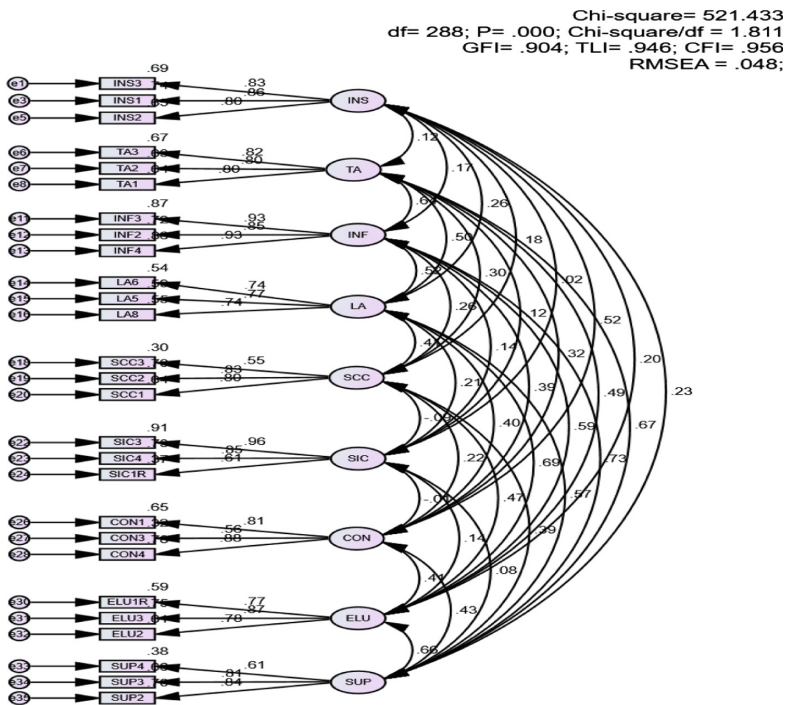

Fig. 2. Standardized CFA results after processing

4.6 Structural Equation Model Analysis

After CFA, the model is concluded to be fit with market data. The SEM analysis results showed that CMIN/df = 1.811 (<2), confirmed the model fitness. Besides, other criteria

of SEM analysis are satisfied: GFI = 0.904; TLI = 0.946; CFI = 0.956 (>0.9); and RMSEA = 0.048 (<0.08), the results are significant and summarized as follows (Fig. 3).
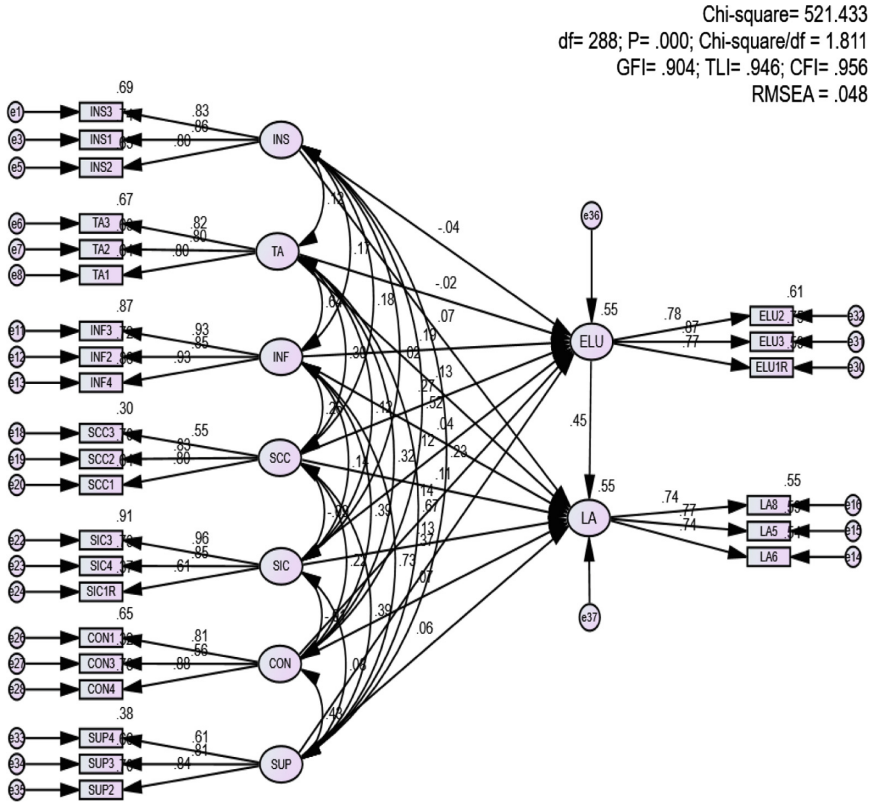

Fig. 3. Final standardized SEM results

From the results, 5 factors: University support (0.367), Computer competency of students (0.274), Infrastructure (0.195), Content and design of courses (0.145), and Collaboration of students (0.118) have significant impacts on e-learning usage of students and they could explain for 54.8% of the variance in e-learning usage of students. However, the learning achievement of students through e-leaning system is determined by 2 factors: E-learning usage (0.446), and Collaboration of students (0.129). These 2 factors explain for 54.5% of the variance of learning achievement of students (Table 4).

Table 4. Hypothesis testing results

Code	Hypothesis statement	Standardized weight	P-value	Result
H1a	Lecturer => E-learning usage	−0.039	0.503	Rejected
H1b	Lecturer => Learning achievement	0.070	0.262	Rejected
H2a	Computer competency of students => E-learning usage	0.274	***	Accepted
H2b	Computer competency of students => Learning achievement	0.107	0.098	Rejected
H3a	Collaboration of students => E-learning usage	0.118	0.012	Accepted
H3b	Collaboration of students => Learning achievement	0.129	0.012	Accepted
H4a	Content & design of courses => E-learning usage	0.145	0.026	Accepted
H4b	Content & design of courses => Learning achievement	0.072	0.306	Rejected
H5a	Access ability => E-learning usage	−0.017	0.817	Rejected
H5b	Access ability => Learning achievement	0.129	0.107	Rejected
H6a	Infrastructure => E-learning usage	0.195	0.013	Accepted
H6b	Infrastructure => Learning achievement	0.044	0.602	Rejected
H7a	University support => E-learning usage	0.367	***	Accepted
H7b	University support => Learning achievement	0.061	0.572	Rejected
H8	E-learning usage => Learning achievement	0.446	***	Accepted

4.7 ANOVA Analysis

ANOVA test is carried out to analyze if there is any difference in the relationship between independent variables and e-learning usage or learning achievement of students by the demographic variables, such as: gender, age, program, experience, and major. The analysis results showed that the relationship between independent and dependent variables is not changed by gender, age, learning program, and major. However, the impact of experience of using e-learning system on e-learning usage could be realized. The relationship changed as follows:

– For group of students with less experience (<=1 year), there are 3 remaining significant impact factors including: Computer competency of students, Content and design of course, and University support (no significant impact from Infrastructure and Collaboration of students).
– For group of student with more experience (>1 year), there are 4 remaining significant impact factors including: Computer competency of students, Content and design of course, Infrastructure, and Collaboration of students (no significant impact from University support). Certainly, the university support is only necessary for junior students.

5   Discussion and Conclusions

5.1   Discussion

The above analysis result showed that the e-learning usage of students in Vietnam is affected by: University support (0.367), Computer competency of students (0.274), Infrastructure (0.195), Content and design of courses (0.145), and Collaboration of students (0.118). While the learning achievement on e-learning is affected by: E-learning usage (0.446), and Collaboration of students (0.129). This results are similar to previous researches of Laily et al. (2013) and Selim (2007). But the order of impact is a little bit different. For example, in Laily et al. (2013), top 3 impact factors on e-learning usage are: students' collaboration, students' content, and infrastructure. But, in this research, collaboration of students has the lowest impact. The reason may be in the characteristic of Vietnamese students, they are not active in collaboration and lack of self-study skills.

Based on this result, Lecturer and Access ability have no impact on e-learning usage and learning achievement of students. This could be explained by the low participation of lecturer in the e-learning system in Vietnamese universities. Although, there are some policies to encourage more participation and using of lecturers to communicate with students through e-learning system, but the effectiveness of these policies is low (Pham and Huynh 2017). So, currently, lecturer plays a less important role on the use of e-learning system and learning achievement of students. Moreover, Internet connection and network access are popular and not different between campuses and programs, so that, access ability has less impact on e-learning usage and learning achievement of students at the university.

According to the above results, the strongest factor impacting on learning achievement of students through e-learning system is the e-learning usage. This means the more time of using e-learning system, the better learning outcomes of students. So, we should encourage the students to use the e-learning system during their learning program to increase the educational results. The strongest impact factor on e-learning usage of students is university support. Therefore, the board of management of universities should pay attention to providing supporting services, especially technical support for students and lecturers in using e-learning system, and in helping them to interact and to get benefits from e-learning usage, such as: information seeking, group forming, online testing, online manuals…

Moreover, collaboration of students has fairly strong impact on both e-learning usage and learning achievement. Therefore, encouraging the interaction and collaboration between students through e-learning system, such as: group work assignment, ideas preparation, online projects…, could help to increase the use of e-learning system and to improve the learning outcomes of students.

5.2   Managerial Implications

From the above results, some managerial implications for encouraging the use of e-learning system and for improving the learning achievement of students through e-learning system could be suggested as follows:

– The university should equip students with computer skills and knowledge for using the e-learning system to support their study. Especially, the university should require students to study computer related subjects in the 1st or 2nd year. Besides, orientation meeting for junior students should provide students with information to use online library and other computer facilities to support students' study in the campus.

– The university should invest more on their ICT infrastructure, equip students with secured and high speed Internet connection, so that, these infrastructure help to improve the information quality and communication services inside of the university.

– The content and design of online courses should be revised and updated to be suitable for online environment. For example, more learning materials should be provided on the e-learning system, long lectures should be broken into small chunks, more active learning methods should be applied, online tests and virtual workshops should also be used…

– Encourage students to collaborate with each others through e-learning system by providing more online services for them. Developing an information portal for connecting e-learning system with other information systems of the university. Moreover, training the lecturers to apply new teaching methods focusing on collaboration and active learning to improve educational quality, such as: online test, group projects through e-learning and online collaboration in solving a real problem… Scoring methods could also help to increase the use of e-learning system and to allow students to learn actively from any where and at any time.

– The university should pay attention to university support for junior students, because it is very important for making it easy for new students to be familiar with e-learning system and to realize to benefit of e-learning on self-study.

5.3   Conclusions and Limitations

In summary, based on previous researches (Laily et al. 2013; Selim 2007), this paper proposed a research model for evaluating the impact of some factors on e-learning usage and learning achievement of students at several universities in Vietnam. Some main factors include: lecturer, student computer competency, student collaboration, content & design of courses, access ability, infrastructure, and university support.

Based on 356 valid samples collected from students at several universities in Ho Chi Minh City (Vietnam), the measurement scales are verified and the research model is tested. After Cronbach alpha test, EFA, CFA, and SEM analysis, 5 factors are confirmed to have positive impact on e-learning usage, including: University support (0.367), Computer competency of students (0.274), Infrastructure (0.195), Content and design of courses (0.145), and Collaboration of students (0.118). Besides, the learning achievement of students through e-leaning system is determined by 2 factors: E-learning usage (0.446), and Collaboration of students (0.129).

According to ANOVA analysis, there is no difference in the relationship between independent variables and e-learning usage or learning achievement of students by the demographic variables, such as: gender, age, program, experience, and major.

However, the e-learning usage of more experience students is not affected by university support (which has a strong impact for less experience group).

There are several limitations of this research, including: (1) The small and limited sample size, (2) The lack of evaluating the impact of mediating factors & other variables related to online learning processes.

Therefore, some implications for future researches could include: (1) Increase the sample size or extend the scope to various educational institutions/programs; and (2) Identify and measure the impact of some new factors, such as: knowledge process, evaluating & teaching method…, on e-learning usage and learning outcomes of university students.

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