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Critical Success Factors for e-learning at University and College Level in the Frame of EMVITET Project

Thi Hai Van Nguyen[1*], Thi Thu Ha Truong[1]
Thanh-Lam Nguyen[2], Nguyen Thi Le[3], Ho Thi Quynh Nhu[4]
Tran Thi Quynh Nhu[4], Do Thu Thuy[3], Hoang Tuan Nguyen[5]

[1]University of Technology and Education, The University of Danang, Vietnam
[2]Lac Hong University, Vietnam
[3]HCM City Industry and Trade College, Vietnam
[4]Hue Industrial College, Vietnam
[5]College of Technology II, Vietnam

[*] *Corresponding author. Email: nthvan@ute.edu.vn,*

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ABSTRACT

E-learning has become a trend in university education around the world, especially in the context of the increasingly widespread and complicated COVID-19 epidemic over the last two years. Online teaching and learning are considered a temporary solution for the education industry nationwide. Teaching and learning online opens up many opportunities but also brings many challenges for students and lecturers. This study investigates the effect of critical success factors (CSFs) on e-learning at universities and colleges which are members of the EMVITET project. Five categories were firstly identified via the literature and a questionnaire using the Likert scale was then carried out to evaluate the importance of each factor from students' perspectives. Analytical results indicated 25 CSFs that influence the success of e-learning. Internet quality, self-efficacy, learning materials, are available and up-to-date, enthusiasm while teaching, and Content and property of subject are the top five influential factors that impact the e-learning success. This study, thus, supports leaders and teachers at universities and colleges in making decisions and strategies about e-learning.

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1. Introduction

The development of Information Technology (IT) has resulted in massive growth in a wide range of fields such as finance, business, education, and health. In education, e-learning has become a mainstream been widely adopted in many educational institutions. E-learning is defined as "an approach to teaching and learning, representing all or part of the educational model applied, that is based on the use of electronic media and devices as tools for improving access to training, communication and interaction and that facilitates the adoption of new ways of understanding and developing learning" (Sangrà et al., 2012). In another way, e-learning is considered as the use of modern Information and Communications Technology (ICT) and computers to deliver instruction, information, and learning content (Selim, 2007). E-learning brings many benefits to learners and institutions. It reduces cost for travel, classroom and facilities, labor, and printed materials. It increases accessibility to information, better content delivery, personalized instruction, content standardization, accountability, on-demand availability, self-pacing, interactivity, confidence, and increased convenience (Bhuasiri et al., 2012).

Critical success factors (CSFs) are defined as "those things that must be done if a company is to be successful" (Freund, 1988). This term appeared from the fact that some organizations seemed to be more successful than others, and researchers wanted to investigate the success components (Ingram et al., 2000). CSFs should be few in number, measurable and controllable (Selim, 2007).

In past decades, many studies have explored CSFs for e-learning in all levels, from the perspective of students, teachers, to institutions (Selim, 2007) (Bhuasiri et al., 2012) (Alhabeeb et al., 2018) (McGill et al., 2014). For example, (Bhuasiri et al., 2012) investigated the influence of multiple factors on the success of e-learning systems in developing countries. A questionnaire was designed to collect responses from ICT experts and faculties. Six CSF dimensions that were identified include learners' characteristics, instructors' characteristics, institution and service quality, infrastructure and system quality, course and information quality, and extrinsic motivation. (Alhabeeb et al., 2018) compared the e-learning CSFs from the perspectives of students and academic staff in Saudi Arabia. For students, technology infrastructure, instructor characteristics, and student characteristics were the three most important CSFs. An investigation conducted by (Taha, 2014) to identify the factors that affect the implementation and development of e-learning secondary schools. Four categories were explored including students characteristics, teachers' characteristics, technology, design and content.

The EMVITET (Empowering Vietnamese VET teachers for transformation towards Education 4.0) Erasmus+ capacity building project aims at creating a new learning ecosystem for Education 4.0 in Vietnam, based on student-centered learning, competence-based education, collaboration and networking in digital environments, and sharing knowledge through a community of practice (Sangrà et al., 2012). Digital technologies and environments are core elements in forming platforms and spaces for authentic learning, collaboration, sharing and networking. The first common publication of the EMVITET project explained the core concept of Education 4.0: *"Education 4.0 shifts mindsets and approaches in learning and teaching. Digitalisation enables learning to occur anywhere which makes learners key actors in their own learning. Teachers change their role to facilitators of learning. Instead of focusing so much on degrees, learning concentrates on relevant competences. Education 4.0 refers also to ecosystems of educational institutions and the world of work, which produce innovations and evolve in the change. It means that in education we do not just adapt to changes, but we actively build our own meaningful future. In Education 4.0, the traditional ways of implementing education are not enough, but we need to rethink learning and education to match the needs of the changing world."* (Marshall, 2012).

University of Technology and Education (UTE-DN), Lac Hong University (LHU), Ho Chi Minh university of Technology and Education (HCMUTE), HCM City Industry and Trade College (HICT), Vietnam, Hue Industrial College (HUEIC), Vietnam College of Technology II (HVCT) are members of EMVITET project. The reason for this conduction is students cannot go to classrooms due to the social distance caused Covid-19 pandemic. There has not been any survey that investigated CSFs for e-learning in these universities and colleges. This study, thus, aims to explore critical factors that affect the success of e-learning at universities and colleges in a frame of EMVITET from the student perspective.

The rest of this paper is organized as follows. Section 2 reviews pieces of research about CSFs for e-learning. Section 3 establishes dimensions and critical factors for e-learning success. Data collection and results are presented in Section 4. Finally, Section 4 shows the conclusions and recommendations.

2. Dimensions of CSFs for e-learning

From the literature, e-learning success factors could be divided into 5 categories including learners' features, instructors' features, technology infrastructure, e-learning system quality, and course's features (Figure 1).

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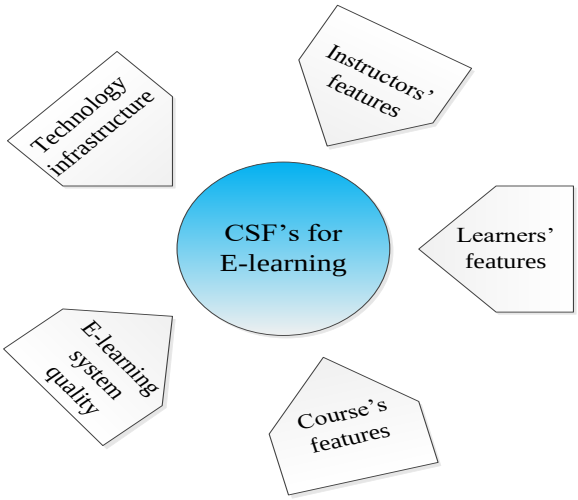

Figure 1. *Categories of success factors for E-learning.*

E-learning cannot be effectively conducted without learners. With an e-learning based course, learners are responsible for their learning pace. Previous studies indicated some relevant learner characteristics such as computer self-efficacy, Internet self-efficacy, attitude toward e-learning. Along with learners, instructors play a crucial role for the effectiveness and success of e-learning. Some relevant features of an instructor that affect e-learning success are timely response, self-efficacy, focus on interaction, technology control.

Different from traditional learning where learners and instructors are in face to face communication, participants in a virtual learning environment interact through digital tools. Reliability and robustness of physical infrastructure are considered to be important institutional conditions so that e-learning could be successfully applied (Marshall, 2012). Technological facilities, thus, have a positive effect on learners' satisfaction. Success factors that are relevant for technology infrastructure consist of internet quality, equipment accessibility, reliability of technical infrastructure, etc.

Learning management system (LMS) is a web-based technology that enables universities or educational institutions to create, distribute, and manage lessons, courses, quizzes and other training materials. It is one of the crucial determinants to e-learning could be conducted. The quality of LMS that relates to the belief of learners about e-learning's performance is measured by ease of use, interactivity, functionality, support in language, etc. A well-designed course has a strong positive effect toward learners' satisfaction. Relevant factors for course's features are flexibility, learning materials, etc.

3. Success factors for e-learning

Five categories that contained 25 different factors were identified. Table 1 summaries these CSF's into five categories including learners' features, instructors' features, technology infrastructure, e-learning system quality, and course's features. The definition of each factor was also specified and Table 1 was used as a basis for the questionnaire survey design.

Table 1. *Definitions of CSF for e-learning.*

Categories	Factor		Definition
Learners' features	L1	Attitude toward e-learning	Willingness to participate in online learning
	L2	Experience and knowledge about computers	Ability to use computer to finish a particular assignment.
	L3	Internet self-efficacy	Ability to interact with the Internet

Categories	Factor		Definition
	L4	Self-study and self-discipline	Ability to make herself or himself study and do something, especially something difficult
	L5	English proficiency	The understanding of English while using digital tools
Instructors' features	I1	Self-efficacy	The clear presentation and explanation about online lectures
	I2	Enthusiasm while teaching	The enthusiasm of instructor while teaching using e-learning tools
	I3	Focus on interaction	Ability to motivate learners to participate in online discussions
	I4	Timely feedback	The instructor responses quickly to learners' problems
	I5	Flexible teaching organization	Ability to flexibly organize teaching activities
	I6	Fair interaction and assessment	The instructor treats learners fairly during their online learning period
	I7	Proficiency in e-learning system	Ability to effectively manipulation the e-learning system and digital tools
Course features	C1	Content quality	The quality of writing, videos, images, etc. to meet generally accepted standards.
	C2	Course flexibility	Learners' perception of the efficiency and effects of adopting e-learning in their working, learning, and commuting hours
	C3	Learning materials are available and up-to-date	The prompt provision of learning materials
Technology infrastructure	T1	Internet quality	The quality of Internet can be evaluated by data transmission speed, error rates,…
	T2	Reliable technical infrastructure	The degree of accuracy, reliability, and consistency of the information
	T3	Available online communication tools	Availability of online communication tools (e.g, email, Facebook,…)
	T4	Technical support in teaching	Availability of training and offline technical support, ability to access equipment

Categories	Factor		Definition
E-learning system quality	E1	Ease of registration	Ease of registration on e-learning course
	E2	Ease of use	The degree to which users expect the use of the e-learning system to be free of effort
	E3	System functionality	The ability to which the e-learning system could provide flexible access to instructional and assessment media
	E4	System interactivity	Availability of communications with the instructor in the e-learning system
	E5	Language Support	The ability to explain terminologies of the system so that users could be understandable
	E6	System response	The time that elapes from manipulation of a user until feedback from the system is received

4. Data collection and analytical results

4.1. Data collection

This study was carried out for 6 members of EMVITET project (UTE-DN, LHU, HCMUTE, HVTC, HUEIC, HITC), the reason for this deployment is students could not go to class due to the social distance caused by the Covid-19 pandemic. This study was focused on perspective students who are trained for a bachelor degree.

A five-point Likert-style statement was designed for each e-learning CSF, for which participants were asked to show their opinion regarding its importance to the success of e-learning. Five-point Likert scale that ranges from 1 to 5 includes Very unimportant, Unimportant, Normal, Important, and Very important, respectively. The threshold for the importance of factors if their average mean values equal to or higher than 4. The survey includes two stages. At the first stage, a paper-based questionnaire was designed and then sent to some experts in education to get their feedback. A web-based questionnaire was redesigned at the second stage to collect data from participants.

Data was collected from students who are studying in six universities and colleges of EMVIET project. Table 2 summarises the demographic profile and descriptive statistics of surveyed students in terms of gender, academic year, and which department they are studying. Total received responses are nearly 1500 in which 1234 responese are valid (accounting for 82.27%). Majority of respondents are male which account for 69.1% (852 replies) comparing 30.9% of female. This is quite understandable since most of six universities and colleges are technical training institutions that attracts more males than females. This table indicates that participants from three colleges account for 31,8% of responses.

Table 2. *Learners' demographic data.*

		Frequency	Percentage (%)
Gender	Male	852	69.0%
	Female	381	30.9%
	Other	1	0.1%
Level	University	845	70.8%
	Vocational college	349	29.2%
Institution	Hue Industrial College (HueIC)	50	4.1%
	HCM City Industry and Trade College (HITC)	239	19.4%
	College of Technical II (HVCT)	104	8.4%
	Lac Hong University (LHU)	60	4.9%
	University of Technology and Education - The University of Danang (UTE-DN)	273	22.1%
	HCM City University of Technology and Education (HCMUTE)	508	41.2%

4.2. Results and discussion

Table 3 shows the mean and standard deviation of 25 CSFs in the e-learning assessment. It can be seen that 25 factors have a mean response higher than four. For the category "course's feature", the mean is higher than 4.5

Table 3. *Descriptive statistics of CSF indicators for e-learning.*

Categories	CSF	Min	Max	Mean	Standard Deviation
Learners' features	L1	1	5	4.32	0.83
	L2	**1**	**5**	**4.46**	**0.81**
	L3	1	5	4.20	0.80
	L4	1	5	4.24	0.79
	L5	1	5	4.13	0.89
Instructors' features	**I1**	**1**	**5**	**4.59**	**0.67**
	I2	1	5	4.54	0.68
	I3	1	5	4.32	0.76
	I4	1	5	4.49	0.70
	I5	1	5	4.38	0.73

Categories	CSF	Min	Max	Mean	Standard Deviation
	I6	1	5	4.45	0.74
	I7	1	5	4.31	0.77
Technology infrastructure	**T1**	**1**	**5**	**4.60**	**0.72**
	T2	1	5	4.35	0.78
	T3	1	5	4.34	0.76
	T4	1	5	4.06	0.90
E-learning system quality	E1	1	5	4.31	0.77
	E2	1	5	4.21	0.79
	E3	1	5	4.12	0.81
	E4	1	5	4.20	0.79
	E5	1	5	4.22	0.79
	E6	**1**	**5**	**4.39**	**0.77**
Course's features	C1	1	5	4.52	0.66
	C2	1	5	4.49	0.69
	C3	**1**	**5**	**4.58**	**0.69**

For the dimension of learners' features, students showed that Self-learning ability and sense of discipline (L2) was the most important factor with the mean value of 4.46. Students who participate in online classes feel less excited and motivated than in face-to-face classes. Thus, students with has high self-discipline generally obtain better academic performance than those have low low self-discipline.

The presentation and explanation of the lecture content (I1) was the most important factor in the dimension of instructors' features with the mean value of 4.59. This factor could be presented by the clear presentation and explanation of the instructors about their online lectures.

Most of responses indicated internet quality (T1) significantly contribute to the success of virtual learning. The mean of T1 was highest among considered factors with a value of 4.60. In the e-learning, teachers, and learners communicate through a virtual environment based on electronic technologies. Thus, the success of an online session, thus, is much affected by the quality of the internet connection.

For category "E-learning system quality", students replied that the processing speed of the E-learning system (E6) was the most important influential factor in their online learning. The system response could be explained by the system's delay when posting files, downloading files… With regards to course's features, learning materials are updated in a timely manner (C3) of the online course has the biggest influence on students' e-learning performance with the mean value of 4.58.

It can be seen that Internet quality, the presentation and explanation of the lecture content, learning materials are available and up-to-date, enthusiasm while teaching, and content and property of subject

are the top 5 essential factors that influence e-learning success from students' perspective. On the other hand, Internet self-efficacy, system interactivity, English proficiency, diversity on system functionality, and technical support in teaching are the five least influential factors for e-learning. Fig. 2 shows CSFs for e-learning from the perspectives of students.

The importance of categories is ranked at Table 4. According to the students' responses, course's features was the most influential group on the e-learning success with the average of 4.53, the second

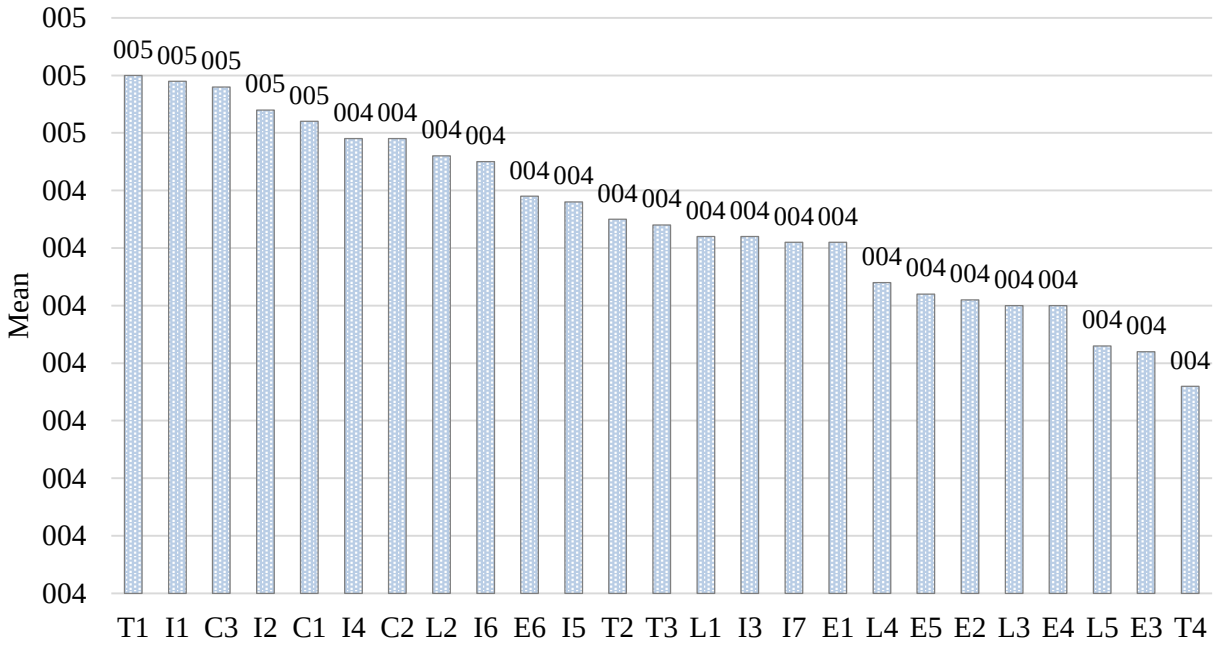

Fig. 2. *CSFs for e-learning from students' perspective*.

rank is Technology infrastructure and the third is instructors' features. Notably, learners' features and the quality of e-learning were not appreciated by students. Fig. 3 compares the influence of CSF's groups on the success of e-learning.

Table 4. *Summary of critical success factors for e-learning from student perspective*.

Categories	Mean	Rank
Course's features	4.53	1
Instructors' features	4.44	2
Technology infrastructure	4.34	3
Learners' features	4.27	4
E-learning system quality	4.24	5

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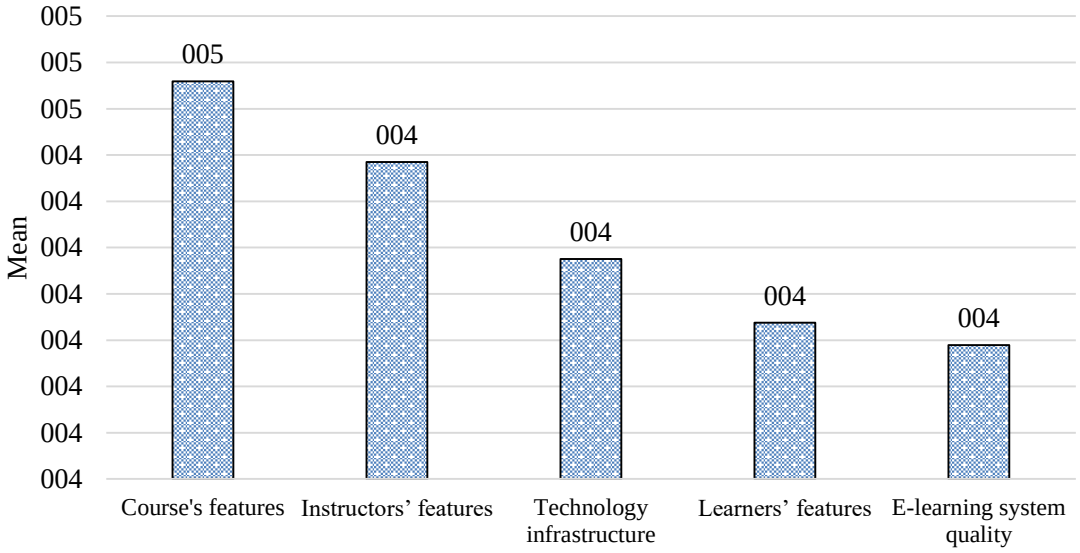

Fig. 3. *Comparison of the influence of CSF's groups on the success of e-learning.*

As mentioned at the beginning of this article, the research was conducted for 6 member schools of the EMVITET project, including 3 Universities (HCMUTE, LHU and DN-UTE) and 3 Colleges (HVCT, HICT and) HUEIC). When analyzing and graphing for each survey of schools, the group of colleges has quite similar results and the group of universities in the University block also gives nearly the same results. Specifically, the result chart of each school is as follows:

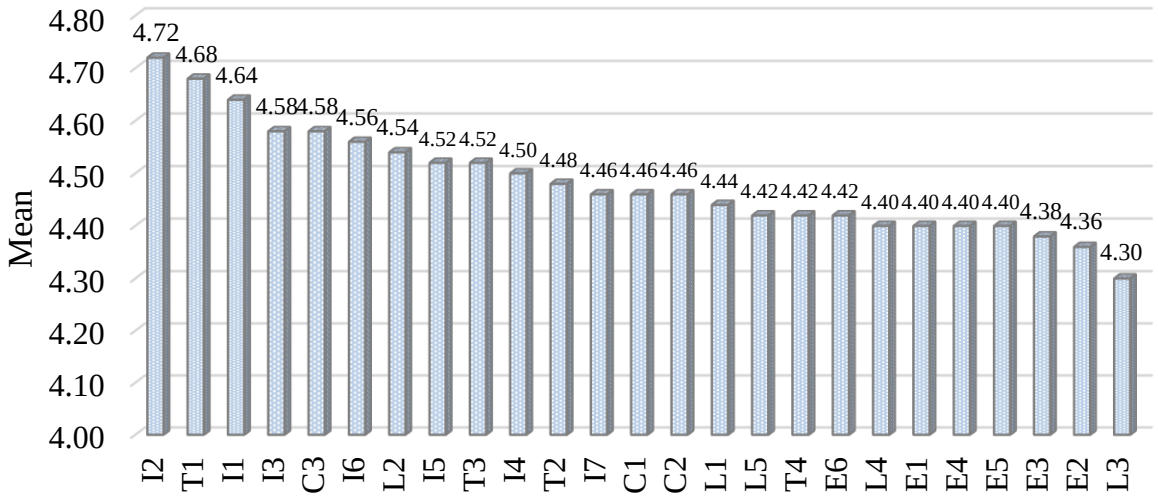

Fig. 4. *CSFs for e-learning from students' perspective of* ***HueIC***

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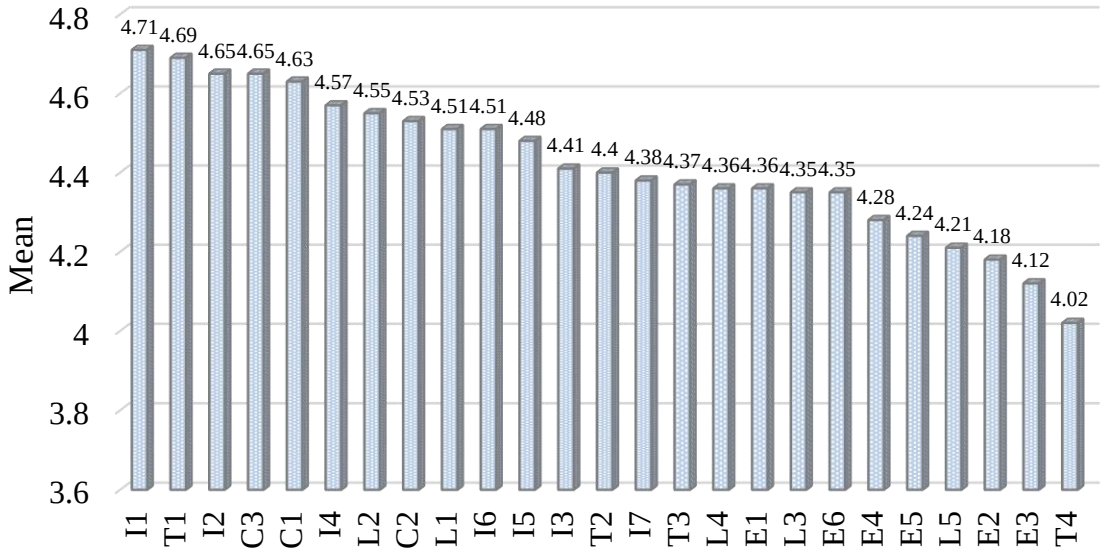

Fig. 5. *CSFs for e-learning from students' perspective of* ***HITC***

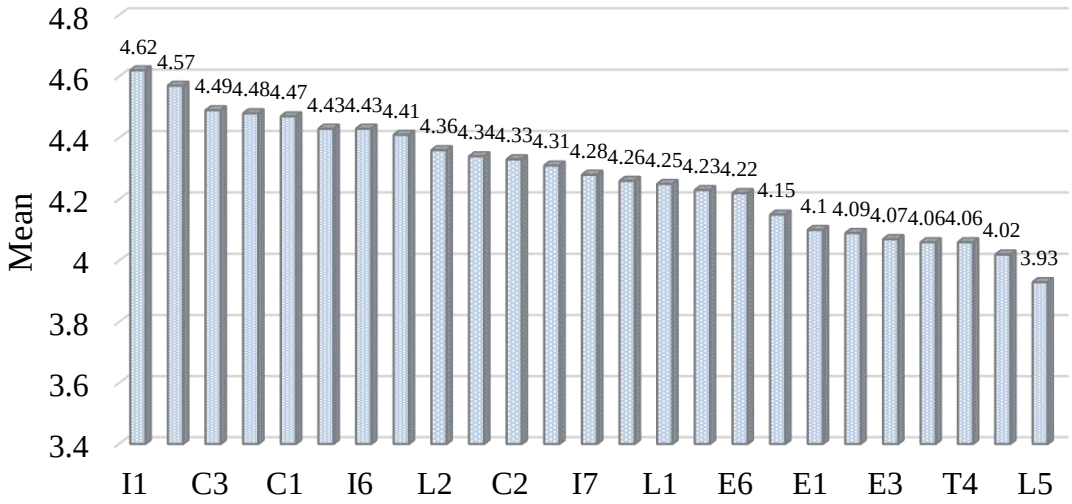

Fig. 6. *CSFs for e-learning from students' perspective of* ***HVTC***

For the group of colleges, the instructor's features are a decisive factor for success, namely the factor "self-efficacy" and "enthusiasm while teaching". HVCT and HICT choose "self-efficacy" that means the clear presentation and explanation about online lectures, while HUEIC chooses "enthusiasm while teaching" that means the enthusiasm of instructor while teaching using e-learning tools. For the group of university, Internet quality of category "Technology infrastructure" is the most important for e-learning CSF.

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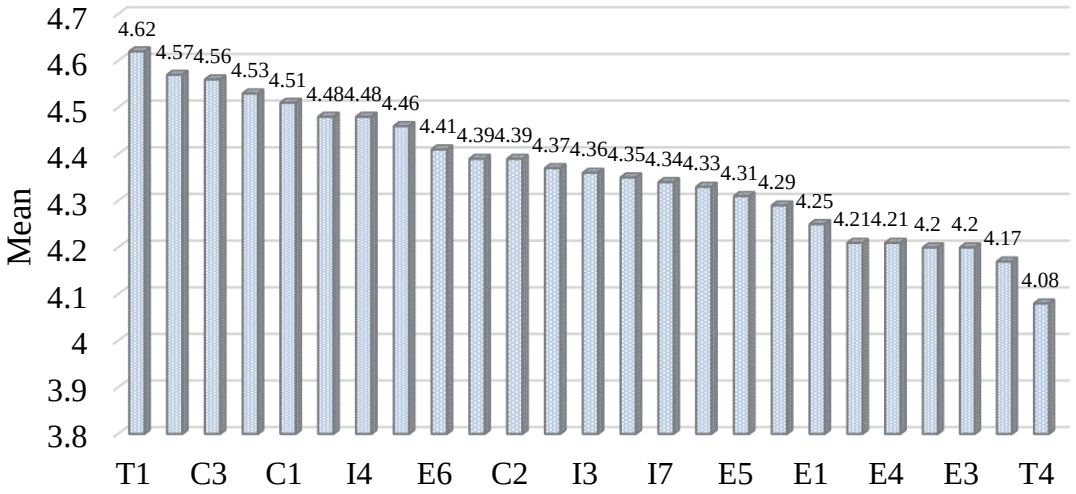

Fig. 7. *CSFs for e-learning from students' perspective of* ***LHU***

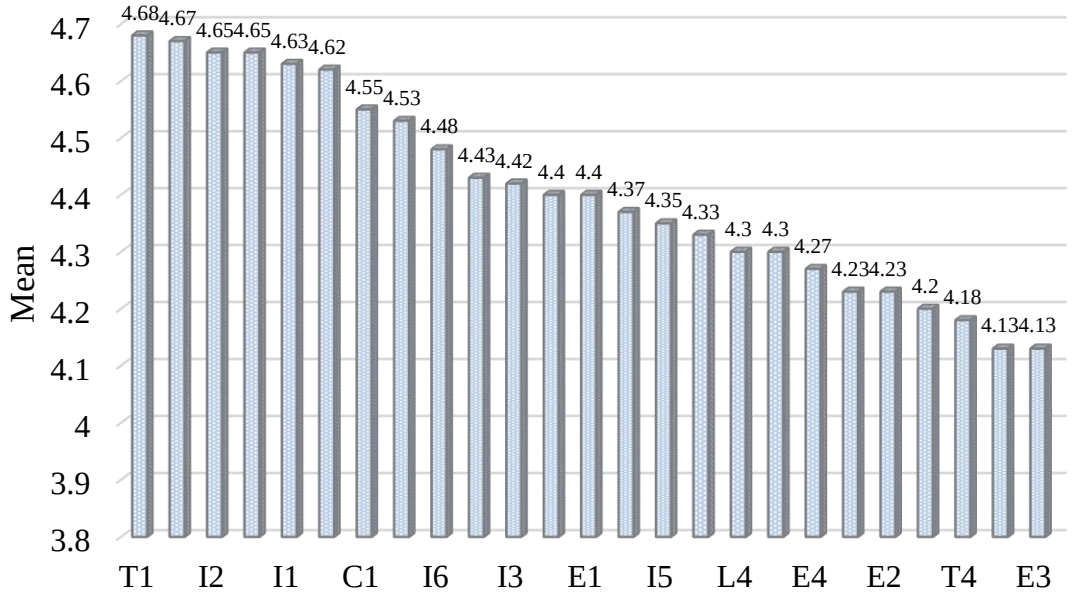

Fig. 8. *CSFs for e-learning from students' perspective of* ***UTE-UD***

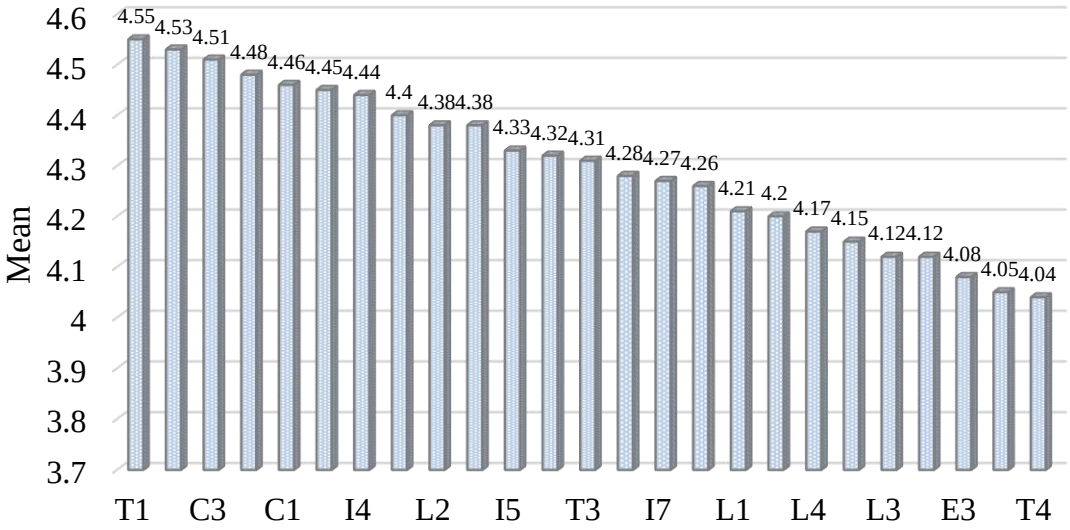

Fig. 9. *CSFs for e-learning from students' perspective of HCMUTE*

5. Conclusions

This study aims to discover the CSFs that might influence the success of e-learning from the students' perspectives. Five dimensions including learners' features, instructors' features, course's features, technology infrastructure, and system quality were first identified. A questionnaire using a five-point Likert scale was conducted to collect responses of students who are studying at six institutions including University of Technology and Education (UTE-DN), Lac Hong University (LHU), Ho Chi Minh university of Technology and Education (HCMUTE), HCM City Industry and Trade College (HICT), Vietnam, Hue Industrial College (HUEIC), and Vietnam College of Technology II (HVCT) - members of EMVITET project. Analytical results revealed that 25 factors are essential to the success of e-learning. For students, the course's features was the most important group that might affect their online learning. In particular, internet quality was the most influential CSF to the success of e-learning.

Results obtained from this study could be utilized by leaders and decision-makers to make suitable policies and strategies. Lecturers also use findings from this study to have suitable online teaching programs. In the future, feedback from teachers needs to collect to compare the CSFs between students' and teachers' perspectives.

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Thi-Hai-Van Nguyen, Ph.D.
Thi-Hai-Van Nguyen is now working as teacher of University of Technology and Education, The University of Danang (UTE-UD). She graduated in Automation of France – Vietnam excellence engineers training program (PFIEV) at Danang University of Technologies (DUT) in 2006. Then she studied Master and Ph.D. in France during 2009-2015. Her research interests include control and automation, mechatronics, plasma, energy recovery, and university administration. She can be reached at Dept. of Industrial Education, UTE, 48 Cao Thang St., Da Nang city, Vietnam; email: nthvan@ute.udn.vn.

Thi Thu Ha Truong, MSc.
Thi Thu Ha Truong is now working as a lecturer at University of Technology and Education, The University of Danang (UTE-UD), Vietnam. She studied at Faculty of Project Management, University of Science and Technology, UD from 2006 to 2011. In 2016, she achieved a master's degree at National Taiwan University of Science and Technology (NTUST), Taiwan. Her research interests include project management, time series analysis and forecasting, artificial intelligence in civil engineering. She can be reached at Dept. of Civil Engineering, UTE, 48 Cao Thang St., Da Nang city, Vietnam; email: tttha@ute.udn.vn.

Assoc. Prof. Thanh-Lam Nguyen, Ph.D.
Thanh-Lam Nguyen is now working as the Vice Rector of Lac Hong University (LHU) located in Bien Hoa City, Dong Nai Province, Vietnam. He is also the key contact point and coordinator of international projects that LHU joins as a HEI partner. He was awarded with Taiwan Government Scholarship for his Ph.D. study at National Kaohsiung University of Applied Sciences (which is now NKUST) during 2011-2014. His research interests include: statistics, fuzzy statistics, quality management, manufacturing process monitoring, performance evaluation, business administration, and education quality assessment.

Nguyen Thi Le, M. S.
Nguyen Thi Le. (F '74) is a lecturer of physics and soft skills at Ho Chi Minh City Industry and Trade College. She received B. S. degree in Physics from Hanoi National University of Education in 1995, and M. S. degree in Methods of Teaching Physics from Ho Chi Minh City University of Education in 2005. Her interest is teaching methodology. She can be reached at Dept. Fundamental Sciences, No. 20 Tang Nhon Phu, Phuoc Long B Ward, District 9, Thu Duc city, HCMC; email: nguyenthile@hitu.edu.vn

Ho Thi Quynh Nhu, Ph.D.
She achieved the Degree of Doctor of Philosophy in English Language Education from Hue University of Foreign Languages in 2019. She is now working as a lecturer of translation courses, ESP courses and English language skills at Hue Industrial College. She is interested in ESP/EOP, translation, English teaching methodology, language course/curriculum development, Computer-assisted language learning (CALL) and Mobile-assisted language learning (MALL). She has published several articles within her research areas. She can be reached at Dept. Fundamental Sciences, Hue Industrial College, 70 Nguyen Hue Street, Hue City, Vietnam; email: htqnhu@hueic.edu.vn

T**ran Thi Quynh Nhu, M.A.**
She received M.A. degree in Educational Management from University of Leeds in 2013. She is now working as a lecturer at Hue Industrial College. She is interested in ESP, English teaching methodology, language course/curriculum development, and language assessment. She can be reached at Dept. Fundamental Sciences, Hue Industrial College, 70 Nguyen Hue Street, Hue City, Vietnam; email: ttqnhu@hueic.edu.vn

Do Thu Thuy, M. S.
She received the B. S. degree in Management of Information System from University of Economics and Law in 2011, and M.S. degree in Global TVET Management from KOREATECH University, Korea in 2021. She is now working as a staff of International Relations at HCMC Industry and Trade College. She can be reached at Science & Technology Management and International Co-operation Department, No. 20 Tang Nhon Phu, Phuoc Long B Ward, District 9, Thu Duc city, HCMC; email: dothuthuy@hitu.edu.vn

Tuan Nguyen Hoang, MSc. He is a lecturer in thermal engineering who is teaching at College of Technology II. He graduated from thermal engineering in 2011 and received his master's degree in 2019 from HCMC University of Technology and Education. He can be reached at Faculty of Refrigeration, College of Technology II, 502 Do Xuan Hop, Thu Duc City, Vietnam; email: tuannguyenhoang@hvct.edu.vn