# **QUALITY OF ONLINE LEARNING ENGLISH IN THE CONTEXT OF COVID-19** AT UNIVERSITIES IN DA NANG, VIET NAM

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ARTICLE I	NFO	ABSTRACT				
Received:	09/6/2022	The year 2021 is full of difficulties for many fields, including				
Revised:	24/6/2022	education. E-Learning is currently the method which is widely applied by most universities during COVID–19 pandemic. Besides its				
Published:	24/6/2022	outstanding advantages, this method still has some limitations affecting				
		the learning quality of student, especially for English subjects. This				
KEYWORDS		study aims to determine the factors affecting the quality of online				
		learning English in the context of COVID-19 pandemic at universities				
Online Learning English		in Da Nang city. Qualitative method was used to build research models				
Quality		and scales. Quantitative method was used to test the scale and the				
E-Learning		model's hypotheses. Results from a survey of 561 students showed that				
COVID 10		not only the teaching participants as lecturers, the supporting people as				
COVID-19		universities but also the students themselves affected the quality of				
Student		online learning English. Thereby, the study made some suggestions for				
		students, lecturers and universities in order to improve the quality of				
		online learning English.				

# CHẤT LƯỢNG HỌC TIẾNG ANH TRỰC TUYẾN TRONG BỐI CẢNH COVID-19 TẠI MỘT SỐ TRƯỜNG ĐẠI HỌC TRÊN ĐỊA BÀN THÀNH PHỐ ĐÀ NÃNG, VIỆT NĂM

**Lê Thái Phượng** Trường Đại học Kiến trúc Đà Nẵng

THÔNG TIN BÀ	I BÁO	ΤΟΜ ΤΑΤ			
Ngày nhận bài:	09/6/2022	Năm 2021 là một năm đầy khó khăn đối với nhiều lĩnh vực, trong đó			
Ngày hoàn thiện:	24/6/2022	có lính vực giáo dục. Học trực tuyên là phương thức được hầu hết các trường Đại học ứng dụng trong bối cảnh COVID-19. Bên cạnh những			
Ngày đăng:	24/6/2022	lợi ích đạt được thì phương thức này vẫn còn một số hạn chế ảnh			
ТỪ КНО́А		hương den chất lượng học của sinh viên, dặc biệt là doi với các môn tiếng Anh. Nghiên cứu này nhằm xác định các nhân tố ảnh hưởng đến chất lượng học tiếng Anh trực tuyến trong bối cảnh COVID-19 tại các trường đại học trên địa bàn thành phố Đà Nẵng. Phương pháp định tính			
Học tiếng Anh trực tuyến					
Chất lượng		được sử dụng để xây dựng mô hình và thang đo nghiên cứu. Phương			
E-Learning		pháp định lượng được sử dụng để kiếm định tháng đo và các giả thuyết của mô hình. Kất quả từ quâc khảo sát 561 sinh viên cho thấy không			
COVID-19		chỉ người tham gia giảng day là giảng viên, người hỗ trợ sinh viên là			
Sinh viên		nhà trường mà cả bản thân sinh viên cũng ảnh hưởng đến chất lượng			
		học tiếng Anh trực tuyến. Qua đó, nghiên cứu đã đưa ra một số gọi ý đối với sinh viên, giảng viên và nhà trường nhằm nâng cao chất lượng học tiếng Anh trực tuyến.			

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# **1. Introduction**

In the context of the complicated and uncontrollable COVID-19 pandemic, universities have chosen E-Learning (EL) as an optimal method to continue their teaching and learning activities. Students can refer to learning materials and exchange with lecturers through various tools such as Google Classroom, Google Meet, Zoom, Microsoft Team... or any online training system developed by their universities.

Currently, there are multiple ways to understand EL from different perspectives and in different forms. In a narrow sense, EL is any learning that is internet-enabled or web-based [1]. In a broader sense, "EL is the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services, as well as remote exchange and collaboration" [2]; is learning supported with electronic technology such as online classes and portals to access the courses outside the classroom is known as EL [3] or EL to mean any learning that is enabled electronically [4]. In this study, the authors approached EL as a learning and training activity based on information and communication technology, especially information technology.

EL has two forms of communication between lecturers and learners: synchronous and asynchronous. Synchronous communication is a form of communication in which faculty and students access the network at the same time. Asynchronous communication is a form in which students and lecturers do not necessarily have to access to the network at the same time, such as self-study courses on the Internet, email, forums. In the context of the impact of COVID-19 pandemic, universities currently mainly use synchronous communication for teaching. Therefore, this study focused on online teaching and learning with synchronous communication.

Compared with traditional education, online education brings students convenience and flexibility [5]. EL is carried out in a network, hence it is suitable for learners' circumstances, ensuring anytime, anywhere; lecturers easily manage classes with a large number of students. EL has been widely applied and there have been numerous research works all over the world [6 - 11]. However, EL in Vietnam has only begun to develop in recent years in order to combine with traditional teaching methods, thus there are very few research works on this issue, and most of them still have numerous limitations [12].

This study systematized some basic theories about EL, and quality of EL. In addition, it also focused on the quality of EL for English subjects. The research question is what are the factors that influence the quality of online learning English in the context of COVID-19 pandemic at some universities in Da Nang city. Thereby, the study also provided some orientations for universities to enhance their effectiveness of teaching and online learning English.

# 2. Research Methodology

## 2.1. Research model and hypothesis

Nowadays, quality is considered as a major issue for modern education generally, but particularly so for institutions involved in EL. However, the quality of higher education is complicated and depends on the perspectives of the related parties. In Vietnam, there are three common views on the quality of higher education. Firstly, the perspective of the internal quality emphasizes the quality of teaching in higher education system. Quality is often ensured by multiple links or content of the teaching activity, such as setting expertise, curriculum design and teaching model selection, often in terms of learning standards to measure the quality of education must be reflected in the quality of graduates and the ability to meet the actual needs of employers. Thirdly, the quality perspective from the learners is the interest in the needs of the students, considering the students' learning needs as the basic for assessing the quality of training.

This study considered the quality of EL based on the learner's point of view; it means that the quality of EL is assessed by student's perceptions of the degree of meeting the student's demand.

Regarding the factors affecting the quality of EL, there have been numerous research works all over the world. Some of them are summarized in Table 1.

<b>Table 1.</b> Key Determinants of Quality of EL	
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Key Determinants	Reference					
Administrative Support, Course Content, Course Design, Instructor Characteristics, Learner	[10]					
Characteristics, Social Support, Technical Support	[10]					
Interaction, Staff Support, Institutional QA Mechanism, Institutional Credibility, Learner	[6]					
Support, Information and Publicity, Learning Tasks	[0]					
Interactivity, Collaboration, Motivation, Network of Opportunities/direction for future,	[9]					
Pedagogy, Content/Material, Assessment, Usability, Technology, Support for Learners						
Learners' characteristics, Instructors' characteristics, Institution and Service Quality,	[7]					
Infrastructure and System Quality, Course and Information Quality, Extrinsic Motivation	[/]					
Teaching pedagogy, Teaching & Professional Behavior, Course Instructional Planning &	[12]					
Methodology, Online connectivity and availability, Students' Engagement	[15]					
Course Design, Content Support, Course Support, Social Support, Administrative Support,	[0]					
Learner Characteristics, Instructor Characteristics and Technician Characteristics.	[9]					
Personal, Teacher, Institution	[11]					

(Resource: Author's compilation)

Research works have mentioned many determinants, but all involved in 3 aspects including students, lecturers and universities. These are also 3 subjects involving in the online teaching and learning process. Therefore, the authors agreed with the approach to quality of EL of Bhowmik et al. [11] Nevertheless, Bhowmik et al. [11] only determined the overall relationship between students, lecturers and universities for the quality of EL, but did not analyze every characteristic of each subject. This study divided 3 aspects into many determinants in order to further analyze the impact of each determinant on the quality of EL. The authors also proposed some additional determinants to suit the current context ofteaching and learning English at universities (Table 2).

Aspects	Determinants	References
	Technological ability	[7]
Student related	Attitude to EL	[7]
Student Telated	Learning objectives	[6]
	English proficiency	Authors
	Course content	[10]
Lecturer related	Course design	[9], [10]
	Interaction	[6], [8]
	Student assessment	[8]
	Technology skills	[7], [11]
	Personality	Authors
	Applied technology	[10], [11]
University related	Technical support	[6], [8] - [10]
	Guide to EL	Authors

**Table 2.** Factors affecting the quality of online learning English

(Resource: Synthesized and suggested by authors)

Thus, the independent variable consists of 13 latent variables level 1 and 3 latent variables level 2, the dependent variable is 1 latent variable level 1 (Figure 1).

From the research model, there are three hypotheses as follows:

H1: There is a positive relationship between students related and the quality of online learning English at universities.

H2: There is a positive relationship between lecturers related and the quality of online learning English at universities.

H3: There is a positive relationship between universities related and the quality of online learning English at universities.



Figure 1. Research model

## 2.2. Instrument development

The scales related to the quality of EL in the past were limited and inconsistent in content since the online learning environment of universities was made up of different components. Moreover, there has been no research on the quality of online learning English. Therefore, besides referring to previous research results, the authors used the interview method in order to develop the scale for the model. There were totally 4 group discussions with students and 2 group discussions with lecturers who used to teach English online. The results are 55 observed variables for 14 latent variables (Table 3).

Scale	Sign	Scale	Sign
1. Student Related	STU	2.4. Student assessment	LSA
1.1. Technological ability	STA	Assessment by process	LSA1
Computer skill	STA	Plus points for student's participation	LSA2
Internet skill	STA	2 Minus points for student's learning attitude	LSA3
EL tools-using skill	STA:	3 Seriousness during the tests	LSA4
1.2. Attitude towards EL	SAE	Fairness in student assessment	LSA5
Diligence	SAE	The appropriateness of the evaluation method	LSA6
Seriousness	SAE	2 2.5. Technological skills	LTS
Pre-preparation for class	SAE?	<sup>3</sup> Proficiency in using Internet	LTS1
Cooperation	SAE4	Proficiency in using online teaching applications	LTS2
1.3. Learning objectives	<b>SLO</b>	Ability to apply new tools in course design	LTS3
GPA	SLO	2.6. Personalities	LPE
Knowledge related to subject	SLO	2 Enthusiasm in teaching	LPE1
Developing English skills	SLO3	3 Having affection for students	LPE2

Table 3.	Scales	of the	model
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Scale	Sign	Scale	Sign
1.4. English proficiency	SEP	Seriousness	LPE3
English vocabulary	SEP1	Fair treatment	LPE4
English grammar	SEP2	Paying attention to individual	LPE5
English listening skill	SEP3	3. University related	UNI
English speaking skill	SEP4	3.1. Applied technology	UAT
English reading skill	SEP5	EL platform is easy to install	UAT1
English writing skill	SEP6	EL platform is easy to use	UAT2
2. Lecturer Related	LEC	Network quality is stable	UAT3
2.1. Course content	LCC	3.2. Technical support	UTS
Interesting content	LCC1	Technical support department is available	UTS1
Course content brings high applicability	LCC2	Easy to contact Technical support department	UTS2
Course content is updated	LCC3	Technical issues are reported and handled timely	UTS3
Course content is appropriate to student's ability	LCC4	3.3. Guide to EL	UGL
2.2. Course design	LCD	Guide to EL is available	UGL1
Learning materials are sufficient	LCD1	Guide to EL is timely sent to students	UGL2
Exercises are appropriate	LCD2	Student is able to practice after reading the guide	UGL3
Learning methods are diverse	LCD3	4. Quality of online learning English	QLO
Class is properly designed for EL	LCD4	Interest in studying	QLO1
2.3. Interaction	LIN	Development of English skills	QLO2
Activities require interaction with the lecturer	LIN1	Meeting expectations of the course	QLO3
Activities require interaction between students	LIN2	Satisfaction with the course	QLO4
Equal opportunity for interaction in the class	LIN3		
Lecturer's encouragement to increase interactivity	r LIN4		

(Resource: Synthesized from group discussions with lecturers and students)

# 2.3. Data collection

The questionnaire structure was built based on the observed variables in Table 3 and designed in Google Form for online survey. The 5-point Likert scale including 1 - Strongly disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, 5 - Strongly agree was used.

The sampling method is a convenient method with the criterion of accessibility. However, the authors shared the Google Form link to the students of 08 universities in Da Nang city for the sample to be representative.

Regarding the size of sample, this study consisted of 55 observed variables and 14 latent variables, so the minimum sample size was 500 samples [14]. In fact, the survey was conducted from August 30, 2021 to September 12, 2021 and collected 608 samples, of which 561 samples met the requirements sufficiently and 47 samples did not due to numerous missing responses. The characteristics of the sample are presented in Table 4.

Characteristic	Quantity	Ratio	Characteristic	Quantity	Ratio				
Gender	561	100.0	University	561	100.0				
Male	175	31.2	Da Nang University of Economy	60	10.7				
Female	386	68.8	Da Nang University of Polytechnic	45	8.0				
Level	561	100.0	Da Nang University of Foreign Languages	61	10.9				
First	67	11.9	Da Nang University of Education	87	15.5				
Second	196	34.9	Duy Tan University	82	14.6				
Third	138	24.6	Da Nang University of Architecture	87	15.5				
Fourth	135	24.1	Dong A University	70	12.5				
Fifth	25	4.5	FPT University	69	12.3				
	(Resource: Result of data analysis)								

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Table 4.	Descriptive	statistics	of the	study	sample

# 2.4. Data analysis

SPSS 20.0 and AMOS 20.0 software were used for data analysis. The testing steps in this study include testing the reliability, convergent validity and discriminant validity of the scale. Next, the structural equation modeling (SEM) was used to test the research hypothesis.

SPSS 20.0 and AMOS 20.0 software were used for data analysis. Analytical methods include as follows:

+ Testing the reliability of the scales by Cronbach's Alpha.

+ Testing the convergent and discriminant validity of the theoretical model by exploratory factor analysis (EFA) (Maximum Likelihood Estimation Method, Principal Axis Factoring and Promax Rotation) and confirmatory factor analysis (CFA).

+ Testing the hypothesis of the theoretical model by analyzing the structural equation modeling (SEM).

#### 3. Findings

#### 3.1. Assessment of the Measurement Model

The result of Cronbach's Alpha test revealed that the scales are reliable since the Cronbach's Alpha is greater than 0.7 and the Corrected Item-Total Correlation is greater than 0.3 (Table 5). **Table 5** *Reliability Analysis* 

Construct	Items	CA	LITC	Items	Items	CA	LITC	
Technological ability	3	0.909	0.793	Student assessment	6	0.940	0.658	
Attitude to EL	4	0.905	0.759	Technology skills	3	0.955	0.897	
Learning objectives	3	0.934	0.822	Personality	5	0.939	0.781	
English proficiency	6	0.937	0.738	Applied technology	3	0.919	0.769	
Course content	4	0.937	0.810	Technical support	3	0.941	0.864	
Course design	4	0.946	0.838	Guide to EL	3	0.940	0.850	
Interaction	4	0.939	0.816	Quality of online learning English	4	0.954	0.834	
		(Re	esource:	Result of data analysis)				

Note: CA = Cronbach's alpha; LITC = The Lowest Corrected Item-Total Correlation

The result of EFA analysis showed that the scale ensures convergence and discrimination since the factor loadings of the observed variables are more than 0.5; KMO coefficient > 0.5; sig > 0.05; eigenvalue > 1; total variance extracted > 50% (Table 6).

KMO	sig	Ei	TVE	NF	LFL	CR	AVE
0.910	0.000	1.091	81.157	4	0.619	0.819	0.536
0.940	0.000	1.182	83.620	6	0.637	0.891	0.578
0.857	0.000	1.213	88.488	3	0.702	0.778	0.538
0.864	0.000	3.552	88.043	1	0.853	0.956	0.843
	<b>KMO</b> 0.910 0.940 0.857 0.864	KMOsig0.9100.0000.9400.0000.8570.0000.8640.000	KMOsigEi0.9100.0001.0910.9400.0001.1820.8570.0001.2130.8640.0003.552	KMOsigEiTVE0.9100.0001.09181.1570.9400.0001.18283.6200.8570.0001.21388.4880.8640.0003.55288.043	KMOsigEiTVENF0.9100.0001.09181.15740.9400.0001.18283.62060.8570.0001.21388.48830.8640.0003.55288.0431	KMOsigEiTVENFLFL0.9100.0001.09181.15740.6190.9400.0001.18283.62060.6370.8570.0001.21388.48830.7020.8640.0003.55288.04310.853	KMOsigEiTVENFLFLCR0.9100.0001.09181.15740.6190.8190.9400.0001.18283.62060.6370.8910.8570.0001.21388.48830.7020.7780.8640.0003.55288.04310.8530.956

Table 6. Exploratory factor analysis and Confirmatory factor analysis

(Resource: Result of data analysis)

Note: Ei = Eigenvalues; TVE = Total variance extracted; NF = Number of factors; LFL = The Lowest factor loading; CR = Composite Reliability; AVE = Average Variance Extracted.

The result of CFA analysis clarified that the model fit indicators are satisfactory (Figure 2), so it can be concluded that the research model is suitable. In addition, the combined reliability of the CR factors are greater than 0.6 and the variance extracted AVE is greater than 0.5, so the research concepts have convergent values (Table 6). The square root AVE of each concept is larger than the correlation coefficient between that concept and two remaining concepts (Table 7), so the construct has discriminant value.

Construct	AVE	SF	LF	IF	EQL
STU	0.536	0.733*			
LEC	0.578	0.313	0.760*		
UNI	0.538	0.218	0.505	0.733*	
QLO	0.843	0.582	0.651	0.403	0.918

*Note:* \* = *square root of AVE* 

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Figure 2. Confirmatory factor analysis (Resource: Result of data analysis)

# 3.2. Tests of Hypotheses

The test model has 1414 degrees of freedom (df); the indicators show that the model is suitable for the data collected, specifically as follows: Chi-square/df = 2,504; GFI = 0.804; CFI = 0.934; TLI = 0.931, RMSEA = 0.052 (Figure 3).



**Figure 3.** Structural Equation Modeling (Resource: Result of data analysis)

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At 5% test significance level, all hypotheses are accepted. Three factors from students, lecturers and universities explain 52.6% of the variation in the quality of online learning English. Lecturers had the greatest impact on the quality of online learning English with the Standardized Regression Weights ( $\beta = 0.546$ ), followed by the students themselves ( $\beta = 0.464$ ) and the university ( $\beta = 0.111$ ) (Table 8).

Table 6. Hypothesis test results								
Hypothesis	Direction	Standardized Regression Weights	Sig.	Supported				
$H_1$	STU => ELQ	0.464	0.000	Yes				
$H_2$	LEC => ELQ	0.546	0.000	Yes				
$H_3$	UNI => ELQ	0.111	0.003	Yes				
		(Resource: Result of data analysis)						

Table 8	<b>8.</b> Hy	pothesis	test	results
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# 4. Discussion and implications

This study shows that the quality of online learning English is the result of the efforts of lecturers, universities and students. This is compatible with the findings of Bhowmik et al. [11]. In addition, this study discovered 3 new results.

Firstly, this study identified lecturers as the factor that had the greatest influence on the quality of online learning English, followed by students and universities.

Secondly, this study identified 3 characteristics of lecturers, students, and universities which previous studies have not mentioned, had an impact on the quality of online learning English. Specifically, the personalities of the lecturers (including Enthusiasm in teaching, Having affection for students, Seriousness, Fair treatment, Paying attention to individual), English proficiency of the students (including vocabulary, grammar, listening skill, speaking skill, reading skill, writing skill), Guide to EL of the universities (including Guide to EL is available, Guide to EL is timely sent to students, Student is able to practice after reading the guide) were 3 new characteristics.

Thirdly, this study determined the role of each characteristic of lecturers, students and universities. Thereby, it contributed to the orientation to improve the quality of online learning English.

- For lecturers, in order to contribute to improving the quality of online learning English, there are 6 factors that need to be considered, including course content, course design, interaction, student assessment, technology skills, and personalities. In particular, interaction is the most important factor creating the success of an online English class. Lecturer needs to create more opportunities for students to interact with their lecturer and other students.

- For students, they should pay attention to technological abilities, learning objectives, English proficiency and especially attitude towards learning online. Every student has different computer skill, Internet skill and online learning tools, as well as different English proficiency, so lecturers need to pay more attention to each individual. In addition, students need giving advices and encouragement to master learning objectives and positive attitude towards EL. Since then, students will make more efforts in online learning English.

- For universities, applied technology is the most important factor. Therefore, the universities need to create an effective online teaching and learning system for students and lecturers to easily apply to teaching and learning. Online learning often has technical issues, so there should be a technical support department established by universities for students and lecturers. In addition, guide to EL needs to be appropriately designed for students to easily understand and apply.

# 5. Conclusion

The COVID-19 pandemic has put pressure on the education industry, but it also creates opportunities and impetus for the education industry to approach the trend of digital transformation. Currently, universities are choosing online learning methods (E-Learning) to ensure safety and initiative/proactivity in the current context. However, how the quality of E-Learning is and what factors determine the success of E-Learning are questions of numerous educational institutions, especially for subjects that interaction is required like English. The result of this study has shown that lecturers had the biggest impact on the quality of online learning English, followed by students and the universities, respectively. Thereby, the study also provided some orientations for universities to improve the quality of teaching and online learning English during COVID-19 pandemic.

# REFERENCES

- [1] C. Keller and L. Cernerud, "Students' perception of e-learning in university education," *Learning, Media and Technology*, vol. 27, no. 1, pp. 55-67, 2002.
- [2] F. Alonso, G. López, M. Daniel, and J. M. Viñes, "An instructional model for web-based e-learning education with a Blended Learning process approach," *British Journal of Educational Technology*, vol. 36, no. 2, pp. 217-235, 2005.
- [3] A. Ngampornchai and J. Adams, "Students' acceptance and readiness for E-learning in Northeastern Thailand," *International Journal of Educational Technology in Higher Education*, vol. 34, no. 13, pp. 1-13, 2016.
- [4] M. M. Abbad, D. Morris, and C. D. Nahlik, "Looking under the Bonnet: Factors Affecting Student Adoption of E-Learning Systems in Jordan," *The International Review of Research in Open and Distance Learning*, vol. 10, no. 2, pp. 1-26, 2009.
- [5] H. T. Nguyen, "E-Learning Model Advantage and disadvantage," (in Vietnamese), *Proceedings of the Conference on E-Learning Training in Industrial Revolution 4.0*, 2020, pp. 501-508.
- [6] I. Jung, "The dimensions of e-learning quality: from the learner's perspective," *Education Tech Research Dev.*, vol. 4, no. 3, pp. 56-70, 2010.
- [7] W. Bhuasiri, O. Xaymoungkhoun, H. Zo, J. J. Rho, and A. P. Ciganek, "Critical success factors for elearning in developing countries: A comparative analysis between ICT experts and faculty," *Computers & Education*, vol. 58, pp. 843-855, 2012.
- [8] D. Gamage, S. Fernando, and I. Perera, "Factors affecting to effective eLearning: Learners Perspective," *Scientific Research Journal*, vol. 2, no. 5, pp. 42-48, 2014.
- [9] K. Hadullo, R. Oboko, and E. Omwenga, "Factors affecting asynchronous e-learning quality in developing countries," *International Journal of Education and Development using Information and Communication Technology*, vol. 14, no. 1, pp. 152-163, 2018.
- [10] K. V. Elumalai, J. P. Sankar, R. Kalaichelvi, J. A. John, N. Menon, M. S. N. Alqahtani, and M. A. Abumelha, "Factors affecting the quality of E Learning during the COVID-19 Pandemic from perspective of higher education students," *Journal of Information Technology Education: Research*, vol. 19, pp. 731-753, 2020.
- [11] S. Bhowmik and D. Bhattacharya, "Factors influencing online learning in higher education on the emergency shifts of COVID-19," *The Online Journal of Distance Education and e-Learning*, vol. 9, no. 1, pp. 74-83, 2021.
- [12] Q. T. Tran and V. H. Bui, "E-Learning management at Technology Universities in Ho Chi Minh City," *Ho Chi Minh City Open University Journal of Science*, vol. 15, no. 1, pp. 51-59, 2021.
- [13] F. Mustafa, A. Khursheed, S. M. Usama-Rizvi, A. Zahid, and A. Akhtar, "Factors influencing online learning of university students under the covid-19 pandemic," *International Journal of Educational Research and Innovation*, vol. 15, pp. 342-359, 2021.
- [14] J. Hair, W. Black, B. Babin, R. Anderson, and R. Tatham, *Multivariate data analysis*. New Jersey: PrenticeHall International Inc, 2006.