



Research Article

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Investigating Critical Factors of Online Teaching Quality for Economics Students: An Empirical Study in Vietnam

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Abstract

The study aims to investigate the critical factors that could significantly impact in the online teaching quality for economics students in Vietnam by employ the PLS-SEM. Four critical factors in a new construct to study online teaching quality for economics students are proposed including characteristics of students, online teaching technology, characteristics of lecturers, online course content. Based on a survey of 705 students in four economics universities in Vietnam, the Structural Equation Modeling was carried out to study the relationship between latent variables based on the scale of psychological properties that measured the dimensions of online teaching quality. The relationship between latent variables is done through the Structural Equation Modeling. The research applied both SPSS 26.0 and PLS-SEM 3.0 software, in order to analyze and verify the gathered data, then proposed a hypothesis model. The results reveal that all proposed factors are positively related to the online teaching quality, in which online course content has the most impact on teaching online quality, followed by characteristics of lecturers, characteristics of students, and finally, online teaching technology. The results of the relationship between critical factors and online teaching quality has been verified and supported. The findings will be an important indication for university managers and researchers when improving the quality of online teaching in Vietnam based on student priorities.

Keywords: Online teaching, PLS SEM, students

1. Introduction

Over the last couple of decades, online learning has developed as an important method in education management (Barclay et al., 2018). Study by Salloum (2018) indicated that online learning system has increasingly been used as one of the powerful tools for the process of learning and teaching. According to Almaiah & Alyoussef (2019), online learning system has grown to be a beneficial informal tool in many educational institutions to use for educate student in and out of classrooms. However, beside the benefits that online learning brings, Almaiah & Almulhem (2018) pointed out that due to some perceptions limitations of students, they will face some issues regarding the understanding of the online learning system. Furthermore, lecturers and students also face problems relate to the lack of computer skills and experience with online learning system (Alshehri et al., 2019; Alshahrani et al., 2018). Nevertheless, statistic has shown that online learning has a higher drop-out rate than traditional learning (Pham et al., 2021). Nevertheless, universities tend to continue to expand their online training services to meet the needs of students (Kampov-Polevoi, 2010; Picciano, 2006).

In Vietnam, online training is well received as a new training method with an important role in changing the mindset of educational activities (Do, 2021). Universities in Vietnam have initially researched and implemented online teaching since 2002 through the organization of seminars on online training methods. Up to now, many universities have initially implemented training support software with positive results. However, when compared with other countries in the world as well as countries in the region, online learning in Vietnam is only at the beginning stage, especially when affected by the COVID-19 pandemic. Most universities have had to organize for students to study by online learning since the Lunar New Year holiday 2020 until now. The reality of implementing online learning has shown that some universities, when implementing their own online training systems, have encountered difficulties in information technology infrastructure when the number of students participating in online learning is large. Consequently, research to evaluate the quality of online teaching in universities is necessary and urgent.

The study will explore the research question in economics universities in Vietnam. Specifically, the study investigate students' adoption of online teaching quality at prestigious economics university. The research question is "What are the critical factors that influence the online teaching quality for economics students in Vietnam?". This is an important research question of this study. Next section of the paper is the literature review which provides the background to this work. Then the methodology is presented, and follow by the results. Finally, we discuss the findings, and conclusion with suggestions for future research.

2. Literature Review

2.1 *Online teaching and online teaching quality*

The rapid growth of online learning and teaching has put a greater need in understanding the nature and quality of online learning and teaching in higher education. Some research illustrated that online learning provide lots of potential, it helps to lower cost, allow delivery of course content more consistency and improves tracking in comparison to traditional classroom environment (Ruiz et al., 2006; Welsh et al., 2003). Online learning is defined as the use of modern information and communications technology (ICT) and computers to deliver instruction, information, and learning content (Selim, 2007). According to Siritongthaworn et al. (2006, 139), online learning is an "innovative approach to education delivery via electronic forms of information that enhance the learner's knowledge, skills, or other performance". The online learning system require a technology background for accessing the online environment, together with the join of students, lecturers, and the course curriculum (Anderson, 2008). Online learning in education and the issue of quality always come together (Oliver, 2001). Biggs (2001) describes the 3 main elements in the concept of quality in

higher education, which are: value for money, fit for the purpose of the institution and transforming. However, there is little research that addresses quality in online curricula (Fresen & Boyd, 2002; Sonwalkar, 2002). Much of the research prior to 1990 focused on distance education to understand the differences between traditional courses and distance learning. These studies have focused on comparing traditional learning outcomes and distance learning methods or student satisfaction (Arbaugh, 2000; Hiltz & Wellman, 1997). Loughran & Russel (1997) cited more than 300 studies since 1928 to confirm the need to study the quality of teaching in Internet-based courses instead of comparing the quality of distance courses with traditional classrooms. Developing this view, Arbaugh (2002) asserted that the delivery of higher education via the Internet is becoming more increasingly lately. However, studies on how education can be conducted effectively using the medium is still limited. Research of Ward et al. (2010) explore the rationale of factors relate to technology are the use of specific technology, the implementation of technology in lecturers' point of view, and the affect of technology on teaching and learning process. The study also analysed students' experience in quality among online learning and in-class learning. However, the study has not identified the factors affecting the quality of online learning.

2.2 Online teaching quality critical factors

Characteristics of students participating in online learning: The characteristics of learners can be understood as factors belonging to learners' individual mentalities that can impact learning activities (Santiago et al., 2012). Learner characteristics include factors such as thinking style, study skills, learning outcomes, understanding of information, level of information technology as well as attitudes or impressions towards the learning environment (Nakayama et al., 2014). Selim (2007) classified that students' characteristics comprised of four critical success factors in online learning include motivation of students, technical competency, students' perception of content and system and collaboration in interaction. Other studies by Arbaugh, 2002; Chiu & Wang, 2008; Fuller et al., 2006; Pituch & Lee, 2006; Sun et al., 2008 indicated several elements of students' characteristics are computer self-efficacy, Internet self-efficacy, computer experience, Internet experience, computer anxiety, and attitude toward online learning. There have been numerous studies that have proven this factor to be a major factor and a significant source of problems associated with online learning. Volery & Lord (2000) also noted that many individual characteristics of learners that have an important influence on the delivery of online knowledge can be theoretically determined. By that, the study proposes the first hypothesis as follow:

Hypothesis 1 (H₁). The characteristics of students participating in online learning has a positive relationship with the online teaching quality.

Online teaching technology: Online teaching technology is understood as elements of information and communication technology, and also includes elements of e-learning system. Information technology as well as software-based training and education are rapidly providing a flexible and cost-effective alternative to traditional learning. Oh (2014) research focused on the technological aspects of eLearning has identified the three areas including: program design, technology effectiveness, and distance learning research make up the majority of papers in mainstream distributed learning research (Barclay et al., 2018; Cheng et al, 2004; Johnston and Krauth, 1996). One of the four factors in research of Selim (2007) included online learning technology are ease of access, internet speed, screen design that contribute to the effectiveness of online learning system. According to Collis (1995), technology and the implementation of technology have affected students' learning results. Therefore, the second hypothesis was proposed:

Hypothesis 2 (H₂). Online teaching technology has a positive relationship with the online teaching quality.

Characteristics of lecturers conducting online teaching: Ozkan & Koseler (2009), Selim (2007) indicated that lecturers' characteristics play a significant role in understanding the learning management systems' effectiveness. The characteristics of teacher include factors such as timely

response, effectiveness of teachers, ability to use technology, ability to interact, attitude to online learning and students. The knowledge and skills of teachers have a great influence on the use of information technology in education in both developed and under-developed countries (Pelgrum, 2001; Ihmeideh, 2009). Almaiah and Alyoussef (2019) have demonstrated that teacher characteristics are one of the main factors that play a critical role in motivating students to get familiar to online learning systems. At the same time, the study also shows the characteristics of teachers including the effectiveness of the teacher himself, the teacher's attitude towards online learning, the experience and motivation of the lecturer when using the online learning system. Therefore, it can be said that when teachers have sufficient computer proficiency and have a positive attitude towards online learning, they can motivate students to use the e-learning system, thereby improving the acceptance of online learning system. This suggests that universities need to train their lecturers on how to effectively use technology resources and how to prepare lectures when learning online in order to interact more easily with technologies. Hence, the third hypothesis was proposed:

Hypothesis 3 (H₃). The characteristics of lecturers conducting online teaching has a positive relationship with the online teaching quality.

Online course content: Course content is understood as all the informational materials in a course such as readings, video recordings or exams. Wang et al. (2010) indicated that content factors, which encompass the content format, structure, and authoring tools. Just like in traditional teaching, course content is one of the most important factors affecting the quality of teaching. Ashwin & McVitty (2015) stated that effective course content in online teaching motivate student to participate dynamically and positively engage themselves in online learning. According to Brophy (2000), when courses content, curriculum, and learning materials are well-designed will enable meaningful educational experiences (Brophy, 2000). Other researchers indicated that there are three components contribute to effectiveness online learning are course quality and minimal standards of the design and development of online programs, as well as a continuous assessment to assure quality (Phipps and Merisotis, 2000). Creating the right course content has a major impact on implementing effective online instruction (Little & Knihova, 2014). Study materials and supporting materials are the two contents of online teaching in universities that made available to students to access. Online course content contributes to the improvement of students' analytical, critical thinking and problem-solving skills (Akyüz & Samsa, 2009). According to Govindasamy (2002) there are seven important factors for online learning implementation including course structure. The design of course content throughout the semester is a significant work in the implementation of online teaching (Zhang et al., 2004). Aldowah et al. (2019) noted that course design and course content are the two elements of course characteristics which play a significant role in shaping the online learning process. Thus, the final hypothesis was proposed:

Hypothesis 4 (H₄). The online course content has a positive relationship with the online teaching quality.

A research model was developed according to the literature review and hypotheses suggested, with the following critical factors: characteristics of students, online teaching technology, characteristics of lecturers, online course content with the online teaching quality. The proposed model is as illustrated in Figure 1.

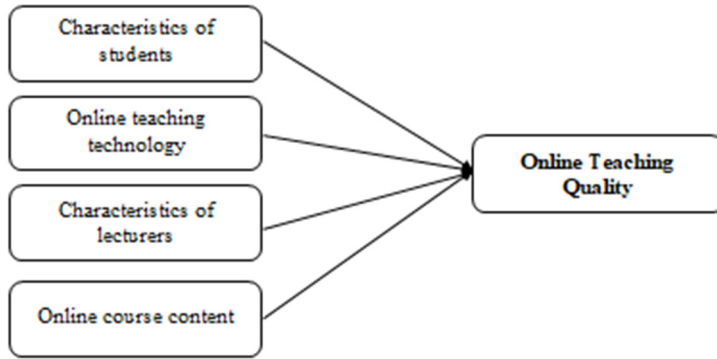


Figure 1: The proposed research model

3. Methodology

3.1 Research Design

The research process when through five main steps. The first step consists of literature review system of previous studies which related to online teaching quality and the analysis of online teaching quality critical factors. The second step developed the research model using data gathered in the first step. In the third step, data is collected by employing a quantitative approach, in which, the main method of data collection use a questionnaire survey. The advantage of this method over other data collection methods as it allows us to conduct study in a wide range of geographical distribution with lower cost in a resonable time. Next step conducted preliminary quantitative research through reliability analysis. Finally, the main quantitative research were analyzed using PLS-SEM technique. The research sample is a very important factor to ensure the quality of the research. Hair et al. (2014) indicate that the minimum sample size should be 10 times the maximum number of arrowheads pointing to a latent variable anywhere in the PLS path model. Therefore, the minimum sample size requirement of this study is 50 because this research has 5 latent variables. The study uses convenient sampling method with a sample size of 800 sample elements with the survey subjects being students of 04 economic universities. Likert's 5-point scale was used in research questionnaires ranging from 1 (do not agree at all) to 5 (agree completely). Total of 738 responses were collected from 02 prestigious economics university in Hanoi (National Economics University and Thuongmai University) and 02 prestigious economics university in Ho Chi Minh city (University of Economics Ho Chi Minh City and University of Economics and Law, Vietnam National University Ho Chi Minh City). Out of 738 responses, there are 33 bias observations were eliminated, that make 705 observations valid for further analysis. Table 2 shows the descriptive statistics of the participants' demographics.

Table 1: Descriptive statistics of participants' demographics

Items		N
Gender	Male	124
	Female	580
	Unknown	1
Year	Freshman student	225
	Sophomore student	191
	Junior student	186
	Senior student	101
	Others student	2

Items	N	
Grade point average (GPA)	Weak	2
	Average	27
	Satisfactory	331
	Good	280
	Excellent	65

The research survey included 705 students (124 male, 580 female, and 02 unknown genders) from different economics universities. Clearly, the number of female students participating in the survey was the highest among all genders (about 82,26% of the total number of students). In addition, the survey was widely distributed from all year students, in which the number of freshman students is highest (about 31,91% of the total number of students). The students' academic ability was also distributed from weak, average, satisfactory, good, and excellent, in which satisfactory students accounted for the highest percentage (about 46,95% of the total number of students).

3.2 Analysis Method

Primary data was collected through a questionnaire and analyzed using the statistical data analysis tool SPSS, SmartPLS. Partial least squares structural equation modeling (PLS-SEM) was employed to achieve the research objectives. PLS-SEM was recommended in the initial period of theory development to access and verify the exploratory research models (Henseler & Fassott, 2010). PLS-SEM is appropriate exploratory research, beside, it is considered to be better than the general linear structural relationship model (Melchor & Julián, 2008). The PLS- SEM also more suitable for small sample analysis compared to covariance-based structural equation modeling (CB-SEM), which is evaluated by covariance matrix (Ringle et al., 2012). The SmartPLS 3.3.3 application of PLS-SEM was used to assess the measurement model, the convergent, discriminant validity, and composite reliability. This study uses PLS Algorithm and Bootstrapping to perform the repetitive sampling 5000 times in order to derive path coefficients and significance (Henseler & Fassott, 2010; Le et al., 2021; Luu, 2021).

The factors were coded as follows: COS = characteristics of students, OTT = online teaching technology, COL = characteristics of lecturers, OCC = online course content, and OTQ = online teaching quality.

4. Results

4.1 Analysis of model reliability and validity

Reliability refers to the consistency of observed variables. Metrics include the reliability of each scale and the internal consistency between the scales (Hair et al., 2014). After the data was collected, the study analyzed the reliability of the scale through reliability testing using SPSS software, the reliability analysis results show that some observed variables have correlation coefficients less than 0.3 and are excluded from the model. After removing the observed variables with inappropriate reliability, the study continued to test the reliability and validity of the model by PLS-SEM technique.

Table 2: Convergent validity and reliability

Constructs	Items	Loadings	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Characteristics of lecturers (COL)	COL1	0,709	0,792	0,809	0,865	0,616
	COL2	0,766				
	COL3	0,807				
	COL4	0,851				

Constructs	Items	Loadings	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Characteristics of students (COS)	COS2	0,830	0,844	0,852	0,906	0,762
	COS3	0,908				
	COS4	0,880				
Online course content (OCC)	OCC1	0,855	0,850	0,875	0,898	0,687
	OCC2	0,814				
	OCC3	0,785				
	OCC4	0,859				
Online teaching quality (OTQ)	OTQ1	0,733	0,864	0,868	0,902	0,648
	OTQ2	0,843				
	OTQ3	0,829				
	OTQ4	0,830				
	OTQ5	0,786				
Online teaching technology (OTT)	OTT1	0,802	0,844	0,846	0,895	0,681
	OTT2	0,841				
	OTT3	0,837				
	OTT4	0,821				

Table 2 shows reliable data when the reliability indexes (Cronbach's Alpha) and Composite Reliability (CR) are greater than 0.7 and the extracted variance index (AVE) is greater than 0.5. All variables have a large load multiplier of 0.7 which is consistent with the model structure. Therefore, the data analyzed here is to ensure the requirements for the convergence value of the factors.

Table 3: Discriminant validity

Scales	COL	COS	OCC	OTQ	OTT
COL	0,785				
COS	0,277	0,873			
OCC	0,670	0,342	0,829		
OTQ	0,591	0,415	0,642	0,805	
OTT	0,516	0,262	0,583	0,533	0,825

Table 3 shows that other analytical parameters of the model also ensure the statistical requirements: The discriminant validity of the model is guaranteed because all values on the diagonal are larger than the values in the corresponding column (Fornell & Larker, 1981).

Table 4: Heterotrait-Monotrait Ratio

Scales	COL	COS	OCC	OTQ	OTT
COL					
COS	0,337				
OCC	0,809	0,397			
OTQ	0,704	0,483	0,725		
OTT	0,630	0,308	0,688	0,618	

Table 4 shows that all Heterotrait-Monotrait Ratio values are less than 0.9, indicating that the discriminant value is confirmed to ensure the model's fit (Fornell & Larker, 1981).

4.2 Structural equation modeling analysis

When evaluating structural equation modeling, indexes such as multicollinearity (VIF), SRMR and RMS_theta are often used in PLS-SEM.

Table 5: Multicollinearity test and model fit

	Online teaching quality	
	VIF	f ²
Characteristics of lecturers	1,901	0,060
Characteristics of students	1,143	0,070
Online course content	2,181	0,093
Online teaching technology	1,591	0,041
SRMR : 0,057; RMS_theta: 0,146; R ² : 0,516; R ² Adjusted: 0,513		

Table 5 shows that the VIF value of the structural equation modeling in this study is less than 5, ranging from 1,143 to 2,181, showing that there is no homogeneity between the scales in the research study, meant that there is no multicollinearity (Hair et al., 2014). The model evaluation SRMR value in this study is 0.057, showing the appropriateness of the model. The RMS_theta value is 0.146. Although this value is greater than 0.12, it is also acceptable according to the recommendations of Henseler et al. (2014). Therefore, the model in this study is suitable to test the structural equation modeling. Besides, the adjusted R² result is 0.516, showing that the explanatory power of latent variables is high. The function value f² represents the influence of the structure (factor) when removed from the model. Structures with a small f² value (less than 0.02) indicate a low degree of association effect. In this model, we see that a link has a low influence on motivation for scientific research. The remaining links all show high influence f²>0.02.

To test the hypotheses posed in the study, after the reliability, fit, and explanatory values of the model were ensured, the study conducted the test with sample size of bootstrapping N = 5000 (Henseler et al., 2014). The proposed hypotheses were considered statistically significant at the 99%, 95%, and 90% reliability levels (Do, 2021). The results of the analysis are shown in table 6.

Table 6: Hypotheses testing

Relationship	Hypothesis	Std. Beta	T Statistics (O/STDEV)	P Values	Decision
Characteristics of lecturers → Online teaching quality	H ₃	0,236	4,992	0,000	Supported
Characteristics of students → Online teaching quality	H ₁	0,196	5,752	0,000	Supported
Online course content → Online teaching quality	H ₄	0,313	7,481	0,000	Supported
Online teaching technology → Online teaching quality	H ₂	0,178	4,202	0,000	Supported

In Table 6, the associations with P-value less than 0.05 are significant associations with 95% confidence. The results show that all hypotheses in our conceptual model are supported.

H₁ shows that characteristics of students has positive relationship with online teaching quality (β = 0,196; t = 5,752; P < 0.01). This result shows that if characteristics of students is improved, so the online teaching quality also improved.

H₂ estimations for the online teaching technology and online teaching quality are supported (β = 0,178; t = 4,202; P < 0.01). This result indicates that the online teaching technology has an impact on online teaching quality.

The results of H₃ shows the positive relationship between characteristics of lecturers and online teaching quality (β = 0,236; t = 4,992; P < 0.01). This result indicates the positive relationship between characteristics of lecturers and online teaching quality.

Finally, the H_4 results also are supported by the model when the prediction of relationship between online course content and online teaching quality are supported ($\beta = 0,313$; $t = 7,481$; $P < 0,01$). This result notes that online course content has an strongest impact on online teaching quality.

Figure 2 depicts the direct relationships of the links.

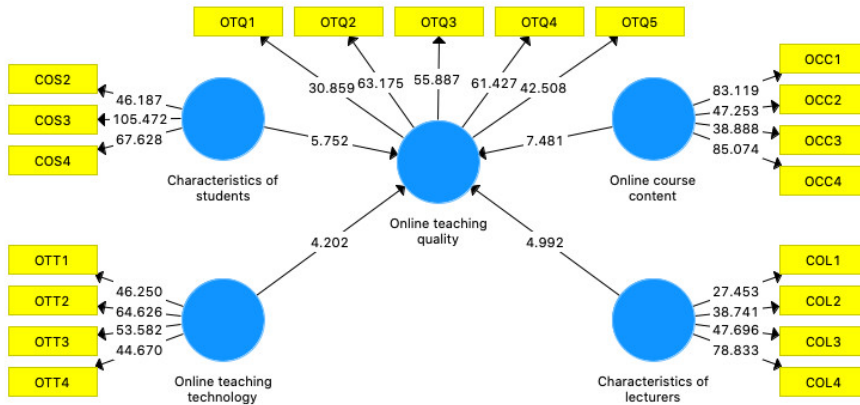


Figure 2: Model of PLS-SEM path analysis diagram

5. Discussion

The study aims to investigate the critical factors that influence online teaching quality for economics students in Vietnam. Accordingly, a new model with four critical factors from the literature analysis was proposed. The affect of four variables was examined include characteristics of students, online teaching technology, characteristics of lecturers, online course content with online teaching quality constructs. The PLS SEM method was used to evaluate the research model and hypotheses. The results of the research are discussed in detail below.

Through an investigation with 705 survey samples who are students in economics universities in Hanoi and Ho Chi Minh city, the research results show that 04 hypotheses are accepted. Among these variables, online course content (OCC) is the most effective factor due to its high beta coefficient value ($\beta = 0,313$). This result is consistent with a study conducted by Aldowah et al. (2019), in which course content play a significant role in shaping the online learning process. Thus, universities need to pay attention to invest in building and developing content of online teaching programs in order to improve online teaching quality. Characteristics of lecturers conducting online teaching (COL) with $\beta = 0,236$ has the second-strongest influence on the online teaching quality. This implies that when lecturers are well encouraged, this will impact online teaching quality. This finding is supported by Ozkan & Koseler (2009), Selim (2007). Accordingly, universities need to train their lecturers on how to effectively use technology resources and how to prepare lectures to improve online teaching quality. Characteristics of students (COS), and online teaching technology (OTT) are also two significant factors that affect the online teaching quality. These factors indicate that characteristics of students and online teaching technology influence the teaching online quality. This result is also supported by research of Volery & Lord (2000) and Barclay et al. (2018). Hence, in order to improve the online teaching quality, universities need to pay attention to build the online teaching environment that suitable with their characteristics of students and online teaching technology.

The study results have confirmed the rationality of the PLS - SEM analysis method, especially in exploratory research and require close linkage in the transition from a theory to a theory to a linear structural model. This study showed a significant improvement when the adjusted R^2 value is 0,516,

corresponding to the explanatory power of 4 independent variables and the dependent variable is 51,6%. The results of this study also show that the additional observed variables from this study have high reliability and convergence values.

In general, the proposed model developed in this research identified the major critical factors of online teaching quality that could become an advantage for Vietnam universities to ensure the successful implementation of online teaching in the context of COVID-19. The research also contribute to the current rationale by using a model of online teaching quality with four new constructs. Consequently, the finding of the study will be an essential reference for university managers, designers and researchers in accordance with students' priorities when improving the quality of online teaching. In other hands, the result of this study can be an useful reference for researchers, which enable them to become better acquainted with the key aspects of online teaching quality among students. From there, all decisions relate to technical and solution issues to improve the online teaching quality can be made more easily, understandable, the system will become more useful, more effective and reliable. The results point out how online teaching quality could be affected significantly by online course content based on a significant correlation between the online course content and the actual online teaching quality.

6. Conclusion

This study has contributed new insights to prior research on online teaching quality in universities. It helps universities to have a more comprehensive view of online teaching quality in Vietnam. An adapted model was used to identify the critical factors that affect on online teaching quality. Our study was to empirically examine students' perceptions with online teaching quality at prestigious economics universities situated in Vietnam. The findings indicate that the two factors have the most significant determinants of online teaching quality are online course content and characteristics of lecturers. The results of this study confirmed that characteristics of students and online teaching technology, are influential in the adoption of online teaching quality. In addition, the research results have confirmed the rationality of the PLS - SEM analysis technique, especially in experimental research that requires close linkages in the transition from a theory to a structural equation modeling.

The research has developed a new construct of combining with characteristics of students, online teaching technology, characteristics of lecturers, online course content into the online teaching quality model. Furthermore, this research aims to identify and understand the critical factors that influence the online teaching quality and provides valuable insights that may be beneficial to universities in Vietnam and other countries. Future research could include other independent predictors, which would provide a deeper insight into online teaching quality assessment.

This study still has some limitations that should be considered in the future. Firstly, due to the limited time, the research could only conduct the survey in economics universities, which limited the representativeness of the research findings. Second, this study has shown some factors that impact the quality of online teaching for students, while there may be also other factors. Therefore, future studies can continue to explore other potential factors so that the model of factors influencing the quality of online teaching is more comprehensive. From the results of this study, subsequent studies can expand the scope of the study to other provinces and cities in the country.

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