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Digital Era after Covid-19: Changes in Student Attitudes and Behaviors in Vietnam

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The COVID-19 pandemic fundamentally reshaped higher education by forcing institutions into a rapid transition to online learning. Universities have had to quickly incorporate and adjust existing technical resources to accommodate this abrupt transition. This has also involved professors and researchers who may not possess a natural, technological aptitude for online instruction. This experience has not only accelerated the adoption of technology in higher education but also highlighted the need for flexibility, accessibility, and innovation in online teaching and learning after the pandemic. This study thus aims to examine the transformative impact of COVID-19 on student attitudes and behaviors towards online learning at the University of Economics Ho Chi Minh City (UEH) in Vietnam. After collecting data from 758 students enrolled at UEH, we utilize SPSS 28 to analyze the sample distribution and Smart PLS 4.0 to analyze the Partial Least Squares Structural Equation Modelling (PLS-SEM) model. The study findings reveal that support from university management and the characteristics of lecturers significantly affect learners' attitudes towards online learning. These attitudes, in turn, affect students' online learning behaviors throughout both the duration and aftermath of the COVID-19 pandemic. Our study findings also show that increased awareness of the serious consequences of COVID-19 drives proactive engagement in online learning behaviors during the pandemic. Furthermore, this impact on behaviors persists even after the crisis is under control. The implications of this study are important for university management, highlighting the potential to transform the challenges posed by COVID-19 into opportunities for sustainable development in online teaching and learning, complementing traditional classroom education in the long term.

Keywords: *Management support, Instructor characteristics, Online learning attitudes and behaviors, Perceived severity of COVID-19*

Introduction

‘The closures implemented as a measure to contain the COVID-19 epidemic have led to an accelerated deployment of distance education solutions to ensure pedagogical continuity’.

- Stefania Giannini - UNESCO Assistant Director General for Education4

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Information and communications technology (ICT) has long been utilized to provide information to students in higher education. However, many academic institutions remain entrenched in outdated procedures. These institutions were forced to abruptly transition to online model of teaching due to the COVID-19 epidemic, which is caused by the SARS-CoV-2 virus. Although they were hesitant to modify conventional pedagogical methods, they were compelled to fully shift to online learning (Roman & Plopeanu, 2021). Nevertheless, these institutions continue to grapple with challenges in digital transformation and the deployment of optimal approaches to adapt to the emergency situations posed by COVID-19. Consequently, staff and students may lack the necessary infrastructure for effective online learning (Adedoyin & Soykan, 2020; Elannani, 2023; Nikou & Maslov, 2021). Therefore, it is crucial to examine students' perceptions of their learning experiences after integrating online components into their courses.

Online learning encompasses the process of gaining knowledge and skills by participating in educational activities that occur either in real-time or at different times, using different devices such as smartphones and computers, as long as there is an internet connection. Within these settings, students have the freedom to learn and engage with instructors and peers from any location, without being dependent on a specific physical space (Singh & Thurman, 2019). Given these advantages, stringent infection prevention and control procedures, enforced by governments globally, have led to the increased significance of online learning as a highly effective option in the higher education sector (Radha et al., 2020; Roman & Plopeanu, 2021). In a recent study conducted by Gonzalez et al. (2020), students' academic performance was evaluated during the COVID-19 epidemic. The findings revealed that students showed a notable improvement in their performance compared to the previous year.

Although prior studies documented improvements in students' performance, there is limited evidence on how COVID-19 quarantine measures affect students' attitudes, intentions, and behaviors toward online learning. This study seeks to fill this void by investigating the attitudes and behaviors of students towards online learning at UEH in Vietnam, both during and after the COVID-19 epidemic. Historically, institutions, scholars, and students have overlooked online learning in Vietnam. In 2008, the Ministry of Education and Training (MOET) implemented a strategic plan to enhance information technology integration in the education sector between 2008 and 2012. The Vietnamese government initiated a project in 2016 with the objective of improving

the incorporation of information technology into teaching methods to elevate the quality of education and training from 2016 to 2020.

Prior to the onset of the COVID-19 epidemic, online learning platforms were predominantly utilized by Vietnamese students for studying English or courses related to soft skills. However, the epidemic forced Vietnamese universities to transition to online learning. According to a survey implemented in Vietnam, 58.8% of students enrolled in undergraduate or vocational programs and 39.1% of students in postgraduate programs had the experience of engaging in online learning during the COVID-19 outbreak (Maheshwari, 2021). Zoom, Microsoft Teams, and Google Meet were the main platforms utilized for online education in Vietnam. However, MOET had reservations about using Zoom owing to security issues. Overall, the COVID-19 epidemic provided an opportunity for Vietnamese universities to reassess and enhance their ICT infrastructure for delivering online learning (Nguyen & Pham, 2020).

The objective of this study is to identify the factors affecting students' intentions and behaviors regarding online learning. Based on survey data from 758 students enrolled at the UEH, we demonstrate that support from university management and lecturer characteristics significantly affect students' attitudes towards online learning, which in turn affects their online learning behaviors during the COVID-19 epidemic. Our study findings indicate that students are motivated to participate in online learning behaviors during and after the COVID-19 epidemic due to their understanding of the negative health impacts of the virus.

Our study's findings contribute to the existing literature on the efficacy of online education in higher education settings in Vietnam. To prepare for future emergencies, such as another wave of the COVID-19 epidemic, higher education institutions can analyze students' attitudes, intentions, and actions toward online learning. This analysis will enable them to develop effective measures to support students during emergency transitions to online learning. Additionally, the findings have important implications for university management, highlighting the potential to transform the challenges of COVID-19 into opportunities for developing online teaching and learning alongside traditional classroom instruction in a long-term and sustainable manner.

The next section organizes the remainder of the study by reviewing relevant prior literature and formulating hypotheses to investigate the impacts of COVID-19 on students' attitudes and behaviors towards online learning. Section 3 provides the data collection and research

methodology employed. Section 4 summarizes the study findings. Finally, Section 5 has the conclusion of the study.

Literature Review

Online Learning in Higher Education

The quickening pace of technological advancement has changed delivery systems in higher education (Renes & Strange, 2011). Although face-to-face communication has traditionally been regarded as crucial in education (Baker, 2004; Saba, 2007), the efficacy of online learning has been thoroughly established over time (Clark, 1983; Russell, 1997). Online learning involves the physical separation of students from teachers and utilizes telecommunication for education and training (Sun et al., 2008; Wang et al., 2013; Wilde & Hsu, 2019). This approach has enabled students who were previously unable to attend college classes in person to fully participate in higher education (Renes & Strange, 2011). Previous studies show that online learning can reduce college tuition costs ((De la Varre et al., 2010), decrease attrition rates (Kapp, 2012), improve task engagement and test scores (Harmon & Lambrinos, 2012), facilitate a feeling of inclusion within educational communities (Barab et al., 2001), and encourage collaborative connection (Hermann et al., 2001).

Previous research indicates that the choice for online learning is associated with the readiness or willingness to engage in online learning, as well as the elements that influence this readiness. In particular, Warner et al. (1998) defined readiness for online learning as consisting of three key elements: (1) the student's preference towards online delivery as opposed to traditional classroom instruction, (2) the student's confidence in using electronic communication for learning, and (3) the ability to engage in autonomous learning. McVay (2000) subsequently revised the notion by creating a 13-item instrument to assess student behavior and attitude as predictors. Smith et al. (2003) performed an investigative study to confirm the validity of McVay's (2000) questionnaire for online readiness. The questionnaire was found to have a two-factor structure, specifically, "Comfort with e-learning" and "Self-management of learning". Online learning facilitates efficient interpersonal interaction among all participants involved in the process (Bernard et al., 2009), allowing for the sharing of knowledge and ideas (Cole & Engeström, 1993). According to Benigno and Trentin (2000), various factors affect online learning, including student characteristics, learning materials, student-student interaction, learning environment, and information technology.

Sun et al. (2008) suggest that individuals' subjective perceptions of online learning can shape their attitudes and intentions to engage in it in the future. Zhang et al. (2012) discovered that the intention to engage is affected by factors such as the psychological safety of communication, perceived responsiveness of the online learning system, self-efficacy, and satisfaction from prior system usage. Conversely, Balfanz and Byrnes (2006) claim that a slow internet connection at home negatively affects students' ability to succeed in online learning, while Liaw et al. (2007) demonstrate the positive impact of professors' attitudes on the success of online learning programs.

Perceived Severity of COVID-19 Epidemic and Student's Attitude to Online Learning

In March 2020, the World Health Organization (WHO) formally proclaimed COVID-19 a worldwide epidemic and highlighted its highly contagious nature. In order to curb the transmission of the virus, strict measures were enforced, such as the shutdown of shopping malls, schools, universities, and restaurants, the prohibition of public gatherings, and the implementation of remote work arrangements (Wilder-Smith & Freedman, 2020). These measures necessitated social distancing, reducing physical presence and social interactions among individuals. Consequently, colleges and universities worldwide were compelled to indefinitely close, prompting a widespread transition to online teaching (Dube et al., 2022; Martinez, 2020; Moyo et al., 2022).

After the first case of the new coronavirus was detected in Vietnam in the end of January 2020, the government promptly decided to temporarily close educational institutions. Universities promptly introduced online learning as a proactive measure to mitigate the virus's transmission and safeguard the well-being of at-risk students, staff, and faculty while ensuring a secure and conducive educational setting. For many students, this was their first experience with remote education. According to the BEAN study conducted in April 2020, 54.8% of students embraced online learning in response to the detrimental health effects of the COVID-19 epidemic5.

Miceli and Castelfranchi (2002) suggest that students predisposed to depressive behavior may face important barriers that hinder their ability to cope effectively with distressing situations. Hence, the COVID-19 epidemic can be seen as a particularly demanding situation for efficient education, especially for these students. Nevertheless, COVID-19 also offers a chance to question conventional practices and models in favor of more accessible, economical, and technology-driven learning systems. The closure policies implemented during the COVID-19 outbreak have caused

5 See https://www.brandsvietnam.com/congdong/topic/24625-BEAN-Survey-Tac-dong-cua-dai-dich-COVID-19-len-giao-duc-truc-tuyen-tai-Viet-Nam

dissatisfaction among disadvantaged students and adversely affected their socialization and interaction, crucial aspects of cognitive development (O'Sullivan et al., 2017). This disruption highlights the importance of ensuring continuous learning opportunities for all students. A successful online learning experience during lockdown depends on two critical elements: the provision of academic support (Cigognini et al., 2011) and the availability of adequate educational platforms (Isaeva et al., 2020).

Our first hypothesis is:

H1: Perceived severity of COVID-19 will positively affect students' attitudes towards online learning.

Support from University Management and Student's Attitude to Online Learning

Attitudes towards a behavior pertain to individuals' positive or negative evaluations of that behavior (Kemp et al., 2019; Lengwadi et al., 2024). The attitudes of students towards educational technology have a direct impact on their learning processes (Ali, 2020). García Botero et al. (2018) analyze the determinants affecting individuals' intentions to engage in behavior and use mobile-assisted language learning. Their data demonstrates that students' attitudes have a major influence on their willingness to embrace mobile technologies for language learning. Hussein et al. (2020) explore undergraduate students' perceptions of emergency online learning in the early weeks of the forced shift caused by COVID-19. Their findings highlight that emergency online learning is often praised for its cost and time efficiency, safety, convenience, and increased participation. However, criticisms include distractions, reduced focus, heavy workloads, technological and internet-related challenges, and inadequate student support.

Students' support plays a crucial role in optimizing learning experiences across various educational settings (Lee et al., 2011). Tailoring support strategies to accommodate students' individual needs and learning styles is likely to considerably enhance their academic progress and overall educational journey (Mullen & Tallent-Runnels, 2006). Such support encompasses a range of services, including tutoring, counseling, academic advising, and accessible office hours. Thorpe (2002) identifies two primary contexts for student support: institutional and course-specific. In the institutional context, students require assistance with admission processes, registration, scholarships, research opportunities, and general student life concerns. Selim (2007) additionally emphasizes the importance of library services, help desks, computer labs, and other campus

facilities as integral components of institutional support. Within the course context, student support focuses on providing guidance and assistance tailored to specific academic courses.

In higher education institutions, online learning is frequently not a voluntary option for students and can result in substantial adjustments. University management plays a critical role in influencing the values, beliefs, and behaviors of learners within educational settings. Therefore, we contend that support from university management can positively affect students' attitudes towards online learning.

Our second hypothesis is:

H2: Support from university management positively affects students' attitudes towards online learning.

Instructor Characteristics and Student's Attitude to Online Learning

Online learning has attracted considerable attention from educational institutions and regulators alike, owing to its potential educational costs and benefits. It is recognized for its ability to reduce educational expenses and facilitate the timely dissemination of knowledge (Lee et al., 2009). Many institutions now offer online degree programs, expanding their educational reach beyond traditional physical constraints and complementing offline classes with web-based tools. Designing effective online learning services is a complex undertaking that demands a multidisciplinary approach. The success of online learning depends on implementing educational models that cater to learners' needs and educational objectives. As online learning becomes increasingly prevalent in both academic and corporate settings, it is crucial to assess the factors that contribute to its success and integrate them into the development of effective online learning systems.

Several prior studies have emphasized the importance of lecturer characteristics in evaluating the effectiveness of online learning (Lee et al., 2009; Liaw, 2008; Selim, 2007). Lecturer characteristics refer to attributes such as caring, helpfulness, and accommodation towards students (Lee et al., 2009). The commitment and competence of instructors have a substantial impact on students' confidence and trust in the domain of online education (Webster & Hackley, 1997). Selim (2007) conducted a study on 37 class sections and collected 538 responses in order to validate the factors that contribute to success in online learning. The results highlight that students' perceptions of lecturer characteristics are among the most crucial factors affecting online learning success, warranting attention in curriculum development and implementation. Similarly, Lee et al. (2009)

analyzed student acceptance of online learning in South Korea. Regression analyses indicated that lecturer characteristics and teaching materials positively correlate with perceived usefulness, while the design of learning content correlates positively with perceived ease of use.

Our third hypothesis is:

H3: Instructor characteristics positively affect students' attitudes towards online learning.

Student's Attitude to Online Learning, Online Learning Behaviors and Intention to Continue Online Learning

Davis (1985) proposed the Technology Acceptance Model as a means of elucidating computer-usage behavior. This model is built upon Fishbein and Ajzen's (1977) Theory of Reasoned Action. In this model, beliefs affect attitudes, which in turn shape intentions, ultimately guiding behaviors. According to Lee et al. (2009), an individual's behavioral intention is jointly affected by their attitude and subjective norms regarding the behavior in question. Attitude towards online learning refers to an individual's positive or negative emotions regarding engaging in online educational activities (Venkatesh et al., 2003). Bruess (2003) highlights the significant role attitudes play in students' adoption of instructional technology in the classroom.

According to Wangpipatwong (2008), there is evidence that students' attitudes have an influence on their intentions and perceptions when it comes to using online learning. Park (2009) utilized the Technology Acceptance Model to investigate the acceptance and utilization of online learning. Their research indicates that cognitive constructs have an indirect impact on university students' intention to utilize online learning. Instead, these constructs influence attitudes towards online learning, which subsequently influence intentions to use it.

This study is conducted against the backdrop of global efforts by over 200 countries to combat the COVID-19 epidemic. Amidst widespread statewide closures, governments, universities, students, and lecturers have actively sought ways to maintain a positive educational outlook and ensure continuity of learning. Online learning has emerged as the predominant alternative to on-campus studies during times of uncertainty. The COVID-19 epidemic has considerably accelerated the adoption of online learning, particularly in Vietnam's education sector, emphasizing the digitalization of formal courses and curricula. As of May 7th, 2020, Vietnam had not reported any new cases of COVID-19 for 21 consecutive days. Consequently, certain epidemic-related restrictions have been relaxed, allowing students to gradually return to classrooms. The unresolved question is whether Vietnam's online education will continue to advance in digital and

technological innovations in teaching and learning, following the mandatory shift to online learning during the COVID-19 epidemic. In this study, we consider two periods: during the COVID-19 epidemic and after it is under control.

Our hypotheses are:

H4: A positive attitude towards online learning will positively affect online learning behavior.

H5a: Online learning behavior positively affects the intention to continue online learning during the COVID-19 epidemic.

H5b: Online learning behavior positively affects the intention to continue online learning after the COVID-19 epidemic is under control.

The Moderating Role of Perceived Severity of the COVID-19 Epidemic

The COVID-19 epidemic has compelled the exploration of alternative methods to traditional face-to-face classroom instruction, responding to heightened demands on the education system (Mushtaque et al., 2021). Concerns over the potential negative effects of social distancing on learning opportunities have posed challenges for academic institutions in finding effective solutions. These circumstances underscore the urgent need to prioritize the safety and well-being of students, faculty, academic staff, communities, and society at large (Rieley, 2020).

Consequently, colleges were compelled to suspend all in-person classroom activities and transitioned courses to online platforms utilizing existing resources amidst the COVID-19 epidemic. The main obstacle does not lie in the efficacy of online teaching-learning methods in delivering quality education but rather in the successful large-scale implementation of online learning by academic institutions (Mushtaque et al., 2021). Zitek and Schlund (2021) emphasize that the perceived impact of COVID-19 on students' everyday lives is associated with heightened health anxiety. Baber (2021) proposes that individuals' attitudes towards maintaining social distance can alleviate the adverse effects of decreased social connection on the efficacy of online learning during the COVID-19 epidemic. Saxena et al. (2021) evaluate the quality of online education and its influence on learner satisfaction, finding that these factors are largely unaffected by perceptions of the harm caused by the COVID-19 virus.

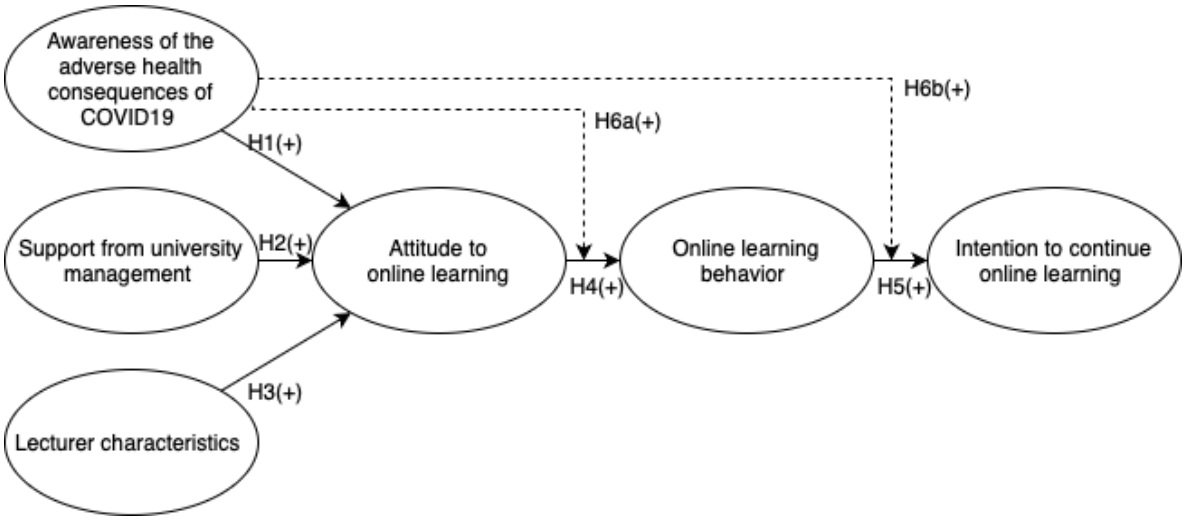
Our last hypotheses are:

H6a: The positive relationship between online learning attitudes and behaviors is stronger among students who perceive the severity of the COVID-19 epidemic.

H6b: The positive relationship between online learning attitudes and intention to continue online learning is more pronounced for students who perceive the severity of the COVID-19 epidemic. The hypotheses in this study are illustrated in Figure 1.

Figure 1

The proposed research model



Methodology

Research Design

This study employs a quantitative research approach to examine associations between variables. Our data is obtained through surveys with questionnaires sent to students at UEH. Straub et al. (2004) suggest that survey-based research is appropriate for exploratory situations and predictive theories. Therefore, a survey-based approach is considered suitable for precisely capturing the effects of the COVID-19 epidemic on student attitudes and behaviors toward online learning in our study.

The questionnaire, originally in English, was translated into Vietnamese using the standard translation and back-translation procedure (Brislin, 1980) before distribution. Experts reviewed the translated items to ensure coherence between the languages. Respondents were instructed to complete the questionnaire based on their most recent experiences with online learning.

Data Collection

An online survey was conducted using SurveyMonkey from April 16th to April 23rd, 2020. This study targeted students of the UEH in Vietnam, two months following the implementation of mandatory online learning in response to the COVID-19 epidemic. The survey was conducted after all classes at UEH had transitioned to online learning for at least one subject. A total of 3,000 invitations to participate in the questionnaire were randomly distributed to full-time UEH students across various majors and courses via their UEH student emails. The survey emails provided participants with information about the project, including its nature, objectives, and the importance of the research for improving the online learning environment. To ensure comprehensive responses, a reminder email was sent to non-respondents five days after the initial email.

Sample

After the online survey concluded, we received 1,055 responses. Upon review, 758 responses were deemed complete, resulting in a response rate of 25.26%, and were included in the analysis data for further research. To evaluate potential non-response bias, we compared the profiles of responders and non-responders from the mailing list, focusing on gender, age, and training format. The chi-square analysis revealed that there was no evidence of any consistent response bias since there were no statistically significant differences in these attributes between responders and non-responders.

Table 1 presents the demographic traits of the survey participants. Out of the participants, 626 (82.59%) were female, while 132 (17.41%) were male. The majority of participants were 22 years old and enrolled in the formal academic university system.

Table 1

Sample distribution

	Quantity	%
Training format		
Full-time students	716	94.46
Part-time students enrolling in second degree programs, in-service education programs, or bridging programs from college to university	42	5.54
Gender		
Female	626	82.59
Male	132	17.41
Age		
22	684	90.24

23 – 25	37	4.88
26 – 30	25	3.30
31 – 35	9	1.19
36	3	0.40

Study Instrument

Before collecting primary data, we selected 30 survey items to assess factors predicting students' attitudes and behaviors toward online learning during the COVID-19 epidemic. These items were adapted from validated research sources to align with the specific context of behavior in our study. Following Prati et al. (2011), we used five items to measure the perceived severity of COVID-19, including statements like 'I think the impact of COVID-19 is serious'; 'I am concerned about the risk of COVID-19 to myself, family members, or friends'; 'I think the COVID-19 epidemic is at a decisive stage; there is a risk of a strong outbreak': 'If I get COVID-19, my life will be adversely affected'; and ' I think it will take a long time to develop a specific treatment or vaccine for COVID-19'. Survey items for measuring management support, instructor characteristics, and intention to continue online learning were adapted from Ungan (2005), Lee et al. (2009), and Hsu et al. (2015), respectively. Additionally, we employed the scale developed by Siponen et al. (2014) to assess student attitudes and behaviors toward online learning. The questionnaire grid is provided in Table 2.

Table 2

Variable description and evaluation

	Loading	t-statistic
Perceived severity of COVID-19 (AVE = 0.55, CR = 0.86)		
I think the impact of COVID-19 is serious	0.75	28.10
I am concerned about the risk of COVID-19 to myself, family members, or friends	0.81	37.38
I think the COVID-19 epidemic is at a decisive stage; there is a risk of a strong outbreak	0.83	51.38
If I get COVID-19, my life will be adversely affected	0.71	24.67
I think it will take a long time to develop a specific treatment or vaccine for COVID-19	0.60	16.54
Management support (AVE = 0.62, CR = 0.91)		
The university is interested in implementing online learning	0.81	43.53
Universities are aware of the benefits of online learning	0.84	59.94
The university enthusiastically supports the implementation of online learning	0.84	62.88
Universities consider online learning important	0.80	39.98
The university communicates to students that it supports online learning	0.77	35.18
The university is ready to provide enough resources to implement online learning	0.66	24.83

Instructor characteristics (AVE = 0.75, CR = 0.91)		
In general, when teaching online, the instructors are very dedicated	0.86	68.07
In general, when teaching online, teachers provide enough information for students throughout the learning process	0.89	82.34
In general, when teaching online, instructors provide clear instructions	0.91	111.38
In general, when teaching online, the teacher's assessment of students' learning outcomes is reasonable	0.83	52.62
In general, teachers contribute to motivating students to study online	0.85	79.90
Online learning attitude (AVE = 0.87, CR = 0.95)		
I feel that online learning is the right thing to do during the COVID-19 epidemic	0.94	153.18
I feel that online learning makes sense during the COVID-19 epidemic	0.94	178.38
I feel that online learning is useful during the COVID-19 epidemic	0.91	101.93
Online learning behaviour (AVE = 0.63, CR = 0.83)		
I do online learning during the COVID-19 epidemic	0.79	50.62
I urge my friends to study online during the COVID-19 epidemic	0.78	45.88
I support my friends to study online during the COVID-19 epidemic	0.80	53.50
The trend of continuing online learning in the context of the COVID-19 epidemic continues (AVE = 0.53, CR = 0.82)		
I will continue to maintain online learning if the COVID-19 epidemic persists	0.73	34.60
I will continue to use more features of the LMS system and other supporting applications to serve my online learning if the COVID-19 epidemic persists.	0.72	37.68
I will continue to study online if the COVID-19 epidemic persists to complete my study tasks	0.74	35.05
I would suggest that my university resume online learning if COVID-19 persists	0.72	35.78
Trends of continuing online learning in the post-COVID-19 context or when the COVID-19 epidemic is under control (AVE = 0.52, CR = 0.81)		
I will continue to maintain online learning with traditional face-to-face learning in the post-COVID-19 context or when the COVID-19 epidemic is under control	0.73	40.09
I will continue to use more features of the LMS system and other supporting applications to serve my blended learning in the post-COVID-19 context or when the COVID-19 epidemic is under control	0.72	38.64
I will continue to study online combined with traditional face-to-face learning in the post-COVID-19 context or when the COVID-19 epidemic is under control to complete my learning tasks	0.73	38.30
I would suggest that my university continue online learning combined with traditional face-to-face learning in the post-COVID-19 context or when the COVID-19 epidemic is under control	0.71	32.44

To operationalize concepts and their respective constructs, we utilized a 5-point Likert scale ranging from 'strongly disagree' (1) to 'strongly agree' (5). This approach is widely accepted in extensive empirical research, particularly in cases where standardized measures for quantifying concepts such as resources and capabilities are not available (Kumar et al., 1993). The data was analyzed using SPSS 28 to examine the sample distribution, and the measurement model was

analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM) methodology, facilitated by SmartPLS 4.0.

Validation of instrument

This section provides the findings, specifically focusing on evaluating the reliability and validity of the measures. Specifically, we calculated: (1) the loadings of the items and the internal consistency reliability, (2) the convergence validity, and (3) the discriminant validity (Hair et al., 2019).

Table 2 presents the description of all items included in our survey, along with their respective item loadings. All of the loadings for the items surpassed the acceptable level of 0.70, which is advised for evaluating the statistical consistency of survey indicators. According to Hair et al. (2019), Composite Reliability (CR) is commonly used to measure internal consistency reliability. Our findings indicate that all CR values obtained were above the recommended criterion of 0.70, demonstrating strong internal consistencies across the measures used in the study.

Convergent validity assesses the extent to which measurements of similar constructs are positively correlated, thus indicating construct validity. It is typically evaluated using the Average Variance Extracted (AVE). All AVE values in our investigation fell within the range of 0.52 to 0.87, which exceeds the recommended threshold of 0.50.

Discriminant validity is a statistical metric employed to ascertain the level of differentiation between a certain construct and other constructs (Hair et al., 2019). In our study, discriminant validity was evaluated using the criterion outlined by Fornell and Larcker (1981). As reported in Tables 3 and 4, the square roots of the AVE scores, ranging from 0.73 to 0.93, were higher than all the corresponding bootstrapped correlation coefficients. Additionally, most of the correlation coefficients were below the cut-off value of 0.7 (Tabachnick et al., 2013), indicating satisfactory discriminant validity throughout the constructs examined in the present research. In this study, we conducted a Harman single-factor test to examine potential methodological biases (Podsakoff et al., 2003). The findings suggested that there was no single factor responsible for the majority of the variance, suggesting minimal methodological bias.

Table 3

Discriminant value according to Fornell-Larcker criteria among variables during the period of COVID-19 epidemic

		[1]	[2]	[3]	[4]	[5]	[6]
PSC	[1]	0.74					
MS	[2]	0.28	0.79				
IC	[3]	0.32	0.65	0.87			
AOL	[4]	0.31	0.57	0.56	0.93		
OLB	[5]	0.17	0.51	0.51	0.69	0.79	
CIOL1	[6]	0.40	0.45	0.43	0.56	0.76	0.73

Notes: PSC: Perceived severity of COVID-19; MS: management support; IC: instructor characteristics; AOL: online learning attitude; OLB: online learning behavior; CIOL1: the intention to continue online learning during the period of COVID-19epidemic.

Table 4

Discriminant values according to Fornell-Larcker criteria between variables when COVID-19 is under control

		[1]	[2]	[3]	[4]	[5]	[6]
PSC	[1]	0.74					
MS	[2]	0.28	0.79				
IC	[3]	0.31	0.65	0.87			
AOL	[4]	0.31	0.57	0.56	0.93		
OLB	[5]	0.17	0.51	0.51	0.69	0.79	
CIOL2	[6]	0.43	0.47	0.45	0.60	0.77	0.72

Notes: PSC: Perceived severity of COVID-19; MS: management support; IC: instructor characteristics; AOL: online learning attitude; OLB: online learning behavior; CIOL2: the intention to continue online learning in the post-COVID-19 context or the COVID-19 epidemic is under control.

Data Analysis

We analyze our data by utilizing SPSS 28. We then perform the Normality test to assess the distribution of data to determine whether our data satisfies the requirement of a normal distribution. We also conduct the Multicollinearity test to determine whether there is intercorrelation or collinearity among independent variables in our analysis.

Our structural model was analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM) methodology with the support of SmartPLS 4.0. The structural model assessment in our study followed recommendations from Hair et al. (2019). Partial Least Squares Structural Equation Modeling (PLS-SEM) approach was employed due to its higher statistical power compared to the Covariance-Based Structural Equation Modeling (CB-SEM) approach under similar conditions (Reinartz et al., 2009). To evaluate path coefficients between endogenous and exogenous constructs, we utilized 500 sub-sampling iterations via the bootstrap method. The Standardized Root Mean Square Residual (SRMR) indicator yielded a goodness-of-fit estimate of 0.065 for the structural model, which falls below the recommended threshold of 0.08 (Henseler et al., 2016).

Results and Implications

Assumption Test

The normality test is used to assess whether the residuals or confounding variables in our model follow the requirement of a normal distribution. According to Ghozali (2016), an appropriate model is characterized by residuals following a normal distribution. To test normality in this study, we employ the Kolmogorov-Smirnov test. The data are considered normal if the probability value is greater than 0.05. In Table 5, the results of the One-Sample Kolmogorov-Smirnov test indicate a test statistic value of 0.249.

Table 5

Normality Test

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		758
Normal Parameters	Mean	0,0000000
	Standard Deviation	0,98633172
Most Extreme Differences	Absolute	0,079
	Positive	0,040
	Negative	-0,079
Test Statistic		0,079
Asymp. Sig. (2-tailed)		.249

Additionally, we assessed multicollinearity using the Variance Inflation Factor (VIF). The multicollinearity test was conducted to identify strong correlations among independent variables by considering the Variance Inflation Factor (VIF). Multicollinearity becomes concerning when VIF values exceed 10 (Hair et al., 2019). Our findings revealed VIF values ranging from 1.06 to

1.79, all of which are well below the threshold criterion of 10 (Hair et al., 2012). Therefore, multicollinearity is unlikely to be an issue in this study.

Results and Discussion for Hypothesis Testing

As COVID-19 continues to unfold unpredictably, our regression analyses were conducted in two distinct contexts: the efficacy of online learning was assessed by its persistence throughout the COVID-19 epidemic (Model 1_Table 6) or through the maintenance of hybrid learning (integrating online and in-person education) in the post-pandemic or regulated COVID-19 environment (Model 2_Table 7).

Table 6

Structural results during the period of COVID-19 epidemic

	Variables	Model 1 (With the regulatory role of PSC)						Model 1 (Without the regulatory role of PSC)					
		AOL		OLB		CIOL1		AOL		OLB		CIOL1	
		β	t - statistic	B	t - statistic	B	t - statistic	B	t - statistic	B	t - statistic	β	t - statistic
H1	PSC	0.12	3.66***	0.00	0.10	0.32	14.91***	0.12	3.75***				
H2	MS	0.35	8.59***					0.35	8.40***				
H3	IC	0.29	7.36***					0.29	7.14***				
H4	AOL			0.70	30.46***					0.69	29.89***		
H5	OLB					0.68	35.84***					0.76	47.99***
H6a	AOL*PSC			0.14	5.85***								
H6b	OLB*PSC					0.14	6.71***						
Adjusted R^2		0.40		0.49		0.70		0.40		0.47		0.59	

Note: *** represents the 1% significance level (2-tailed t-test); PSC: Awareness of the adverse health consequence of COVID-19; MS: support from the university management; IC: lecturer characteristics; AOL: online learning attitude; OLB: online learning behavior; CIOL1: the intention to continue online learning during the period of COVID-19 epidemic.

Tables 6 and 7 present the results of the structural model assessment used to test the hypotheses in our study. The adjusted R^2 values in Model 1 and Model 2 ranged between 0.40 and 0.70, surpassing the threshold of 0.10, indicating that the predictors accounted for a substantial amount of variance. Notwithstanding testing in different scenarios, the results remained uniform across both models. The hypotheses H1, H2, and H3 received support, with ß coefficients of 0.12, 0.35, and 0.29, all significant at the 1% level. These hypotheses posited that the perceived severity of COVID-19 (an external contextual factor), management support, and instructor characteristics

(internal contextual factors) would positively affect students' attitudes towards online learning. Moreover, the primary focus of this study is to examine factors affecting students' intentions and behaviors in online education. Our PLS-SEM analysis revealed that awareness of the adverse health effects of COVID-19 serves as a catalyst for promoting student online learning behaviors during and even after COVID-19 is under control, supporting Hypothesis 1. Early research has provided fundamental insights into how awareness of the adverse health effects of the COVID-19 epidemic can influence the effectiveness of online education (Saxena et al., 2021; Baber, 2021). Saxena et al. (2021) specifically investigate the quality of online learning and its influence on the satisfaction of online learners. They also consider the moderating impact of perceived harm from the COVID-19 virus. However, they find that this moderating effect is notably insignificant. Baber (2021) demonstrates that perceptions regarding maintaining social distance can mitigate the negative impact of reduced social interaction on the effectiveness of online learning during the COVID-19 epidemic. Furthermore, Zitek and Schlund (2021) provide evidence linking the perceived effects of COVID-19 on students' daily lives to increased health anxiety.

Table 7

Analysis results of the research model set in the post-COVID-19 context or when the COVID-19 epidemic is under control

	Variables	Model 2 (With the regulatory role of PSC)						Model 2 (Without the regulatory role of PSC)					
		AOL		OLB		CIOL2		AOL		OLB		CIOL2	
		β	t - statistic	B	t - statistic	β	t - statistic	β	t - statistic	β	t - statistic	β	t - statistic
H1	PSC	0.12	3.43***	0.00	0.06	0.30	13.80***	0.12	3.64***				
H2	MS	0.35	8.55***					0.35	8.32***				
H3	IC	0.29	7.45***					0.29	7.11***				
H4	AOL			0.70	29.51***					0.69	30.75***		
H5	OLB					0.68	33.38***					0.77	52.33***
H6a	AOL*PSC			0.14	5.77***								
H6b	OLB*PSC					0.13	4.94***						
Adjusted R^2		0.40		0.49		0.66		0.40		0.47		0.58	

Note: *** represents the 1% significance level (2-tailed t-test); PSC: Awareness of the adverse health consequence of COVID-19; MS: the support from the university management; IC: lecturer characteristics; AOL: online learning attitude; OLB: online learning behavior; CIOL2: the

intention to continue online learning in the post-COVID-19 context or when the COVID-19 epidemic is under control.

Consistent with Hypotheses 2 and 3, our study findings also reveal that support from university management and instructor characteristics significantly affect students' online learning attitudes, subsequently affecting their online learning behaviors during the COVID-19 epidemic. These findings align with previous research by Volery and Lord (2000), emphasizing the critical role of lecturers in online education as catalysts for learning and navigators of knowledge. Similarly, Volery (2001) identified key success factors in online learning, highlighting the importance of interactive teaching styles to mitigate feelings of isolation among students in distributed learning environments. Lee et al. (2009) also underscored the significance for lecturer characteristics and teaching materials in enhancing the effectiveness of online education.

Hypotheses H4 and H5 across both models, which asserted that attitudes toward online learning affect behavior and future online learning intentions, were accepted with ß coefficients of 0.70 and 0.68, respectively, both significant at the 1% level. Amidst the COVID-19 epidemic, many higher education institutions have transitioned to online learning platforms to maintain academic continuity. However, the effectiveness of online learning in emerging countries like Vietnam, where technical challenges are prevalent, remains uncertain. Our study provides evidence for Hypotheses 4 and 5 that learners' attitudes towards online learning can affect the intention to continue online learning through the online learning behaviors post-COVID-19. Online education may require the development of appropriate infrastructure and technological platforms such as Blackboard, Moodle, and Microsoft Teams, … As reported in the study of Mishra et al. (2020), one of the main challenges for students in adapting to online learning is technical problems. As technology advances and educational demands evolve, universities must develop appropriate strategies and policies to enhance online teaching methods and provide training for students and lecturers. This is in line with the discussion in the study of (García-Morales et al., 2021) that COVID-19 forced students and lecturers in higher education professors to adapt quickly to new online learning and teaching techniques, with little or no training in some cases.

Regarding hypotheses H6a and H6b, interaction terms (AOL*PSC and OLB*PSC) were examined, showing significant positive coefficients at the 1% level in Tables 6 and 7. This underscores that the connection between students' attitudes and behaviors towards online learning and their intention to continue online learning post-COVID-19 is strengthened when students are

mindful of the health impacts of COVID-19. Our findings reveal that awareness of the effects of COVID-19 strongly motivates student online learning behaviors both during and after the epidemic. Specifically, we found that students' awareness of the severe impact of COVID-19 significantly moderates the relationship between their attitudes towards online learning and their intention to continue using online platforms post-COVID-19, even after the epidemic situation is under control. As students become more cognizant of the implications of the COVID-19 epidemic, they increasingly favor pursuing their educational objectives through online learning systems. This inclination is particularly pronounced amidst social isolation, limited campus education opportunities, and a predominant shift towards online study requirements. Our findings echo those of Raza et al. (2021) and García-Morales et al. (2021), underscoring the importance of enhancing the online learning experience to bolster student engagement and utilization of online learning systems.

The COVID-19 epidemic has fundamentally disrupted university students' teaching. Safety protocols such as social distancing and distance learning have made online learning systems a preferred and safer option compared to traditional on-campus schooling. Students are increasingly embracing these dynamic circumstances and willingly adopting online learning tools to adapt to changes in their educational methods. However, the shift to online learning has presented unique challenges in ensuring a seamless teaching and learning process. Nevertheless, it has emerged as a timely alternative to address the disruptions in higher education caused by the epidemic.

Implications

The study's findings indicate that internal contextual factors, including management support and instructor characteristics, had a greater impact on students' attitudes towards online learning than the external factor such as perceived severity of COVID-19. This highlights the critical roles of higher education institutions and individual educators in facilitating and promoting online learning. It suggests that long-term changes in students' attitudes, behaviors, and preferences for online learning will be largely contingent upon these internal elements. Therefore, higher education institutions must adopt comprehensive strategies for online education, which encompass investing in online pedagogical methods and enhancing instructors' skills, to formalize and sustain online learning as a legitimate teaching modality.

The study also indicated that students continue to exhibit interest in online learning, even in the post-COVID-19 environment or when the epidemic is managed. This persistent attention is mostly

maintained by internal sources, as previously mentioned. The study revealed that students' perceptions of COVID-19's severity significantly moderate the relationship between their attitudes toward online learning and their conduct, hence influencing future online learning intentions. This indicates that higher education institutions ought to persist in promoting awareness regarding the hazards and effects of COVID-19 (even post-pandemic) while simultaneously executing long-term solutions and capitalizing on possibilities to enhance sustainable online education. Our findings provide practical implications: online learning during the COVID-19 pandemic should not be regarded solely as a transient solution but as a foundation for the evolution of a hybrid learning model. This approach, combining online and traditional in-person learning, can provide diverse educational frameworks to more effectively address students' requirements. Consequently, our study recommends prioritizing the improvement of internal factors—specifically institutional IT capability, online education infrastructure, instructors' online pedagogical skills, and students' research and learning competencies in a digital context—over-dependence on external ones. These internal factors will be crucial in driving the ongoing adoption and advancement of online learning at universities.

Conclusion and Recommendations

This study examines the impact of the COVID-19 epidemic on student attitudes and behaviors toward online learning within the context of higher education in Vietnam. Analyzing survey data from 758 students at the UEH, our findings reveal that support from university management and lecturer characteristics significantly affect learners' attitudes towards online learning, both during and post-epidemic. These insights contribute to a deeper understanding of how COVID-19 has shaped higher education, particularly in Vietnam, an emerging destination for higher education in Southeast Asia. Importantly, this study provides empirical evidence highlighting the critical role of university management and lecturer characteristics in shaping student attitudes and behaviors towards online learning in this context.

Our research findings reveal that heightened awareness of the severe consequences of COVID-19 motivates proactive engagement in online learning behaviors during the epidemic, with this effect persisting even after the crisis behavior continues. This analysis enables the development of effective measures to support students during emergency transitions to online learning. Moreover, our findings underscore the significance for university management to transform challenges posed

by emergency situations into opportunities for the long-term and sustainable development of online education.

One limitation of this study is its focus solely on Vietnam with a relatively small sample size, so restricting the applicability of the study's conclusions beyond this specific setting. Variations in COVID-19 situations, regulations, and restrictions across different countries or jurisdictions may affect how our results apply elsewhere. Future research could explore comparative analyses and cross-country predictions within similar institutional settings to enhance broader applicability. Additionally, the conceptual model developed for this investigation suggests that structural results should be interpreted with caution, considering its specific formulation for this study's objectives.

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