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# FACTORS AFFECTING THE EFFICIENCY OF ONLINE LEARNING STUDENTS HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY AND EDUCATION IN THE COVID-19 PANDEMIC

# FATORES QUE AFECTAM A EFICIÊNCIA DOS ESTUDANTES DE APRENDIZAGEM EM LINHA HO CHI MINH UNIVERSIDADE DE TECNOLOGIA E EDUCAÇÃO DA CIDADE DE HO CHI MINH NA PANDEMIA DE COVID-19

**NGUYEN THI NHU THUY**
PhD, Ho Chi Minh City University of Technology and Education (HCMC), Vietnam
ntnthuy@hcmute.edu.vn

**PHUNG THE ANH**
PhD, Ho Chi Minh City University of Technology and Education (HCMC), Vietnam
anhpt@hcmute.edu.vn

**TRAN NGOC CHUNG**
Masters, Ho Chi Minh City University of Technology and Education (HCMC), Vietnam
chungtn@hcmute.edu.vn

**NGUYEN THI TUYET NGA**
Masters, Ho Chi Minh City University of Technology and Education (HCMC), Vietnam
nga.nguyen@hcmute.edu.vn

**LE QUANG CHUNG**
Masters, Ho Chi Minh City University of Technology and Education (HCMC), Vietnam
chunglq@hcmute.edu.vn

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**Corresponding author:**
ntnthuy@hcmute.edu.vn

**Abstract:** The article focuses on analyzing the factors affecting the online learning efficiency of students at the Ho Chi Minh City University of Technology and Education during the Covid 19 pandemic. The study identified four factors that affect students' online learning efficiency, including H1- Environment, course context, H2 - Student cooperation, H3- Online learning skills of students, and H4 - Teachers/lecturers. However, the results of an online survey of 1,089 students of Ho Chi Minh City University of Technology and Education (HCMUTE), with Cronbach's Alpha test method, EFA analysis, Correlations, and regression analysis, showed that 3/4 of the initial hypotheses H2, H3, H4 were accepted (with Sig. = 0.000). <0.05, that is, H2, H3, H4 affect the online learning efficiency of students of Ho Chi Minh City University of Technology and Education, while H1 is not accepted (H1 due to Sig.= 0.683) >0.05 (ie H1 does not affect the online learning efficiency of students of Ho Chi Minh City University of Technology and Education during the Covid - 19 pandemic)).

**Keywords**: Ho Chi Minh City University of Technology and Education. Factors affecting. Covid- 19. Online learning efficiency.

**Resumo:** O artigo centra-se na análise dos factores que afectam a eficiência da aprendizagem on-line dos estudantes da Universidade de Tecnologia e Educação da cidade de Ho Chi Minh durante a pandemia de Covid 19. O estudo identificou quatro factores que afectam a eficiência da aprendizagem on-line dos estudantes, incluindo H1- Ambiente, contexto do curso, H2 - Cooperação dos estudantes, H3- Competências de aprendizagem on-line dos estudantes, e H4 - Professores/lectores. Contudo, os resultados de um inquérito online a 1.089 estudantes da Universidade de Tecnologia e Educação da Cidade de Ho Chi Minh (HCMUTE), com o método de teste Alfa de Cronbach, análise EFA,

correlações, e análise de regressão, mostraram que 3/4 das hipóteses iniciais H2, H3, H4 foram aceites (com Sig. = 0.000). <0,05, ou seja, H2, H3, H4 afectam a eficiência da aprendizagem online dos estudantes da Universidade de Tecnologia e Educação da Cidade de Ho Chi Minh, enquanto que H1 não é aceite (H1 devido a Sig.= 0,683) >0,05 (ou seja, H1 não afecta a eficiência da aprendizagem online dos estudantes da Universidade de Tecnologia e Educação da Cidade de Ho Chi Minh durante a pandemia de Covid - 19)).

**Palavras-chave:** Universidade de Tecnologia e Educação da Cidade de Ho Chi Minh. Factores que afectam. Covid- 19. Eficiência da aprendizagem on-line.

## 1. INTRODUCTION

According to Welsh et al. (2003), online learning is the use of technology connecting computer networks on the internet to provide information and guidance to individuals in need. Rosenberg (2001) also introduced a similar concept of e-learning as using internet technologies to provide different solutions to learners. Holmes and Gardner (2006) define e-learning as providing us with access to resources that promote learning anywhere and anytime. The concept of online learning varies, but all revolve around the basics of learning, technology, and connectivity. Research by Oliver and Towers (2000) has shown that, without a connected environment, suitable equipment, and easily accessible, it will be difficult or impossible to conduct online learning. Thus, online learning (E-learning) can be understood as a form of teaching and learning in classrooms on the Internet. Teachers and learners will use online learning platform software, audio and image transmission applications, and smart devices (laptops, smartphones, tablets,...). Lectures and documents (in the form of text, images, videos, etc.) are posted on the platforms and users can easily access and learn anytime, anywhere. There are also real-time courses with participatory and interactive teacher-student interaction.

Research results have shown that the implementation of E-Learning in education depends on the social resources and social networks of each country. Social resources and social networks are the content of the concept of social capital. Studies have shown aspects of social capital such as being a recognized or known network-based resource (Bourdieu, 1986). And in this respect, Bourdieu (1986) also argues that social capital connected to social networks is relatively stable; Coleman (1988) states that social capital lies in social relations and social networks. And Putnam (1995, 1995a, 1995b, 2000) considers social networks as a component of social capital. Besides, many authors also research and show that social capital is created through investment in social

relationships, or social networks, individuals can use social capital to seek benefits, invest or use to convert it into other types of capital (Bourdieu, 1986). This can be understood as individuals can create and using social capital to serve their purposes (Fukuyama, 1995b, 2001). Social networking in education is considered a process of digital transformation and application of educational models on digital teaching platforms, connecting educational platforms on a national and international scale. The birth of E-learning and Teaching is based on exploiting data obtained from the digitization process, and then applying technologies to analyze and transform that data and create new values than conventional ones. made the training. Therefore, online teaching and learning become diverse and rich thanks to the internet connection and application of information technology. E-learning is defined by ASTD (American Association for Training & Development) as a set of applications and processes such as web-based learning, computer-based learning, virtual classrooms, and digital learning. . Online training includes design, content delivery over the Internet, local area network/wide area network (LAN/WAN), audio, videotape, satellite broadcast, interactive TV and CD-ROM ROM (Kaplan-Leiserson, 2002, para. 85).

Based on sociological studies of digital transformation in higher education as well as in the fields of economic, political, cultural, social development, and international integration. Especially in the context that the Covid - 19 pandemic is breaking out on a global scale, affecting the economic, political, health, and especially education situation in all countries. Therefore, this study aims to describe and analyze the factors affecting the online learning efficiency of HCMUTE students, contributing to an objective view of the online learning situation in the context of the Covid epidemic 19. On that basis, some solutions are proposed for students to achieve higher online learning efficiency.

## 2. METHODS

The main methods used in the article are qualitative research and quantitative research in the sociological approach. In qualitative research, we use the method of analyzing secondary documents and qualitative data from the studies of the previous authors. This method not only elicits ideas, but also helps to provide relevant qualitative information to selectively inherit the theoretical basis, content, and research methods, and at the same time point out the information gaps. There are gaps in documents, theoretical tools, and methods to identify new research tools and methods. In

quantitative research, the survey method by online questionnaire and data processing by SPSS statistical method, specifically the topic uses descriptive statistics method (Research using survey method by table) an online questionnaire with the participation of 1,089 students); analytical methods to assess the reliability of Cronbach's Alpha scale; exploratory factor analysis method EFA; building regression models in the study. In addition, the study also used the regression analysis tool in SPSS software, which is Linear Regression. The results of the regression analysis will give the regression coefficients and the level of statistical significance (Sig. value) of each independent variable. For variables with a significance level < 0.05 is satisfactory and used in the regression model.

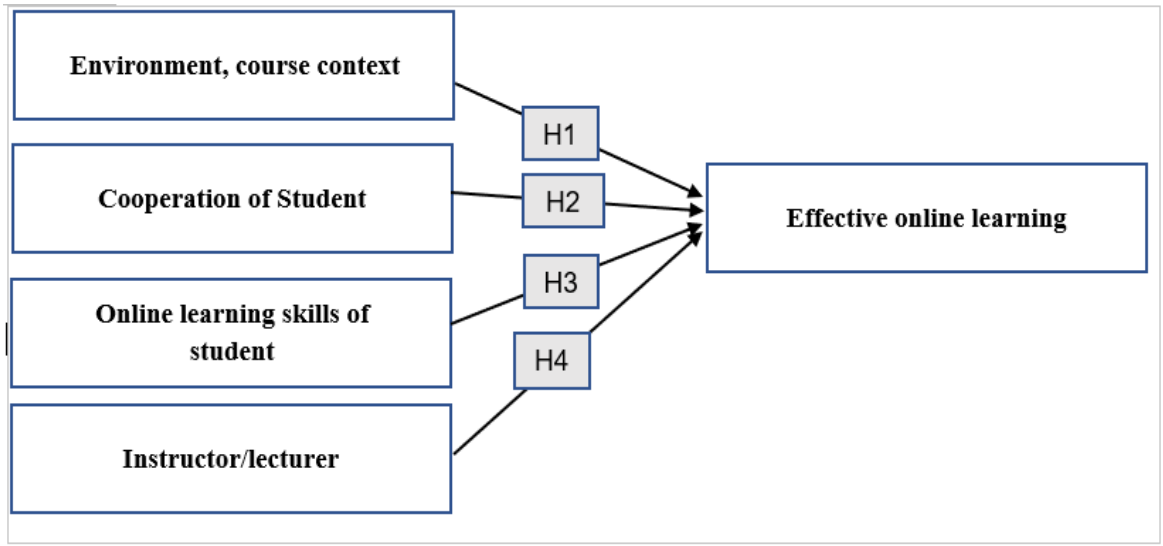


**Figure 1.** Research model proposed by the authors

## 3. RESULTS AND DISCUSSION

### *3.1. The difficulties and advantages in online learning of students at the University of Ho Chi Minh City University of Technology and Education in the context of the Covid - 19 pandemic.*

***Difficulties:*** According to the survey results from 1089 students of HCMUTE, we found that there are some difficulties that students face during online learning as follows: there are 960 students (accounting for 17.8%) claim that online learning causes the feeling of "Easily tired, bored and sleepy"; 731 students (accounting for 13.5%) said that online learning is "online teaching tools

such as zoom, google meet,.... or interrupted"; 698 students (accounting for 12.9%) said that online training lacks "limited interaction between students and students during group work"; 620 students said that "the interaction between lecturers and students in the teaching and learning process is limited" in the online learning process (accounting for 11.5%) (Research team, Survey results November 2021).

The limited interaction between lecturers and students in the teaching and learning process shows that: The impact of the process of interaction and exchange between teachers and students affects the learning outcomes of students. Specifically, most students find that online learning makes learners feel more stressed because it is difficult to absorb knowledge; Students and lecturers are limited in interaction and exchange, and teachers are not as attractive and lively as direct teaching. Interaction is an important component of any learning event (Dewey, 1938, Vygotsky, 1978) and has been identified as one of the key constructs in online learning (Li & Akins, 2005). Therefore, the above difficulties and inadequacies that recognize the effectiveness of students in online learning have not been appreciated. Garrison and Cleveland-Innes (2005) also assessed the depth of online learning, focusing on the nature of online interaction in distance education course design. The authors' findings show that: (1) the first challenge is how to design and facilitate learners to perceive experiences and gain insights; and second (2) it is important to provide engaging questions, focused discussion, challenge and test ideas, appropriate contribution models, and to ensure that the presentation is engaging. Therefore, teachers need to focus on the two-way interaction between teachers and learn through collaboratively working on assignments and participating in small group discussions, which give learners the opportunity to share ideas and learn from each other.

As we have analyzed above, HCMUTE's current online learning system (resources, learning materials, discussions, tests, submissions, interactions, etc.) is mainly through UTEx, FHQx platforms, LMS. This leads to the UTEx, FHQX, and LMS systems sometimes being overloaded because both schools teach and study together, so there is lag and interruption, this is also a difficulty that 603 students in the research sample (accounting for 11.2%) mentioned. to the difficulties encountered when participating in online courses in the context of the Covid-19 pandemic.

On the other hand, for online learning to take place smoothly, the internet connection system plays a key role. However, due to the outbreak of the Covid 19 pandemic, the whole society implemented social distancing/isolation, so all levels and sectors have implemented online learning

and working, thus easily leading to overcrowding. , the transmission is not stable or the costs are high. Specifically, 391 students (7.2%) in the sample said that they have difficulty in practicing online because of "unstable internet"; 512 students (accounting for 9.5%) in the research sample faced difficulties because of "high costs when buying 4G and 5G packages". In addition, the strict family supervision also easily causes a feeling of stress and restraint for students (454 students selected, accounting for 8.4%).

***Advantages:*** According to the survey results from 1089 students, students' online learning in the context of the Covid - 19 pandemic has basic advantages. We give students a rating of advantages on a scale of 1 to 5 (in which, score 1 - the lowest score and score 5 - the highest score) for the observed variables: (1) the main student dynamic study time, making the time for the subject become more flexible; (2) have flexible study time, easy to arrange; can learn anytime, anywhere (convenience); (3) students can take the initiative in their time while ensuring sufficient knowledge; (4) Increase interaction between teachers and learners; (5) increase the ability to be positive and proactive; (6) increase the ability to self-study, self-study and work in groups; (7) meet individual learning needs; exchange and communication between teachers and students; student engagement and interaction; (8) time spent on online learning in the context of the Covid 19 pandemic and implementing social distancing; (9) ensure social distancing, help yourself protect your health against the high risk of infection with covid 19; (10) have knowledge and skills to meet digital transformation requirements. All of these observed variables have scores above 4, the average score of the observed variables clearly shows that the teaching method and form of teaching organization is suitable for interests as well as learning style and conditions for online learning. in the context of the Covid - 19 pandemic. Create opportunities for students to increase their ability to be active, proactive, self-study, self-research, increase their ability to work in groups, participate and interact. This contributes to helping students have the knowledge and skills to meet the requirements of digital transformation.

The above analysis results have partly clearly shown the difficulties and advantages in the online learning process of students in the context of the Covid-19 pandemic. To improve the effectiveness of students' online learning in the context of the Covid - 19 pandemic. In the context of a complicated epidemic, many countries are still strict in isolation and community integration. On that basis, proposing solutions to improve the effectiveness of online training of students in particular and in education and training in general.

### *3.2. Analysis of factors affecting students' digital skills and adaptability in the context of digital transformation at HCMUTE.*

*3.2.1. Reliability analysis of doing scale*

The research has determined and tested the reliability of the scales: Environment, the context of the course (MT); Student cooperation (HT); Student's online learning skills (KN); Instructor/Teacher (ND.GV); Online learning effectiveness (HQ) by Cronbach's Alpha reliability coefficient. With Cronbach's Alpha, it will help to eliminate unsatisfactory observed variables with an item-total correlation less than 0.3 will be eliminated and the criteria for the scale to be satisfactory when Cronbach's Alpha is greater than 0.6 or higher (Nguyen Dinh Tho & Nguyen Thi Mai Trang, 2009). The researchers agree that when Cronbach's Alpha of 0.8 or higher is close to 1, the scale is good, and from 0.7 to close to 0.8 is usable. Some researchers believe that Cronbach's Alpha of 0.6 or higher can be used in case the concept of the scale is new or new to respondents in the research context (Hoang Trong - Chu Nguyen Mong Ngoc, 2008).

**Environment, the context of the course (MTn)**

The results of running the reliability analysis of the scale of the factor "Environment, the context of the course" show that the reliability of 0.852 is greater than 0.6, which is satisfactory, this is a good scale, and all variables (MT1: The disruption of the pandemic and social isolation, limiting the spread of the disease; MT2: No need to go to offline classes, saving time and effort; MT3: Learning facilities Online training (network infrastructure, information technology equipment (such as computers, cameras, printers, scanners), transmission lines, internet services) ensures; MT4: Students can be active in the choice of study time, more comfortable; MT5: Lack of face-to-face meeting and interaction between teachers and students, students and students) correlated with a total greater than 0.3 satisfactory (Source: Monthly survey results November 2021).

**Student Cooperation (HTn)**

The results of running the reliability analysis of the scale of the factor "Students' cooperation" show that the reliability of 0.938 is greater than 0.6, and all variables are satisfactory (HT1: Participating in learning activities). Practice at a high level; HT2: Active, proactive, and dynamic in thinking and acting promptly with requirements and meeting the output standards of the subject; HT3: Interaction creates effectiveness in learning, doing group work; HT4: Sharing knowledge and experiences, giving their own views, learning to think critically, learn what others say and do; HT5: Have communication skills, have the right attitude to solve problems that occur in

learning in life) correlates with a total greater than 0.3 satisfactory (Source: Survey results in November 2021).

**Student's online learning skills (KNn)**

The results of running the reliability analysis of the scale of the factor "Student's online learning skills" show that the reliability of 0.956 is greater than 0.6, and all variables are satisfactory (KN1: Adaptability). positive; KN2: Good time management ability; KN3: High academic persistence; KN4: Performance in the context of online learning, improving online learning skills; KN5: Learning experience online training; KN6: Adaptability) correlates with a total of more than 0.3 satisfactory (Source: Survey results in November 2021).

**Instructor/lecturer (ND.GVn)**

The results of running the reliability analysis of the scale of the factor "Teacher/lecturer" show that the reliability of 0.874 is greater than 0.6, which is satisfactory, but the observed variable is ND.GV6 (Teachers use the techniques) reasonable teaching so that students can understand the meaning of the subject) has a correlation coefficient with the total (Corrected Item-Total Correlation = 0.064) less than 0.3 and does not meet the requirements (Source: Survey results in November 2021). Therefore, it is necessary to remove the variable ND.GV6 and re-test the reliability of the factor scale "Teacher" for the second time.

The results of running the reliability analysis of the scale of the "Teacher/lecturer" factor for the second time (after removing the variable ND.GV6) showed that the reliability of 0.938 was greater than 0.6, and all were satisfactory variables (ND.GV1: Deploy the plan, teaching content suitable to the output standards of the subject. Teacher guides students to effectively use information sources in classroom lessons; ND.GV2: Motivational stimulation, interest in learning for students. Teachers perfect their teamwork and discussion skills for students; ND.GV3: Teachers provide students with individual teaching plans so that students can take the initiative in planning their studies of students and prepare the best attitude and attitude for acquiring knowledge in every classroom hour; ND.GV4: Teachers choose to teach methods and means; Teachers provide and guide testing and assessment course assessment for students to prepare their minds, approach, and process information, and scientifically acquire knowledge during the self-study process; ND.GV5: The teacher organizes for students to discuss the importance of, in terms of meaning, advantages, and disadvantages Self-study: Students learn about the interaction between subjects in the school's training program, what are the advantages and disadvantages of learning conditions, and then

choose the best option for effective self-study. Implementing this measure will help students have skills in information processing, analysis, and comparison; express opinions; know how to listen and share ideas with team members) correlated with a total greater than 0.3 satisfactory (Source: Survey results in November 2021).

**Effective online learning (HQn)**

The results of running the reliability analysis of the scale of the factor "Effectiveness of online learning" show that the reliability is 0.958, greater than 0.6, satisfactory, and all variables (HQ1: Digital context and good adaptability to online learning technology; HQ2: Lectures of the industry/subject are designed on UTEx, FHQx, LMS in accordance with online learning methods; HQ3: Context of Covid -19 pandemic leads to an urgent need for online learning to ensure distance and health safety; HQ4: Conformity, synchronization and efficiency between schools, lecturers and students; HQ5: Ability changes and adaptations of teachers and learners) correlates with a total greater than 0.3 satisfactory (Source: Survey results in November 2021).

*3.2.2. Exploratory factor analysis*

*Exploratory factor analysis with (EFA) independent variables*

The standard of the factor analysis method is that the KMO index must be greater than 0.5 (Garson, 2003) and the Barlett's test has a significance level of sig < 0.05 to show that the data used for factor analysis is appropriate and between the variables. are correlated with each other. Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) value = 0.950. In this study, the results of factor analysis showed that the KMO index was 0.956 > 0.5, which proves that the data used for factor analysis is completely appropriate. Barlett's test result is 22581,863 with a Sig significance level = 0.000 < 0.05, this time rejecting hypothesis H0: observed variables are not correlated with each other in the population. Thus, the hypothesis that the correlation matrix between variables is homogenous is rejected, that is, the variables are correlated with each other and satisfy the factor analysis conditions (Source: Survey results in November 2021). Perform factor analysis according to Principal components with Varimax rotation. The results show that the 21 observed variables were initially grouped into 4 groups. Value of total variance extracted = 77.855% > 50%: satisfactory; then it can be said that these 5 factors explain 77.855% of the variability of the data. The Eigenvalues of all factors are high (>1), and the fifth factor has the lowest Eigenvalues of 1,126 > 1. However, in the results of this analysis, the observed variable ND.GV1 differentiates into 2 values in two factors (factor 1 = 0.604 and factor 3 = 0.523) are not consistent with the theory in factor

analysis, so it is necessary to remove the ND.GV1 variable and do a second-factor analysis for the independent variables (Source: Survey results in November 2021. The results of the second-factor analysis (after removing the observed variable ND.GV1) showed that the KMO index was 0.953 > 0.5, which proves that the data used for factor analysis is completely appropriate. Barlett's test result is 21270,360 with a Sig significance level = 0.000 < 0.05, this time rejecting hypothesis H0: observed variables are not correlated with each other in the population. Thus, the hypothesis that the correlation matrix between variables is homogenous is rejected, that is, the variables are correlated with each other and satisfy the conditions for factor analysis (Source: Survey results in November 2021). Perform factor analysis according to Principal components with Varimax rotation. The results show that the 20 observed variables are grouped into 4 groups (table 1).

The total value of variance extracted = 78.282% > 50%: satisfactory; then it can be said that these 5 factors explain 78.282% of the variability of the data. The Eigenvalues of the factors are all high (>1), and the 5th factor has the lowest Eigenvalues of 1,087 > 1. Factor matrix with Varimax rotation method:

**Table 1.** Result of factor analysis EFA independent variable (2nd time)

| **Rotated Component Matrix**[a] | | | | |
|---|---|---|---|---|
| | Component | | | |
| | 1 | 2 | 3 | 4 |
| KN3 | .819 | | | |
| KN2 | .811 | | | |
| KN5 | .801 | | | |
| KN5 | .800 | | | |
| KN1 | .751 | | | |
| KN6 | .675 | | | |
| HT3 | | .771 | | |
| HT4 | | .759 | | |
| HT2 | | .744 | | |
| HT5 | | .739 | | |
| HT1 | | .718 | | |
| ND.GV5 | | | .832 | |
| NG.GV4 | | | .830 | |
| ND.GV2 | | | .824 | |
| NG.GV3 | | | .818 | |
| MT1 | | | | .863 |
| MT2 | | | | .850 |
| MT5 | | | | .686 |

| | | | | |
|---|---|---|---|---|
| MT4 | | | | .622 |
| MT3 | | | | .549 |
| Eigen - value | 11.458 | 1.681 | 1.430 | 1.087 |
| Phương sai trích(%) | 23.551 | 43.230 | 61.491 | 78.282 |
| Extraction Method: Principal Component Analysis.<br>Rotation Method: Varimax with Kaiser Normalization. | | | | |
| a. Rotation converged in 5 iterations. | | | | |

Source: Survey results in November 2021

*Exploratory factor analysis with (EFA) dependent variables* (Effectiveness of online learning).

The EFA results of the dependent variable scale (Efficacy of online learning) by the Principal components extraction method and the vanimax rotation show that: KMO coefficient = 0.909 (>0.5), Barlett's test result is 6083,106 and significance level. Sig. = 0.000 (<0.05), so exploratory factor analysis (EFA) is appropriate (Source: Survey results in November 2021). 05 variables measuring the effectiveness of online learning are extracted into the same factor at Eigenvalues = 4,277 (>1) and the extracted variance is 85,535% (Source: Survey results in November 2021). Therefore, the EFA results can be used for regression analysis in the next step.

*3.2.3. Correlation coefficient matrix analysis.*

**Table 2.** Grouping of factors after performing exploratory factor analysis

| Factors | Symbol | Measure variable |
|---|---|---|
| Environment, course context | MTn | MT1, MT2, MT3, MT4, MT5 |
| Student cooperation | HTn | HT1, HT2, HT3, HT4, HT5 |
| Instructor/Teacher | ND.GVn | ND.GV2, ND.GV3, ND.GV4, ND.GV5. |
| Student's online learning skills | KNn | KN1, KN2, KN3, KN4, KN5, KN6 |
| Effective online learning | HQn | HQ1, HQ2, HQ3, HQ4, HQ5. |

Source: Survey results in November 2021

Correlation coefficient matrix analysis is a crucial analytical step before performing regression analysis to consider whether groups of independent and dependent variables are eligible for regression analysis. Correlation analysis represents a linear correlation relationship between the pairs of variables being analyzed. The correlation coefficients will range from -1 to 1 and measure the degree of linear correlation between the variables. The Prob value represents the level of statistical significance for the estimated correlation coefficients. The author conducts correlation analysis among the variables in the model.

**Table 3.** Analyze the correlation coefficient matrix between the independent variable and the dependent variable

| Correlations | | HQn | MTn | HTn | KNn | NG.GVn | HQ1 |
|---|---|---|---|---|---|---|---|
| HQn | Correlation Coefficient | 1.000 | .505** | .741** | .752** | .741** | .923** |
| | Sig. (2-tailed) | . | .000 | .000 | .000 | .000 | .000 |
| | N | 1089 | 1089 | 1089 | 1089 | 1089 | 1089 |
| MTn | Correlation Coefficient | .505** | 1.000 | .562** | .546** | .524** | .460** |
| | Sig. (2-tailed) | .000 | . | .000 | .000 | .000 | .000 |
| | N | 1089 | 1089 | 1089 | 1089 | 1089 | 1089 |
| HTn | Correlation Coefficient | .741** | .562** | 1.000 | .734** | .667** | .708** |
| | Sig. (2-tailed) | .000 | .000 | . | .000 | .000 | .000 |
| | N | 1089 | 1089 | 1089 | 1089 | 1089 | 1089 |
| KNn | Correlation Coefficient | .752** | .546** | .734** | 1.000 | .666** | .690** |
| | Sig. (2-tailed) | .000 | .000 | .000 | . | .000 | .000 |
| | N | 1089 | 1089 | 1089 | 1089 | 1089 | 1089 |
| NG.GVn | Correlation Coefficient | .741** | .524** | .667** | .666** | 1.000 | .691** |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | . | .000 |
| | N | 1089 | 1089 | 1089 | 1089 | 1089 | 1089 |
| HQ1 | Correlation Coefficient | .923** | .460** | .708** | .690** | .691** | 1.000 |
| | Sig. (2-tailed) | .000 | .000 | .000 | .000 | .000 | . |
| | N | 1089 | 1089 | 1089 | 1089 | 1089 | 1089 |
| **. Correlation is significant at the 0.01 level (2-tailed). | | | | | | | |

Source: Survey results in November 2021

The results of table 3 analysis show that the correlation between the independent variables in the model is relatively strong (correlation coefficients are all less than 0.6, relatively much larger than 0.7). For the correlation between the independent variables and the dependent variable, it shows that the dependent variable online learning efficiency has a correlation coefficient of non-zero for the independent variable MTn, HTn, KNn, and ND.GVn at a significant level. ten%. With the Sig coefficient (2-tailed) all have the value 0.000<0.05, this shows that the independent variables (MTn, HTn, KNn, ND.GVn) identified in the research model have an influence on the online learning effectiveness of HCMUTE students during the Covid-19 pandemic.

Thus, with the results of the analysis of the correlation coefficient matrix between the variables in the model, the independent variables and the dependent variables are eligible to perform the next step of regression analysis. The regression model has the form: HQn = βo+ β1*MTn + β2*HTn + β3*HKn + β4*ND.GVn

*3.2.4. Regression analysis*

After conducting exploratory factor analysis, grouping variables according to each factor, the study continued to conduct regression analysis. The regression model that the study applies is a multivariate regression model to examine the relationship between the dependent variables and the independent variables. When analyzing regression, the results will show the factors affecting the online learning effectiveness of HCMUTE students during the Covid - 19 pandemic. At the same time, it shows the impact of these factors and the level of solutions their likes. Specifically, regression analysis was performed with 04 independent variables: Environment, course context (MTn), Student cooperation (HTn), Students' online learning skills (KNn), People teaching/Teacher (ND.GVn); and dependent variable Online learning effectiveness (HQn). One-pass input method (Enter method) was used for regression analysis. The values of the factors used to run the regression are the mean values of the observed variables. The model is written as follows: HQn = βo+ β1*MTn + β2*HTn + β3*HKn + β4*ND.GVn + ei (βi: Regression coefficients (i>0); βo: Constant; ei: error).

Evaluate model fit:

Adjusted R2 = 0.695 means that the independent variables in the model include: Environment, course context (MTn), Student cooperation (HTn), Students' online learning skills (KHn). ), Instructor/Teacher (ND.GVn) on Online Learning Effectiveness (HQn) of students at Ho Chi Minh City University of Technology and Education during the Covid-19 pandemic, explaining 69.5% of the variation in Online Learning Effectiveness (HQn) and the rest is the variation of Online Learning Efficiency (HQn) not being explained by the variables. independent in the model, or in other words due to factors outside the model.

**Table 4.** Model Summary b

| **Model Summary**[b] | | | | | |
|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
| 1 | .834[a] | .696 | .695 | .54332 | 1.771 |
| a. Predictors: (Constant), NG.GVn, MTn, KNn, HTn | | | | | |
| b. Dependent Variable: HQn | | | | | |

Source: Survey results in November 2021

The ANOVA table gives us the results of the F test to evaluate the hypothesis of fit of the regression model. The F-test sig value is 0.000 < 0.05, so the regression model is suitable. The test

results of the study showed that F value = 619,762 Sig value. = 0.000 is very small (<0.05), from this result, there exists at least one statistically significant independent variable explaining the change of the dependent variable.

**Table 5.** ANOVA[a]

| **ANOVA[a]** | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 731.806 | 4 | 182.951 | 619.762 | .000[b] |
| | Residual | 319.993 | 1084 | .295 | | |
| | Total | 1051.798 | 1088 | | | |
| a. Dependent Variable: HQn | | | | | | |
| b. Predictors: (Constant), NG.GVn, MTn, KNn, HTn | | | | | | |

Source: Survey results in November 2021

The results of regression analysis and the level of impact of each factor in Table 6 are as follows:

We will evaluate the regression coefficient of each significant independent variable in the model based on the t (student) test with the hypothesis H0: Regression coefficient of the independent variables MTn, HTn, KNn, ND. GVn is 0. The regression model of the study has four independent variables, we will test as many hypotheses as H0. The test results show:

• Sig < 0.05: Reject the hypothesis H0, that is, the regression coefficients of the independent variables HTn, KNn, ND.GVn are statistically different from zero. The research results show that the independent variables HTn, KNn, and ND.GVn all have the coefficients Sig.=0.00<0.05, these variables are all statistically significant, which proves that these independent variables have a significant relationship impact on the dependent variable (HQn - Online learning effectiveness of HCMUTE students during the Covid -19 pandemic).

• Sig > 0.05: Accept the hypothesis H0, that is, the regression coefficient of the independent variables MTn is zero statistically significant. Research results show that the independent variable MTn has the coefficient Sig.= 0.683 >0.05. Therefore, this variable is not significant in the regression model, or in other words, this variable has no impact on the dependent variable (Efficacy of online learning of HCMUTE students during the Covid -19 pandemic).

**Table 6.** Coefficients[a]

| Model | Unstandardized Coefficients | Standardized Coefficients | Unstandardized Coefficients | t | Sig. | Collinearity Statistics |
|---|---|---|---|---|---|---|
| | B | Std. Error | Beta | | | Tolerance |
| (Constant) | .298 | .074 | | 4.029 | .000 | |
| MTn | -.011 | .026 | -.009 | -.409 | .683 | .582 |
| HTn | .278 | .028 | .280 | 10.057 | .000 | .363 |
| KNn | .290 | .029 | .280 | 10.110 | .000 | .365 |
| NG.GVn | .377 | .023 | .385 | 16.244 | .000 | .500 |

Source: Survey results in November 2021

In regression, we will usually have two regression coefficients: unnormalized (in SPSS called B) and normalized (in SPSS called Beta). If the regression coefficient (B or Beta) has a negative sign, it means that the independent variable has a negative effect on the dependent variable. In the research results, the Environmental variable (MTn) has a value of Beta = -.009. As for the independent variables HTn, KNn, ND.GVn all have B or Beta with no sign (positive sign), this proves that the independent variables HTn, KNn, ND.GVn have a positive impact on the dependent variable (Significant) online learning results of HCMUTE students during the Covid - 19 pandemic).

Test the statistical significance of the estimated coefficients: Based on the results in Table 6, and the above analysis, the variables that are statistically significant include: Student cooperation (HTn), Skills online learning (KNn), Instructor/Teacher (ND.GVn) have an influence on the online learning effectiveness of HCMUTE (HQn) students during the Covid- 19 pandemic. Because of all levels of significance ( Sig.) are all < 0.05. The normalized regression model on factors affecting online learning effectiveness of HCMUTE students during the Covid-19 pandemic is determined as follows:

$$HQn = \beta o + 0.280*HTn + 0.280*KNn + 0.385*ND.GVn$$

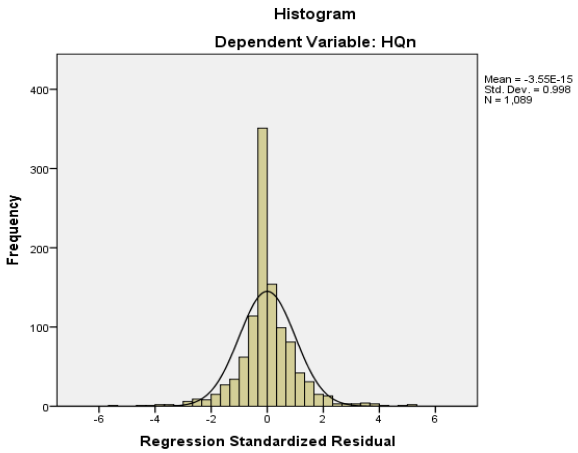


**Figure 2.** Histogram: Assumption of a normal distribution of the residuals

Source: Survey results in November 2021

Looking at Figure 2, the normalized residuals are distributed according to the shape of the normal distribution. There is a bell curve in the figure which is a normal distribution, we see the histogram frequency corresponding to that bell curve. Furthermore, the mean is -3.55E-15 approximately =0, and the standard deviation of 0.998 is approximately =1 further confirming that the normalized residuals are normally distributed.

See the Normal P-P Plot chart (Figure 3), the observed and expected values are all close to the diagonal, showing that the normalized residuals have a normal distribution. The P-P Plot test shows the values of the percentiles of the variable's distribution according to the percentiles of the normal distribution. Observing the level of actual points, concentrated close to the expected line, shows that the research data set is relatively good, the normalized residuals have a distribution close to the normal distribution.

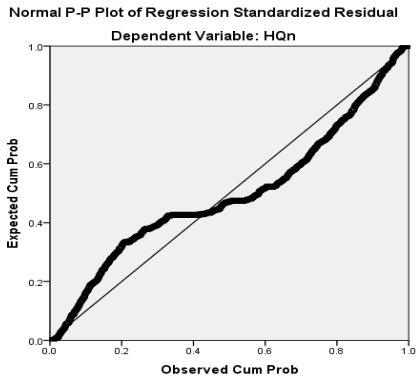


**Figure 3.** Normal P-P Plot . Chart

Source: Survey results in November 2021

Regarding the assumption of linear relationship, the method used is the scatterplot plot. Looking at the chart in Figure 3, we see that the Regression Standardized Residual has no insignificant change in a certain order for the Regression Standardized Predicted Value (Regression Standardized Predicted Value). Hence the assumption of linear relationship is not violated. This means that the normalized prediction value is the normalized value of the dependent variable, and the normalized residual is the normalized value of the residual. We see that the dependent variable has no relationship with the residual.

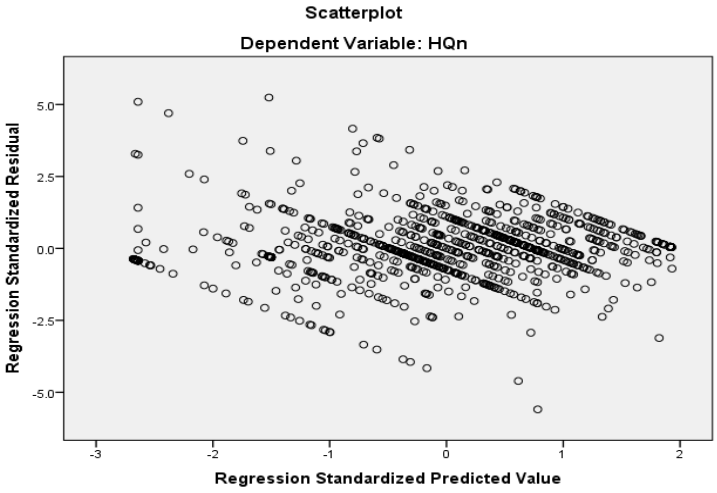


**Figure 4.** Scatterplot . scatter plot

Source: Survey results in November 2021

*3.2.5. Discussion*

Factors affecting the online learning effectiveness of students at Ho Chi Minh City University of Technology and Education during the Covid-19 pandemic were initially identified in the study as H1 - Environment, course context (MTn); H2- Student cooperation (HTn); H3 - Students' online learning skills (KNn); H4 - Instructor/Teacher (ND.GVn). Regression analysis results show that 3/4 of the initial hypotheses H2, H3, H4 are accepted (With Sig. = 0.000<0.05, ie H2, H3, H4 have an influence on learning efficiency online study by students of Ho Chi Minh City University of Technology and Education), and H1 was not accepted (H1 due to Sig.= 0.683 > 0.05 (ie H1 does not affect online learning effectiveness of students) students of Ho Chi Minh City University of Technology and Education during the Covid - 19 pandemic)).

**Table 7.** Statistical hypothesis testing

| **Statistical hypothesis** | **Estimated coefficient (Std. Error), Beta, Sig.** | **t** | **Resul** |
|---|---|---|---|
| H2: Student cooperation (HTn) has an effect on the online learning efficiency of students at Ho Chi Minh City University of Technology and Education during the Covid-19 pandemic (HQn). | Std. Error = 0.028, Beta = 0.280 Sig.=0.000 | t | Accep |
| H3: Online learning skills (KNn) have an impact on the online learning efficiency of students at Ho Chi Minh City University of Technology and Education during the Covid-19 pandemic (HQn). | Std. Error = 0.029<br>Beta = 0.280<br>Sig. = 0.000 | t | Accep |
| H4: Teachers/Teachers (ND.GVn) have an influence on the online learning | Std. Error = 0.023<br>Beta = 0.385 | t | Accep |

| | |
|---|---|
| efficiency of students at Ho Chi Minh City University of Technology and Education during the Covid-19 pandemic (HQn) | Sig. = 0.000 |

Source: Survey results in November 2021

In the results of our study, the cooperation of students (HTn) has an effect on the online learning effectiveness of students at Ho Chi Minh City University of Technology and Education during the Covid-19 pandemic (HQn) (Std. Error = 0.028, Beta = 0.280 Sig. = 0.000). Students (learners) are at the heart of modern education. In education 4.0, the learner-centered teaching method is one of the active teaching methods to promote the initiative and creativity of learners. With this method, learners will be self-discoverers of knowledge, teachers are only guides and information providers. This means that, for effective learning to be effective, students' participation in learning activities requires seriousness and high concentration. During the learning process, students need to promote their positivity, initiative, and dynamism in thinking and acting promptly with the requirements and standards of the course's output. In the general trend of the industrial revolution 4.0, education 4.0 requires students to have communication skills and appropriate attitudes to solve problems that occur in learning and life. Regularly interact with each other in the classroom, and in group, activities to increase learning effectiveness. Support and share knowledge, experiences, and opinions and learn critical thinking.

In order to cooperate between students and students, between students and lecturers, and between students and media, a good learning environment and positive learning effects are required tablets must be good. In our study, students' online learning skills have an influence on the online learning efficiency of students at Ho Chi Minh City University of Technology and Education during the Covid -19 pandemic (HQn) (Std. Error = 0.029, Beta = 0.280 Sig. = 0.000). In the online learning process, the skill of active adaptation is one of the relatively new skills. Because there, learners have to get used to and adapt to technology, with electronic lectures, the ability to interact and communicate through laptop screens, televisions, skills in computer manipulation, and test-taking skills online testing, all of this in the online education mechanism is completely different from the traditional method of education in the face-to-face classes. Therefore, active adaptive skills are essential skills that every student in the online learning mechanism must practice on their own.

In order for online learning to be effective, good time management skills to create high performance in the context of online learning are also one of the basic and necessary skills in online learning skills of students. Online learning requires persistence, high discipline, because students have to interact with online learning using laptops, computers, and phones. Because of mastering the means and tools of online learning, the online environment always contains many temptations, because there are many videos, images, and many content spread on social networking sites that always attract attention student focus and attention. The concentration of attention on issues unrelated to the lesson/learning content transmitted on youtube, the higher the social network, the lower the concentration in online learning and vice versa. This will affect students' online learning performance.

On the other hand, the essence of online learning is that learners can learn anytime, anywhere, anytime. Therefore, good online learning time management requires students to have a clear plan, build themselves a suitable timetable to be able to absorb the right amount of knowledge, participate in assignments. Check the schedule of the time already installed by the teacher on the software.

The theory of planned behavior has shown that, each individual needs to consider and choose his or her behavior in order to achieve the best results, that is, to weigh the gain - loss in their own choices me. Therefore, students need to be aware of the importance of good management of online learning time, thereby training themselves to be proactive, self-disciplined, persistent with high academics, actively adapting and enhance your online learning skills.

Another very good skill in online learning for students is the online learning experience. With this skill, students need to share, seek support, actively participate, and discuss with lecturers, with friends in groups/classes to bring the best online learning effect. Student cooperation as well as study skills show the attitude and behavior of students when participating in online classes. The behavior is shown through very fast internet access time, the ability to interact and work directly on the Laptop, and the ability to access information, documents, and digital learning equipment to fully meet the needs of users. request, access behavior information about personal life on social networking sites. Behavior is a factor that accounts for a high proportion of students' selection, refinement, and learning of digital skills and adaptability. People who can use information technology, the internet, fast operation, and quick search access can be seen as having the ability to adapt quickly and bring more effective online learning.

The results of the regression analysis have also shown that the factor of teachers and lecturers has an influence on the effectiveness of students' online learning during the Covid-19 pandemic (Std. Error = 0.023, Beta = 0.385 Sig. = Std. Error = 0.023, Beta = 0.385 Sig. = 0.000). Teachers and lecturers greatly influence students' online learning efficiency during the Covid 19 pandemic. With 4.0 education, teachers and lecturers no longer play the role of "teachers", where they act as guides.

According to the analysis results from the survey, environmental factors (including observed variables: The disruption of the pandemic and social isolation, limiting the spread of the disease; No need to go to class. Offline learning should save time and effort; Online learning facilities (network infrastructure, information technology equipment (such as computers, cameras, printers, scanners), transmission lines, translations) and internet service) ensures, Students can be proactive in choosing study time, more comfortable, Students can be proactive in choosing study time, more comfortable, Lack of encounters and interactions. Direct cooperation between teachers and students, students and students does not affect the online learning effectiveness of HCMUTE students during the Covid -19 pandemic. This can be explained by the development of engineering and technology in Vietnam. On the other hand, it also shows the preparation and adaptability of the Vietnamese people in general and HCMUTE students in particular for online learning in the university. The Covid - 19 pandemic has been prepared and adapted relatively well. Moreover, the online learning platform of the Ho Chi Minh City University of Technology and Education has created consistency in the content and structure of online courses that also bring success and improve the effectiveness of students' online learning.

**3.3. Solutions to improve online learning efficiency of HCMUTE students during the Covid - 19 pandemic.**

Firstly, in terms of technology, online teaching tools: Schools and families need to invest, support and meet learning equipment, improve internet connection, buy copyrighted teaching software. and learning to ensure continuity, specifically:

Secondly, about the psychology of teaching (teachers, lecturers) and students (students): Families, schools, teachers and lecturers need to grasp the fatigue and stress of students to create an environment, friendly learning, avoid being constrained, tight control easily causes feelings of fatigue, boredom, drowsiness and stress.

Third, it is necessary to clearly identify the factors affecting the online learning effectiveness of students during the Covid-19 pandemic in order to analyze and propose an appropriate research model, thereby giving necessary measures real, closer to reality.

Fourth, for the cooperation of students in online learning: it is necessary to determine the extent to which learners can grasp the knowledge, skills and techniques compared to the requirements of the training program. The content of the assessment is the daily learning results, as well as the results reflected in the periodical tests, summative tests in terms of knowledge, skills and techniques of each module. Therefore, it is necessary to create opportunities for students to increase their ability to be active, proactive, self-study, self-research, increase their ability to work in groups, participate and interact in the online learning process. line. This contributes to helping students have the knowledge and skills to meet the requirements of digital transformation in general and the ability to adapt to online learning in particular.

Fifth, for students' online learning skills: learning on digital platforms as well as students' adaptability in the context of the Covid -19 pandemic will easily lead to psychological fatigue and stress. directly, this more or less affects students' adaptability in active learning and research. Therefore, it is necessary to facilitate and encourage students to actively adapt, manage their time well, persevere with high academics, work performance, study and access information in the context of online learning. Enhancing online learning skills, learning, accumulating online learning experiences and adaptability are qualities and attributes that contribute to perfecting students' online learning skills.

Sixth, for teachers and instructors (instructors): when organizing and developing online classes, they need to focus on goals and the most effective technologies to accomplish those goals. in online format. Apply guiding design principles in developing online classes as well. The flexibility of the online instructor allows students to take online courses in a relaxed, light-hearted mentality, helping students feel the effectiveness and feasibility of online learning. Therefore, teachers and lecturers need to:

Develop and stimulate students' motivation and interest in learning.

• Plan and provide students with a teaching and learning plan

• Encourage and disseminate rules and regulations to help students prepare the best attitude and attitude for online learning.

• It is necessary to choose appropriate teaching methods and means to avoid causing boredom and drowsiness to students.

• Provide specific and clear instructions for testing and assessment at the end of the course, helping students prepare their minds, approach and process information, and acquire knowledge in a scientific way during the process. self learning.

• Encourage the development of communication skills and teamwork skills for students to promote their positivity, initiative and creativity.

## 4. CONCLUSION

The research results partly reflect and analyze the factors affecting the online learning efficiency of students at the Ho Chi Minh City University of Technology and Education during the Covid-19 pandemic. The results show that the research model built by the authors is consistent with the hypothesis. Specifically, the results of the correlation table analysis between the independent variables and the dependent variable show that there is an influence. However, when testing the fit of the model in depth by multivariable regression testing, the research results show that: student cooperation and online learning skills of students, teachers, The lecturers have an influence on the online learning effectiveness of students at the Ho Chi Minh City University of Technology and Education during the Covid-19 pandemic, the independent variable "environment" did not affect the online learning efficiency of students at the Ho Chi Minh City University of Technology and Education.

Although there are many different approaches to online learning terminology, as well as determining factors affecting students' online learning results in the context of the 4.0 revolution in general and during the Covid -19 pandemic in particular. However, the above studies are an important basis for individuals and organizations to research how digital has supported teaching and learning and research how to improve digital skills for learners to meet the new conditions.

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