ORIGINAL ARTICLE

Evaluating the Effectiveness of Online Physical Education Teaching toward Students at Ho Chi Minh City University of Technology and Education, Vietnam

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ABSTRACT

Background. In the era of technology development and continuous improvement, all fields of society, including physical education (PE), must necessarily follow technology trends to keep up with the general development speed. **Objectives.** The study is to evaluate the effectiveness of online teaching of PE at HCMUTE, thereby serving as a basis for improvement of this activity. **Methods.** Survey questions were carried out to measure the evaluation of indicators affecting student satisfaction with the effectiveness of online teaching of PE at HCMUTE. 400 male and female students with normal health, participating in online PE and non-sports majors. Data analysis in this study was supported by the SPSS Version 22 application. **Results.** The topic has selected 04 indicators that satisfy the conditions. Accordingly, the indicator of "Self-learning" is highly appreciated by students ($\overline{x}$ =3.90 - Agree level, P>0.05); the factors related to the indicator of "Protecting your health, avoiding disease" were assessed by students as normal ($\overline{x}$ =3.11 - Normal level, P>0.05); The indicator of "Technology applications to support online learning of PE" was highly appreciated by students ($\overline{x}$ =4.14 - within the Totally Agree range, P>0.05); The indicator of "New way of interacting when learning PE online" is highly appreciated by students when it has $\overline{x}$ =4.17 within Totally Agree, P>0.05. **Conclusion.** Research results show that most students participating in the survey see the positive effects of studying PE online - something they have not felt before; In which, interactive activities and technology application play an important role.

KEYWORDS: *Technology, Teaching, Physical Education, Efficiency, Online.*

INTRODUCTION

It is well known that physical activity is inherently 'good' for students with respect to varied biological (e.g., growth, bone health) and psychosocial outcomes including self-esteem and cognitive functioning (1). However, the Covid-19 pandemic interrupted this activity. Therefore, "E-Learning" has become close to everyone, especially in the context of the long and complicated Covid pandemic (2). It is a method

of learning by means of communication through the Internet in an interactive way with learning content and is designed on the basis of teaching methods and is strictly managed to ensure interaction and meet the needs of students. Learners' requests to learn anytime, anywhere. This learning method brings great benefits, saves time, effort, and money, and also improves the quality of knowledge transmission and

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acquisition for students. Because of the advantages and benefits that E-Learning teaching is an inevitable trend in the future, educational institutions, especially higher education institutions, are constantly looking for ways to approach this market (3). So, the education of the student must be of good quality and constantly updated in a dynamic process in this context (4).

According to the experts' general opinion, the application of information and communication technology in the field of education and training has initially achieved positive results. Software technology thrived, in which educational software supporting online teaching also achieved remarkable achievements such as: Office suite, Cabri, Crocodile, SketchPad/Geomaster SketchPad, Maple/Mathenatica, ChemWin. Many studies around the world have confirmed the positive effects of online teaching and learning. In online teaching, the higher the satisfaction, the higher the learning outcomes (5). Technological factors, student-lecturer relationship, and learner control have significant influence (6). There are two factors affecting the satisfaction and learning outcomes, which are the student's feedback and learning styles (7). Self-efficacy of students is an important factor affecting online learning results, moreover, the effectiveness of online teaching depends on students' interaction with the technology system (8). Curriculum and students' perceptions of technology, along with the student's motivation have a significant influence on learning outcomes (9). The four factors affecting online teaching are learners, teachers, learning materials providers, and technology. Among them, technology is the most important factor (10). Ali and co-authors have determined that software quality (technology) is one of the main factors affecting online teaching effectiveness (11). In 2020, Hye Chang and Heeyoung Han emphasized that even difficult online teaching can create forums, facilitating interaction between learners and instructors (12).

The online education model is an advanced teaching method and is widely applied and popular in the world, including PE and sports. When the Covid-19 pandemic broke out in Vietnam (February 2020), the leaders at all levels promptly directed the national education system to flexibly respond, in line with global

trends. Directing learners not to go to school to prevent the pandemic has created an opportunity for the Vietnamese education system to synchronously deploy online teaching and learning.

Ho Chi Minh City University of Technology and Education (HCMUTE) is a multi-disciplinary university, multi-disciplinary in the direction of career - application, in which several training areas are research - developing. It has a reputation and a tradition of more than 60 years, with advanced and quality management and training programs. Among them, it has a strong and stable Internet Network; Big data center (Big data center); Virtual Teaching Center (UTEx); Teaching management software (LMS)… However, the evaluation of the effectiveness of online teaching of PE has not been paid attention and organized methodically. Therefore, we conducted a study on the effectiveness of online teaching of PE at HCMUTE. The results of this study will be the premise for further studies on online teaching and learning here and to find out the development directions for this new and promising form of training.

MATERIALS AND METHODS

Participants. The research object of the project is 400 male and female students (ages 18-20, from different regions of Vietnam) with normal health, participating in online PE of HCMUTE's non-sports majors (see Table 1). Sample identification using a convenient, random sampling technique. The results obtained sample include: 324 male students (accounting for 81%), 76 female students (accounting for 19%). The number of survey subjects distributed predominately is the Faculty of High-Quality Training (48%), Faculty of Economics (12%), Faculty of Machine Design (8%), then stretches to other faculties.

After finding out the theoretical basis, and designing the questionnaire, the research was conducted in the following two steps: Step 1. Preliminary research was carried out through a trial survey of 30 students based on some pre-prepared criterion and interviews to exploit issues related to the research topic. Step 2. Formal research. On the basis of the calibrated scale after the interview and trial survey, the official survey sent to the interview is completed with 3 parts in structure with 65 questions (observed variables). To solve the research

problem, we conducted interviews with two subjects (students and lecturers) with 2 questionnaires on a Likert scale - 5 levels. Then, evaluate the scale and test the research model by Cronbach's Alpha coefficient (Cronbach, 1951) and Exploratory Factor Analysis (EFA).

Table 1. Study sample (students) distributed by sex, faculty and academic year

Factor	Classify	Frequency	%
Gender	Male	324	81
	female	76	19
Faculty	High quality trainEconomics	192	48
	Mechanical design machine	48	12
	Mobile Phone - Electronics	32	8
	Dynamic mechanics	20	5
	Print & Media	17	4.25
	Information Technology	16	4
	Foreign language	15	3.75
	Food Chemistry Technology	15	3.75
	Construction	14	3.5
	Sewing & Fashion	13	3.25
	Applied Science	11	2.75
School year	1	0	0
	2	285	71.25
	3	97	24.25
	4	18	4.5
	Total	400	100%

Procedures. In order to ensure that the selected indicators are reasonable and objective, the study takes the following 4 steps: Step 1. Synthesize and systematize the indicators to evaluate the effectiveness of online teaching and learning of PE that have been approved. Used by domestic and foreign authors; Step 2. On the basis of general exercises, reduce complex and rarely used indicators; Step 3. Interview by questionnaire to get an expert opinion (PE lecturers) to identify indicators objectively and feasible; Step 4. Compare expert opinions (PE lecturers) and students directly participating in online PE to identify indicators objectively and feasible.

Data Analysis. Data analysis in this study used descriptive analysis. The parameters mean, standard deviation, and t-student were used to calculate the indicators. Besides, the Wilcoxon test, also known as a Sign - rank test (test by means of two independent samples) is used to compare and find the difference between two groups of independent data (students' opinions and lecturer's opinion) when the dependent variable is continuous or ordinal but need not be normal distribution. In this study, data analysis was assisted by using SPSS - version 22 application.

RESULTS

To ensure that the selected indicators are reasonable and objective, the study proceeds in the following 4 steps:

Step 1. Synthesize and systematize indicators to evaluate the effectiveness of online teaching and learning of PE that have been used by domestic and foreign authors; Step 2. On the basis of general exercises, remove complex and rarely used indicators; Step 3. Interview by questionnaire to get the expert's opinion (PE lecturers) to identify the indicators objectively and in a feasible way; Step 4. Compare the opinions of experts (PE lecturers) and students who have directly participated in learning online PE to identify indicators in an objective and feasible manner.

From the original 13 indicators, after reducing to 10 indicators, the study continued to interview lecturers specializing in PE to select indicators and evaluate the effectiveness of teaching and learning PE online. The form of interview is indirect 2 times of questionnaire (2 weeks apart). Each exercise in the interview table has 3 options for answering: Priority 1: 3 points; Priority 2: 2 points; Priority 3: 1 point. The convention is to select only indicators to evaluate the effectiveness of online teaching and learning of PE with a rate of ≥80% agreeing

through 2 interviews (removing indicators with an approval rate <80%). At the same time, there must be consistency (no significant difference) between the 2 interviews. The number of votes sent out and collected in the first and second interviews were 20. The specific results are presented in Table 2. It shows that there are 5/10

indicators with ≥80% approval rate. Simultaneously, the Wilcoxon signed rank test was carried out (Wilcoxon signed rank test), it was noted that all 10/10 selected interview indicators had Sig>0.05. Thereby, it proved that there was no statistically significant difference in opinion between the two interviews.

Table 2. Results of consultation with experts to select indicators to evaluate the effectiveness of online teaching and learning of PE (by the Wilcoxon method of 2 interviews)

	Indicators	First time (n=20)		Second time (n=20)		Test Statistics[a]	
		∑ marks	%	∑ marks	%	Z	Asymp. Sig. (2-tailed)
1	Ind 1_Students have good opportunities to access learning-supporting technology applications	52	86.7	49	81.7	-1.732[b]	0.083
2	Ind 2_Students are more active when participating in learning activities and absorbing lectures	30	50	26	43.3	-1.633[b]	0.102
3	Ind 3_Learners get used to a new way of interacting when learning PE online	54	90	52	86.7	-1.414[b]	0.157
4	Ind 4_Students can meet their needs for movement and communication	26	43.3	29	48.3	-1.342[c]	0.180
5	Ind 5_Students are enhanced with self-study	58	96.7	56	93.3	-1.414[b]	0.157
6	Ind 6_Students have a fresh and clear spirit, support to study well in other subjects	27	45	27	45	0.000[d]	1.000
7	Ind 7_Students protecting their own health, avoiding disease but still can grasp subject knowledge	52	86.7	49	81.7	-1.732[b]	0.083
8	Ind 8_Learners satisfy their passion for sports training and competition	28	46.7	28	46.7	0.000[d]	1.000
9	Ind 9_Students have a harmonious and balanced development body	27	45	29	48.3	-0.816[c]	0.414
10	Ind 10_Student's satisfaction in online classes	53	88.3	54	90	-0.447[c]	0.655

(a. L2 < L1, b. L2 > L1, c. L2 = L1)

The number of votes sent and received in the first and second interviews was 20. The specific results are presented in Table 1, showing that 5/10 indicators show ≥80% of the votes in favor. Parallel conducting the Wilcoxon rank test (Wilcoxon signed rank test) recorded that all 10/10 selected interview indicators have Sig>0.05. Thereby, it proves that there is no statistically significant difference in opinion between the two interviews. Through the expert's opinion, the topic has selected 4 indicators that satisfy the conditions as the convention (re-coded) including: IndI_Students have a good opportunity to access learning support technologies; IndII_Students get used to new ways of interacting and learning new ways; IndIII_Students are enhanced with self-study; IndIV_Students protecting their own health, avoiding epidemics, but can still grasp subject

knowledge. Comparing the evaluation opinions between 2 subjects of 20 lecturers and 50 students through the mean value and t-student index.

The research results in Table 3 show that the indicators to evaluate the effectiveness of teaching and learning PE online are chosen quite high by both lecturers and students. Through the t-student test, it is found that: The mean corresponding between lecturers and students ranges from 2.54 to 2.96 (equivalent to close to the priority interval 1 when selecting). The P-values (Sig. 2-tailed) in the range (0.427~0.939) are >0.05, which reflects the difference in mean value of the corresponding matching indicators between lecturers and students that there is no significant difference. Thereby, there are consistency and similarity between lecturers and students when choosing indicators to evaluate the

effectiveness of teaching and learning online PE at HCMUTE.

Thus, from the 13 initial indicators, through the steps of trimming, selecting, surveying the opinions of PE experts, comparing lecturers and students participating in online learning of PE, the topic has selected 5 indicators that satisfy the convened criterion. Summarizing the selected lecturers' opinions (PE experts) and students is the basis to ensure that the topic continues to proceed to the next steps.

The results of testing the reliability of the observed variables according to the indicators to evaluate the effectiveness of online teaching and learning of PE by Cronbach's Alpha coefficient are presented in Table 4, showing that: Cronbach's alpha coefficients of the indicators are >0.6; the correlation coefficients of the total variables of the observed variables in the scale are >0.3. Observable variables that meet the conditions will be accepted and used in the next EFA analysis.

Table 3. Comparing the evaluations of lecturers and students on selected indicators to evaluate the effectiveness of teaching and learning online PE

	Indicators	Objects	N	Levene's Test for Equality of Variances		Mean ($\bar{x}$)	Std. Deviation (±SD)	t	Sig. (2-tailed)
				F	Sig.				
1	Ind I_Students have good opportunities to access learning-supporting technology applications	Lecturer	20	0.431	0.514	2.60	0.503	0.301	0.765
		Student	50			2.56	0.501		
2	Ind II_Learners get used to a new way of interacting when learning PE online	Lecturer	20	0.105	0.747	2.70	0.470	-0.162	0.872
		Student	50			2.72	0.454		
3	Ind III_Students are enhanced with self-study	Lecturer	20	3.725	0.058	2.90	0.308	-0.808	0.427
		Student	50			2.96	0.198		
4	Ind IV_Students protecting their own health, avoiding disease but still can grasp subject knowledge	Lecturer	20	1.010	0.318	2.60	0.503	0.451	0.655
		Student	50			2.54	0.503		

Table 4. Cronbach's Alpha reliability statistics of indicators in online teaching and learning PE at HCMUTE

No.	Observable variable	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Indicator I: Technology applications that support learning (App), Alpha = 0.792					
1	App1	12.41	3.586	0.701	0.693
2	App2	12.40	3.409	0.734	0.672
3	App3	12.43	3.814	0.528	0.778
4	App4	12.45	4.002	0.467	0.807
Indicator II: New way of interacting when learning PE online (Int), Alpha = 0.782					
1	Int1	16.61	5.206	0.627	0.717
2	Int2	16.66	5.183	0.639	0.713
3	Int3	16.81	5.800	0.385	0.800
4	Int4	16.54	5.477	0.624	0.722
5	Int5	16.71	5.464	0.537	0.748
Indicator III: Improving self-study (Sst), Alpha = 0.997					
1	Sst1	15.61	10.334	0.993	0.995
2	Sst2	15.62	10.322	0.986	0.997
3	Sst3	15.61	10.335	0.992	0.996
4	Sst4	15.62	10.311	0.986	0.996
5	Sst5	15.61	10.324	0.993	0.996
Indicator IV: Protecting your health, avoiding disease (Pro), Alpha = 0.996					
1	Pro1	9.34	14.981	0.995	0.994
2	Pro2	9.33	14.959	0.993	0.994
3	Pro4	9.35	14.971	0.989	0.995
4	Pro5	9.33	14.887	0.983	0.997

The research scale in the topic has 18 independent observed variables after checking the reliability of the Cronbach Alpha method (there are 2 excluded variables, App5 and Sst3). To confirm the appropriateness of the scale with these 18 observed variables, the study continues to use the exploratory factor analysis method EFA, KMO index (Kaiser - Meyer - Olkin), and Barlett's. The criterion to evaluate the significance level of EFA is the factor loading coefficient (Factor loading). If this factor loading factor is >0.3, it is considered to have reached the minimum level; having a value =0.4 is considered important; and values >0.5 are considered to be of practical significance. Therefore, in this study, the factor loading coefficient is selected in the exploratory factor analysis if the observed variables satisfy the condition of coefficient >0.5 (13).

Comparing this threshold with the results in the rotation matrix, there is one bad variable, Int5 that needs to be considered and eliminated; Since the variable Int5 uploaded in both factors is Component 1 and Component 3 with a load factor of 0.324 and 0.629, respectively, the difference in load factor is 0.629 - 0.324=0.305<0.5. Conduct the second EFA analysis (remove Int5), with the remaining 17 observed variables, the results are presented in Table 5 and Table 6. The results of the second KMO test (Table 5) show that the KMO coefficient =0.818 satisfies the condition 0.5<KMO<1 and the value Sig.=0.000 (<0.05). Thereby, it can be concluded that the exploratory factor is appropriate to the survey data and 17 observed variables are linearly correlated with the representative factor. Table 4 presents a summary of the explained total variance. The results show that the extracted variance value is 81.21% with a stop of the Eigenvalues factor of 1.436. This indicates that up to 81.21% of the variation of the factors is explained by the observed variables and 17 observed variables are grouped into 4 factors.

Table 5. Total variance explained in the EFA analysis (2nd time)

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.375	43.384	43.384	7.375	43.384	43.384	4.812	28.308	28.308
2	2.831	16.655	60.039	2.831	16.655	60.039	4.028	23.692	51.999
3	2.163	12.722	72.760	2.163	12.722	72.760	2.563	15.074	67.074
4	1.436	8.450	81.210	1.436	8.450	81.210	2.403	14.136	81.210
5	0.765	4.502	85.712						
6	0.700	4.118	89.830						
7	0.592	3.485	93.315						
8	0.475	2.794	96.109						
9	0.400	2.352	98.461						
10	0.156	0.917	99.378						
11	0.050	0.293	99.671						
12	0.026	0.153	99.824						
13	0.013	0.075	99.900						
14	0.007	0.040	99.940						
15	0.007	0.039	99.979						
16	0.003	0.016	99.995						
17	0.001	0.005	100.000						

Extraction Method: Principal Component Analysis.

The result of the factor rotation matrix (2nd EFA - Rotated Component Matrix) shows the maximum value of the factor loading coefficient for each observed variable. The characteristic variables all have a factor loading >0.5 and are classified into 4 factors that represent the factors that evaluate the effectiveness of online teaching of PE. The characteristic variables of the rearranged factor are different from the original theoretical model. After factor analysis, factors with changes in the number of observed variables are rearranged as shown in Table 5.

Thus, according to the research results presented in Table 7, the scales to evaluate the effectiveness of online teaching of PE at HCMUTE officially include 4 groups of indicators (factors): [1] Sle - Self-learning consciousness - there are 5 variables; [2] Pro - Protecting your health, avoiding disease but still be able to grasp subject knowledge - there are 4 variables; [3] App

- Technology applications to support online learning - there are 4 variables; [4] Int - Interaction when learning PE online - there are 4 variables.

The "Self-study awareness" indicator is highly appreciated by students, overall average value =3.90 (agreement). The indicators related to the indicator "Protecting their health and avoiding disease" were rated as Normal by the students, overall mean =3.11. The indicator "Technology applications to support online learning of PE" is highly appreciated by students when it has an overall mean of 4.14 (within the Totally Agree range); Overall assessment (shown in Figure 1) found that the average value of the indicators is quite high, in the range of 3.11~4.17. The overall mean is 3.8 (within the Agree range). Therefore, it can be affirmed that the online teaching of PE at HCMUTE has shown its practical effectiveness.

Table 6. Factor Rotation Matrix (2nd time)

Rotated Component Matrix

|	Component			
	1	2	3	4
Sst5_Can self-study, search and collect materials according to subject requirements	0.951			
Sst1_Mastering your own study plan	0.951			
Sst3_Actively acquire knowledge during class time	0.949			
Sst2_Spontaneously preview the course material	0.943			
Sst4_Self-help complete the exercises on time	0.942			
Pro2_Good physical condition, not affected by disease		0.968		
Pro1 Safe learning environment, ensuring good acquisition of subject knowledge		0.967		
Pro4 Ensure normal diet, sleep, and study activities during the epidemic situation		0.963		
Pro5 No need to spend time traveling to check the status of infection and disease		0.961		
App2_Google Meet			0.910	
App1_Zoom			0.892	
App3_Microsoft Teams			0.632	
App4_Social Network			0.587	
Int1_Interaction between students and lecturers during online lessons				0.766
Int4_Interaction between students and lecturer outside of online classes (via mail, Zalo, Facebook ...)				0.763
Int2_Interaction between students and students during online lessons				0.760
Int3_General interaction between class members during online lessons				0.591

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

Table 7. Summary of indicators corresponding to observed variables after indicators analysis

	Indicators	Variables
1	Sle	Sle1, Sle2, Sle3, Sle4, Sle5
2	Pro	Pro1, Pro2, Pro4, Pro5
3	App	App1, App2, App3, App4
4	Int_	Int1, Int2, Int3, Int4

Sle: Self-learning, Pro: Protecting your health, App: Technology applications to support online learning, Int: The New interactive way of learning online PE
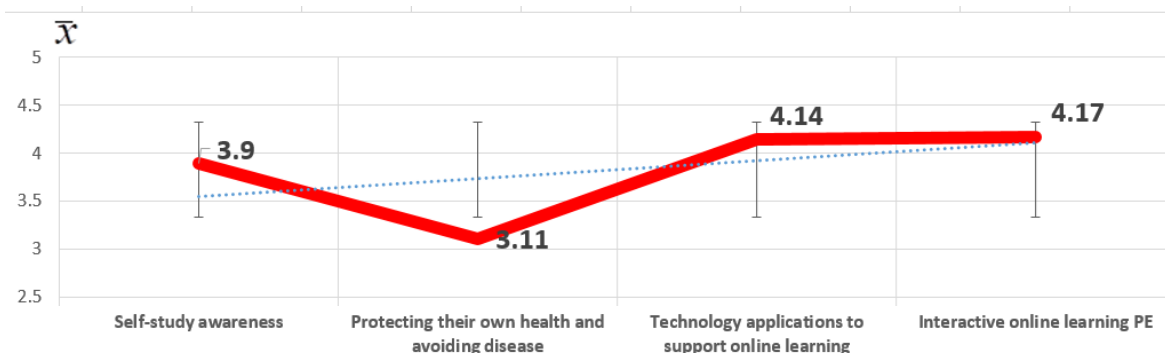
Figure 1. The average value of indicators.

DISCUSSION

The research results show that the self-study indicator is the highest rated by students after learning PE online, especially of the observed variables such as "Mastering your learning plan" and "Actively acquiring knowledge during class time" (mean =3.91). Thus, it can be seen that, whether studying face-to-face or online, studying anywhere, any subject needs students' self-study consciousness. This is also the regular and continuous duty of teachers and families to learners. During the COVID-19 pandemic period or the multimedia era of the digital network, PE can also make use of the media resources of the Internet to enrich its course content as other subjects, and at the same time achieve the same teaching quality as the offline course [14].

Through the study, it was found that the observed variables most appreciated by students were "Good physical condition, not affected by disease" and "Do not have to spend time traveling to check the status of infection and disease" (mean =3.12). Next is the variable "Safe learning environment, ensuring good acquisition of subject knowledge" (mean =3.11). Distance learning of PE has become a special challenge for those who teach this subject, as they bear part of the responsibility to achieve the recommended daily amount of physical activity of individuals, which is extremely important for maintaining health and strengthening the immune system and consequently combating COVID-19 disease effectively [15]. Limiting the rapid spread of the COVID-19 is a priority program because it relates to public health. The greatest concerns during online PE teaching were identified in terms of pupils' safety, intellectual property of resources, and quality of curriculum delivery [16].

Indeed, e-learning applications are becoming more and more popular during the COVID-19 pandemic, and they have a great impact on the entire economy, education and other aspects of society. Their convenience has made it easy for teachers and learners to access knowledge without having to go to school to study, thereby saving a lot of time and costs. Disasters and pandemics such as COVID-19 can create a lot of chaos and tensions; therefore, there is an important need to study the technology deeply and with due diligence to balance these fears and tensions amidst such crises [17]. Aside from the effective technology integration, students can easily access the learning materials which they can go over again as well, and they have more time in doing physical activities [18].

For students to pay attention to the lesson and actively participate in interactions, lecturers need to innovate teaching methods and apply technology proficiency in teaching. For students, the effective means of mental influence and interactive communication were invitations to participate in online fitness groups, performing exercises in these groups, moderate advertising of fitness clubs and swimming pools, and notification of sports competitions [19]. In addition, the interaction of students with students, students with lecturers, technology, and course content are factors that affect online learning outcomes [20]. Student satisfaction depends on the interaction of students with students and students with teachers [21].

CONCLUSION

From the 13 initial indicators, through the steps of trimming, selecting, surveying the opinions of PE experts, and comparing lecturers and students participating in teaching and learning online PE, the research has selected 4 indicators to evaluate the effectiveness of online PE teaching at HCMUTE. These include: Ind1_Students have good opportunities to access learning-supporting technology applications; Ind2_Learners get used to a new way of interacting when learning PE online; Ind3_Students are enhanced with self-study; Ind4_Students protecting their health, avoiding epidemics, but can still grasp subject knowledge.

Thereby, the majority of students have a consensus to express their satisfaction when evaluating the effectiveness of all aspects when learning PE online. Which, interactive activities and technology applications play an important role when implementing online learning of PE. However, objectively, some indicators are not highly appreciated by learners ("Protecting health, avoiding epidemics"). These are the limitations that lecturers need to seriously note to overcome and improve when organizing online teaching of this subject.

APPLICABLE REMARKS

- HCMUTE needs to consider the barriers in teaching and learning PE online to promptly adjust the shortcomings in physical education activities at the University as surveyed.

- It is important to note the indicators selected by the topic to evaluate the effectiveness of teaching and learning PE online, thereby making adjustments and additional changes to make this activity more and more effective and comprehensive, contributing to the general education and training mission of the University.
- HCMUTE needs to recognize and promote the effectiveness of teaching and learning PE online, continue to apply, and be ready to respond proactively to teaching PE online when there is an epidemic.

AUTHORS' CONTRIBUTIONS

Study concept and design: Thanh Nguyen Duc, Thang Nguyen Manh. Acquisition of data: Thanh Nguyen Duc, Thang Nguyen Manh. Analysis and interpretation of data: Thanh Nguyen Duc. Drafting the manuscript: Thanh Nguyen Duc. Critical revision of the manuscript for important intellectual content: Thanh Nguyen Duc, Thang Nguyen Manh. Statistical analysis: Thanh Nguyen Duc. Administrative, technical, and material support: Thanh Nguyen Duc, Thang Nguyen Manh. Study supervision: Thanh Nguyen Duc.

CONFLICT OF INTEREST

The authors declare that no conflicts of interest could be perceived as interfering with the publication of this study.

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