Factors Affecting Students' Satisfaction in Blended Learning Courses: A Case Study in Thai Nguyen University

NGUYEN THI HONG MINH[1], NGO THI BICH NGOC[1], NGUYEN THI HONG CHUYEN[1],
LE THI THU HUONG[1]
[1]Thai Nguyen University of Education,
Luong Ngoc Quyen Street, Thai Nguyen,
VIETNAM

Abstract: - Blended learning has become an inevitable trend in universities in recent years. This reflects the innovation in teaching and studying methods amid the accelerating digitalisation and the fourth industrial revolution, especially after three years of the COVID-19 pandemic. This study showed that the student's awareness of the ease of use of blended learning had a positive influence on their motivation and engagement, which affected their satisfaction with blended learning courses. These results acted as useful references for universities in general, and Thai Nguyen University in particular, to proactively adjust and implement more practical solutions to assist their students with better study results, and to help their lecturers find specific measures to provoke the students' proactiveness, enthusiasm and creativity.

1 Introduction

Technology now plays a key role in all aspects of life. In education, technological advancements in teaching and learning have been applied more widely, especially during the COVID-19 pandemic. Technologies have formed a new trend in education, which is "stop schooling but not stop studying". In addition, this is also the main factor promoting changes in teaching and learning methods in the fourth industrial revolution. According to, [1], blended learning is a combination of in-class study and online study to make the best of both methods. A blended learning environment is the "blending" of various learning methods including offline and online learning, [2].

Blended learning activities can possibly bring about several benefits such as flexible study, geographical distance bridging, self-autonomy improvement and students' effective learning, [3]. However, in blended learning courses, it is vital to pay attention to various key determinants of the students' satisfaction as this is among the factors taken into consideration in assessing the effectiveness of the courses. Moreover, clearly understanding these determinants also has a direct impact on blended learning quality improvement and the relation between them and the student's satisfaction, which partly maximises the effectiveness of blended learning courses.

This study surveyed the students at Thai Nguyen University to explore the relationship between the effectiveness, ease of use students' motivation, and satisfaction with blended learning courses.

2 Research Findings

2.1 Theoretical Background and Framework

2.1.1 Blended Learning

In this research, blended learning refers to any official course in which learners partly or fully work with online contents or guidelines under certain control of time, place and remote monitoring, [4]. Numerous lecturers have recently adopted different technology-integrated teaching models with online content and online study modes under their control of students in time, speed, methods of study or place. As a result, it was important to clearly distinguish between blended learning and technology-assisted learning, and between blended learning and other conventional learning and teaching methods, [5].

Blended learning is considered a promising land for teaching and learning at the university level as it promotes the achievements, of course, learning outcomes by skilfully adopting information technological applications to maximise the effectiveness of learning and delivery of knowledge

and skills to the right learners at the right time and in the right place, [6]. In addition, the share of teaching and learning is various, and only courses with 30-50% of online content delivered via online platforms are regarded as blended learning, [7].

2.1.2 Theoretical Framework

To have successful blended learning courses, there are a wide range of factors affecting their quality. According to, [8], theories related to TAM (Technology Acceptance Model), especially those involving perceived usefulness, perceived ease of use, perception of engagement and learners' satisfaction, have great impacts on the success of these courses.
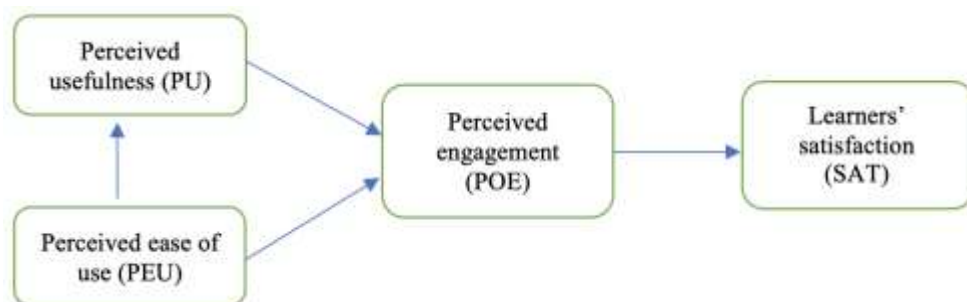

Fig. 1: Recommended research model

In this particular research, perceived usefulness and perceived ease of use are initial testing tools for students' satisfaction towards the courses. Perceived usefulness can easily be observed and considered one of the biggest factors in TAM. It refers to the level at which one can use technologies to improve performance. Besides, perceived ease of use refers to the level at which one is aware of how easy it is to use a blended learning system. In this model, perceived ease of use affects the perceived usefulness of a blended learning course.

- Perceived usefulness (PU): According to, [9], PU reflects the belief that using technologies in teaching likely leads to more effective teaching than other methods.

- Perceived ease of use (PEU): PEU illustrates the convenience of using technologies in teaching without any user difficulty, [10]. Therefore, the PEU of blended learning courses possibly affects learners' engagement in learning.

- Perception of engagement (POE): POE reflects learners' positive attitudes when attending and focusing on study activities, [11].

- Learners' satisfaction (SAT) refers to learners' short-term attitudes taken into consideration to assess educational experiences, services and facilities, [12]. This shows how satisfied they are with various aspects of the courses.

In this research model, the independent variable was Perceived engagement (POE). It included two factors: Perceived usefulness (PU) and Perceived ease of use (PEU). The dependent one was Learners' satisfaction (SAT). The identification of such variables contributed to the survey in the later stages.

In this research, the author recommended and tested the following hypotheses:

Hypothesis 1 (H1): Perceived ease of use affects the usefulness of a course, which aims to test the correlation between the Perceived ease of use and Perceived usefulness;

Hypothesis 2 (H2): Perceived ease of use has a positive impact on learners' engagement in the study; this is intended to test the correlation between Perceived ease of use and students' satisfaction;

Hypothesis 3 (H3): Perceived usefulness has positive impacts on learners' engagement in the study; this aims to test the correlation between the Perceived usefulness and Perception of engagement;

Hypothesis 4 (H4): Perception of engagement has a positive impact on learners' satisfaction with a blended learning course; this is intended to test the correlation between students' engagement in study and their satisfaction in blended learning classes. The details of factors in the model are presented in Table 1 (Appendix).

2.2 Research Data and Methodology

2.2.1 Research Data

In this research, the author surveyed students of Thai Nguyen University from January 2021 to December 2022 with random sampling as the main sampling method. To get the necessary data, a questionnaire is selected as the major data-collecting tool. The questionnaire was designed based on a four-factor framework and included five-level Likert-scale items. There were 700 questionnaires administered to the students during one lesson, and 473 valid ones gathered at the end of the lesson (accounting for 67.5%). The data collected from the questionnaires were then analysed for findings and conclusions.

2.2.2 Research Methods

- Qualitative method: The qualitative research method implemented was an in-depth interview with experts including 05 lecturers teaching blended learning courses with at least one year of experience, 02 educational administrators and 10 students participating in at least one blended learning course.

- Quantitative method:

+ Questionnaire design: The author designed a questionnaire to get data as required in the research model and analyse quantitatively using measurements.

+ Observed variables: These were formed to measure the research concepts with five-level Likert-scale items: 1 –disagree, 2 – disagree, 3 – neutral, 4 – agree, and 5 –agree.

2.2.3 Data Analysis

The data analysis methods were as follows.

- Measurement reliability testing: Cronbach's Alpha was used to test the reliability of the variables in the research model. Those that cannot meet the required level of reliability were excluded and not analysed. To be more specific, the variables with the corrected item-total correlation lower than 0.3 and Cronbach's Alpha lower than 0.6 were considered unreliable, [13].

- Exploratory factor analysis (EFA): According to, [13], EFA is appropriate when its KMO is at least 0.5; the Factor loading of at least 0.5 indicates the close correlation between the variables and factors; and the observed variables with factor loading of less than 0.5 are eliminated.

- Confirmatory factor analysis (CFA): In CFA, the first test aimed to identify how a model fits to the market data. According to, [14], a model is considered fit to the market data when it has good indices consisting of CMIN/df not higher than 2, or 3 in some cases, the Goodness of Fit Index (GFI), Tuker-Lewis index and Comparative Fit Index (CFI) not lower than

0.9, and RMSEA not higher than 0.05. According to, [15], it was claimed that if GFI is lower than 0.9, the model is considered to not fit with the market data. With TLI, CFI $\geq$ 0.9, CMIN/df $\leq$ 2, and RMSEA $\leq$ 0.08, the model fits with the market data, [16]. Moreover, the convergent value of the model was also tested and the concepts in the research model were classified.

- Structural equation model (SEM): SEM was used to test the research model. If a model has such indices as CMIN/df not higher than 2, or 3 in some cases, GFI, TLI and CFI not lower than 0.9 and RMSEA not higher than 0.05, it is considered of good quality and to fit with the market data, [14]. Besides, a model with TLI and CFI $\geq$ 0,9, CMIN/df $\leq$ 2, and RMSEA $\leq$ 0,08 are regarded to fit (or to be compatible) with the market data, [16].

2.3 Research Findings

2.3.1. Reliability Test of the Measurements

It was shown that Cronbach's Alpha of all factors were higher than 0.6, which indicated that they met the standards. PEU1 and PEU2 had the corrected item-total correlation of 0.212 and 0.031 respectively, which were less than 0.3. Therefore, they were excluded from the variables in the factor of perceived ease of use, and the other variables in this factor needed retesting.

Table 2 (Appendix) illustrated that the Chronbach's Alpha of PEU factor was 0.828, higher than 0.6, and all variables had a corrected item-total correlation higher than 0.3. This marked the end of the initial step of reliability testing. As a result, 23 observed variables were reduced to 21 with PEU1 and PEU2 excluded. All of these 21 variables in the four-factor groups in the official research model entered the next step of EFA.

2.3.2 Explanatory Factor Analysis

In this research, EFA was used to narrow down the observed variables to find out those that best reflected the influence of the factors if possible. The EFA results were as follows.

As displayed in Table 3 (Appendix), the KMO was 0.854, which was higher than 0.5 and the Sig. value of the Barlett test was 0.000, lower than 0.05, which meant all 21 observed variables were correlated and appropriate for fact analysis.

In terms of Rotated component matrix, the author used Promax produce to minimise the number of observed variables in one factor. This also aimed to exclude any variable with a factor loading less than 0.5 as only those with a factor loading of 0.5 or more were valid for explaining a factor. In other words, after the use of the rotated component matrix, the variables left

were those with a factor loading not less than 0.5 which were arranged into the major groups. The EFA results for factor measurement are presented in Table 4 (Appendix).

It was illustrated that there were four-factor groups that were able to explain 61.88% of data fluctuations. After rotating, the author saw that the factor groups were clearly distinguished and all 21 observed variables in the four groups met the requirements for further analysis.

2.3.3 Confirmatory Factor Analysis

After implementing Cronbach's Alpha test for reliability of the measurements and EFA, the author carried out CFA via AMOS to test the appropriateness of the measurements in the research model based on such criteria as the level of fit with the market data, unidimensionality, reliability of the measurements, convergent value and discriminant validity.

CFA was carried out for 21 observed variables and the four-factor groups from EFA which formed a measurement model of all concepts to evaluate the appropriateness of the model for the research data.

2.3.4 Factor Correlation Test in the Research Model

The results of the factor correlation test in the research model are shown in Figure 1.

Figure 1 shows that the model had a GFI of 0.950, higher than 0.8, indicating the model was a good fit for the market data. The Chi-square/df was 1.424 (lower than 2), TLI was 0.977 (higher than 0.9) CFI was 0.980 (higher than 0.9), and RMSEA was 0.030 (lower than 0.08), which all proved that the model was compatible with the market data. After testing and identifying the appropriateness of the model, the author evaluated the SEM analysis results.

SEM analysis results showed that Perceived ease of use (PEU) had influences on Perceived usefulness (PU), PU had impacts on Perception of engagement (POE), and POE affected learners' satisfaction as their P values were all below 0.05. However, there was no relation between PEU and POE.

In more detail, PU had positive impacts on the POE of a blended learning course with the estimated regression coefficient of 0.169, the standardized one of 0.134 and P of 0.013 (relatively 5%). Besides, PU positively influenced PEO in a blended learning course with an estimated regression coefficient of 0.109, a standardized one of 0.129 and a P of 0.019 (relatively 5%). In addition, POE had positive impacts on learners' satisfaction in a blended learning course with the estimated regression coefficient of 0.157, the standardized one of 0.150 and P of 0.005 (relatively 1%). The figures in Table 5 (Appendix) (SE, CR, P and Standardized regression coefficient) all satisfied the standards of qualitative analysis and are consistent with other relevant indices, [3]. Lastly, the Structural equation model (SEM) analysis results are presented in Figure 2.
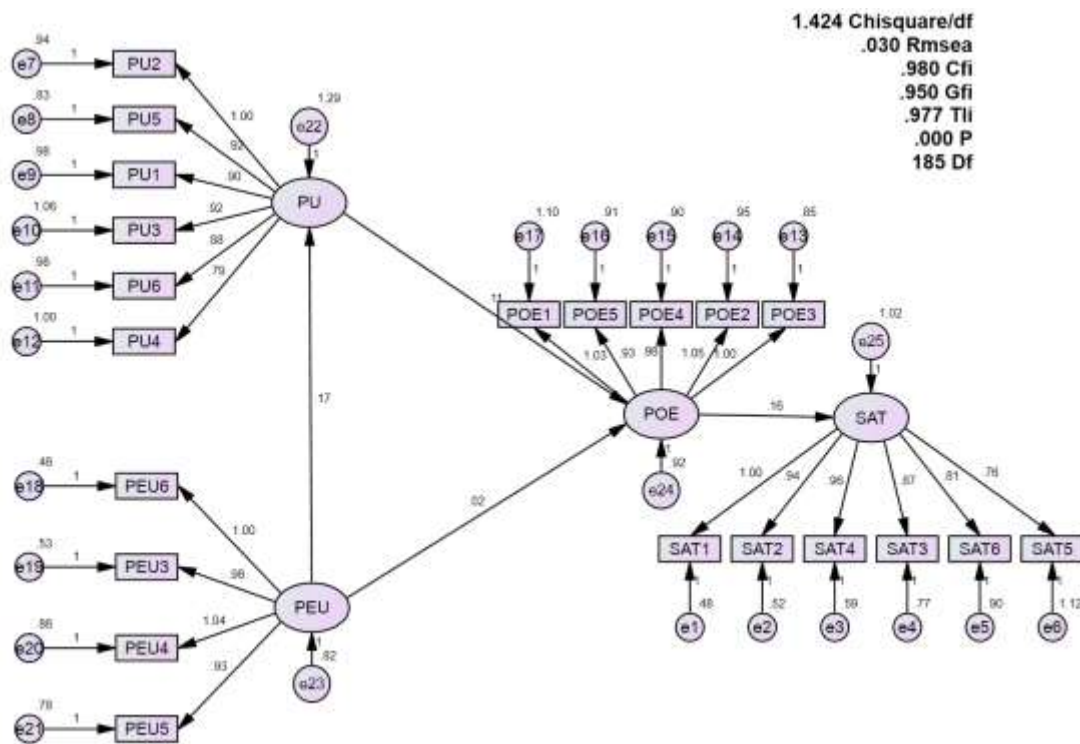

Fig. 2: Structural equation model (SEM) analysis results

2.3.5 Hypothesis Testing
The author tested four recommended hypotheses based on four regression coefficients β1, β2, β3 and β4, which were equivalent to four hypotheses H1, H2, H3 and H4. The coefficients were tested with hypotheses (Ho: $\beta_i = 0$; H1: $\beta_i \neq 0$) and generated the following results. The Hypothesis testing results are presented in Table 6 (Appendix).

3 Conclusion
This research provided statistical evidence of the relations among factors including perceived usefulness, perceived ease of use and perception of engagement related to students' satisfaction in blended learning courses. Analysing the collected data, the author found out that the success of a blended learning course is closely related to learners' satisfaction. To be more specific, the ease of use affects the usefulness of a blended learning course which positively influences the learners' engagement in learning. The usefulness also has an impact on the learners' positive attitudes toward learning, leading to their satisfaction with the blended learning course. In general, to improve the students' satisfaction with blended learning courses, Thai Nguyen University needs to pay more attention to the factors affecting its students' satisfaction. In addition, to better engage the students, the lecturers should have proper teaching strategies so that their students can reach their study goals and maintain their progress.

The research findings also indicate that the Perceived ease of use is proportional to the Perceived usefulness of the course, and positively influences students' engagement in the course. POE has a positive impact on students' satisfaction in blended learning courses. This shows that the lecturers working at Thai Nguyen University of Education need to innovate their interaction with students to create their motivation in study, design and adopt blended learning so that the courses are easy to use, study and research for the students. In such a way, the students' study results in blended learning are likely to be improved.

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Appendix

Table 1. Details of factors in the model

Factors	Abbreviations	Detailed description
Satisfaction	SAT1	Study contents are presented
	SAT2	I like the use of technology in lectures
	SAT3	I actively do study activities
	SAT4	I can comfortably interact with my lecturers
	SAT5	I feel confident expressing my points of view
	SAT6	I can access different material resources
Perceived usefulness	PU1	Study activities are enriched in blended learning
	PU2	Blended learning is useful in new knowledge acquisition
	PU3	Blended learning facilitates the study process
	PU4	Blended learning helps meet learners' needs to research information
	PU5	Blended learning helps me study better
	PU6	Blended learning is more useful than conventional classes
Perceived ease of use	PEU1	Students have no difficulty in participating in blended learning classes
	PEU2	It does not take much time for students to understand how to use blended learning methods
	PEU3	Students find it easy to understand and follow blended learning activities
	PEU4	Students see that the system is user-friendly
	PEU5	Students see that they can learn faster when attending blended learning courses
	PEU6	Students have no difficulty in attending blended learning
Perception of engagement	POE1	Students like using the blended learning system
	POE2	Students are satisfied with the use of a blended learning system
	POE3	Students can see that there are a lot of interesting activities in blended learning
	POE4	Students are interested in subjects applying the blended learning model
	POE5	Students like sharing knowledge and materials in groups via blended learning platform

Table 2. Reliability of "Perceived ease of use" factor after excluding PEU1, PEU2

Measured variables	This means after the variable excluded	Variance after the variable excluded	Corrected item-total correlation	Alpha after variables excluded
Cronbach's Alpha (PEU) = 0.828				
PEU3	9.6131	9.318	.680	.773
PEU4	9.1036	8.691	.637	.794
PEU5	9.5011	9.335	.614	.801
PEU6	9.6596	9.293	.697	.766

Source: Author's analysis

Table 3. KMO test

KMO test		0.854
Bartlett test	Chi-square	4088.827
	Df	210
	Sig. value	.000

Source: Author's analysis

Table 4. EFA results for factor measurement

	Factors			
	1	**2**	**3**	**4**
SAT1	.817			
SAT2	.785			
SAT4	.771			
SAT3	.714			
SAT6	.685			
SAT5	.605			
PU5		.769		
PU2		.764		
PU3		.720		
PU6		.720		
PU1		.713		
PU4		.657		
POE3			.728	
POE2			.720	
POE4			.703	
POE5			.693	
POE1			.693	
PEU6				.795
PEU3				.778
PEU4				.716
PEU5				.679
Extraction Method: Principal Axis Factoring.				
Rotation Method: Promax with Kaiser Normalization.				
a. Rotation converged in 5 iterations.				

Source: Author's analysis

Table 5. Structural equation model (SEM) analysis results

Correlation factors		among	Estimated coefficient	regression	S.E.	C.R	P	Standardized regression coefficient
PU	<---	PEU	.169		.068	2.480	.013	.134
POE	<---	PEU	.015		.059	.261	.794	.014
POE	<---	PU	.109		.046	2.347	.019	.129
SAT	<---	POE	.157		.057	2.784	.005	.150

Source: Author's analysis

Table 6. Hypothesis testing results

Hypotheses	Description	Testing results
H1	Perceived ease of use influences Perceived usefulness of course	Hypothesis confirmed
H2	Perceived ease of use positively affects the Perception of engagement in learning	Hypothesis confirmed
H3	Perceived usefulness positively affects the Perception of engagement in learning	Hypothesis confirmed
H4	Perception of engagement positively affects learners' satisfaction in a blended learning course	Hypothesis confirmed

Conflict of Interest
The authors have no conflict of interest to declare.