



Fostering Students' Attitude Towards Online Learning: the Mediation Effect of Satisfaction and Perceived Performance

Abdul Hafaz Ngah, Rosyati Abdul Rashid, Nur Asma Ariffin,
Fauzayani Ibrahim, Noor Azuan Abu Osman,
Nurul Izni Kamalrulzaman, Mohamad Firdaus Halimi Mohamad
and Nor Omaila Harun

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Fostering students' attitude towards Online learning: The mediation effect of satisfaction and perceived performance.

Abdul Hafaz Ngah¹, Rosyati Abdul Rashid², Nur Asma Ariffin^{3,4}, Fauzayani Ibrahim⁴, Noor Azuan Abu Osman⁵, Nurul Izni Kamalrulzaman⁴, Mohamad Firdaus Halimi Mohamad¹, Nor Omaima Harun^{6,7*}

¹Faculty of Business, Economics & Social Development, Universiti Malaysia Terengganu, Malaysia

²Centre for Foundation & Continuing Education, Universiti Malaysia Terengganu, Malaysia

³Faculty of Fisheries and Food Science, Universiti Malaysia Terengganu, Malaysia

⁴Centre for Academic Management & Quality, Universiti Malaysia Terengganu, Malaysia

⁵Faculty of Engineering, University of Malaya, Kuala Lumpur, Malaysia

⁶Faculty of Science & Marine Environment, Universiti Malaysia Terengganu, Malaysia

⁷Data & Digital Development Centre, Universiti Malaysia Terengganu, Malaysia

***Corresponding author**

omaima@umt.edu.my

Abstract. The COVID-19 pandemic outbreak has caused Malaysian education institutions to embrace online learning due to the Movement Control Order (MCO) and closure of universities. By adopting the Stimulus-Organism-Response (S-O-R) theory, this study aims to identify the factors influencing students' attitudes to continue online learning. Since attitude can influence behaviours, the lecturers must stimulate a positive attitude among students during the online learning sessions. The study also looked into the potential of student satisfaction and performance as a mediating variable. A purposive sampling method was employed in the study, and 1349 data were gathered using an online survey. The data were analysed using a structural equation modelling with Smart Partial Least Squares. The results indicate that perceived ease to use positively affected satisfaction and performance; satisfaction and performance were found to have a positive relationship with attitude. Satisfaction and performance explain 69.8% of the variance of attitude. Data analysis also revealed that performance and satisfaction mediated the relationship between perceived ease to use and attitude. These findings suggest that the university's top management must foster a positive attitude among students to continue to use online learning to prevent COVID-19 from spreading on campus. The present study limited the variables studied to ease of use, satisfaction, and performance of science students at Universiti Malaysia Terengganu. Additionally, the present study significantly contributes to the body of knowledge about student's attitudes in online learning amidst the Covid-19 pandemic. From a practical perspective, it is crucial for the top management of higher institutions in Malaysia and around the globe to provide online learning systems and platforms which are easy to use.

Keywords: Online learning during COVID-19, Stimulus-Organism-Response Theory, Attitude

1 Introduction

The COVID-19 pandemic has shaped the year 2020 by halting all service provision industries and economy; agriculture, manufacturing, and education. This pandemic caused severe economic and social disruption and has changed all human activities. The pandemic has led to the drastic loss of human life and presents an unprecedented challenge to public health, food systems, and the whole working world.

The biggest challenge posed by the COVID-19 pandemic for academic institutions, from lower to tertiary levels, is making sure the teaching and learning process can be resumed and replaced with online classes from the traditional physical classrooms. In response to the COVID-19 pandemic, even without proper physical and mental preparation for students and lecturers, many institutions immediately shifted all courses to being entirely online. Therefore, most education institutions are undertaking tremendous ongoing efforts to provide the necessary support to their faculties, instructors, and students. Several studies have suggested that online education and blended instruction can be as effective as traditional classroom models in focusing on learners' satisfaction with online instruction, particularly during the transition period from a traditional approach to an online learning approach [1].

Although e-learning and its various blended approaches have become a choice in this pandemic, re-designing a curriculum to meet the traditional components is not the best move. The literature confirms the role of attitude in predicting students' behaviour. Most of the studies on e-learning in the COVID-19 pandemic setting were concerned with performance [2], satisfaction [3], and continuance of online learning [4,5]. However, in this case, COVID-19 forces us to apply social distancing, hence continuing learning via online is not a choice, but compulsory for students all around the globe. Thus, all higher institutions started to enforce online learning even without proper information on students' readiness in terms of facilities and attitude. Nevertheless, learning must be via online. On top of that, the factors influencing attitude among students in this setting are still scarce in the available literature. Owing to the established literature, it was confirmed that attitude has a great influence on behaviours; it is crucial for the lecturers and higher institutions to identify what are the factors to stimulate a positive attitude among students during online learning sessions in the COVID-19 pandemic. Therefore, to fill the literature gaps, the present study aims to unearth factors that influence the students' attitude to continue learning online in this critical situation of the COVID-19 pandemic.

The study focuses on online learning during the COVID-19 pandemic and uses individual (student) as a unit of analysis. Besides revealing the factors that influence students' attitudes, the study also aims to discover the mediation effects of performance and satisfaction. The findings from this study will no doubt benefit lecturers in

designing their online learning sessions and the management of higher institutions to craft a better policy to escalate a positive attitude towards online learning among students who mostly miss being present physically on campus.

The following sections of this article discuss the literature review, research methodology, data analysis, and discussion and conclusion. The literature review section focuses on research framework development while the research methodology section explains the methodological approach for data collection. Additionally, the data analysis section explains the measurement and structural model analysis. The last section of the current study explains the findings of the study and the implications.

2 Literature Review

2.1 Stimulus-Organism-Response Theory

The theory of Stimulus-Organism-Response (S-O-R) was first introduced in 1974 by Mehrabian and Russell. This theory proposes that stimuli (S) from an individual's environment can elicit the cognitive and affective response (O), which leads to a behavioural response (R) [6]. The stimuli are the external elements of the physical atmosphere to a person, while the organism is referred to as a person's internal processes and structures occurring between stimuli and responses [7]. The theory is appropriate for the context of this study since it has been used in researching users' behaviour in online learning [8]. In the current study, the perceived ease of use represents stimuli since it comes from students' surrounding environment using the system. The stimuli can influence students' internal response, which is their satisfaction and performance; satisfied students who use the online learning system may display a positive behavioural response reflected by their positive attitude towards online learning. Figure 1 demonstrates the research framework of the study.

2.2 Attitude

Attitude is the degree to which a person has a favourable or unfavourable appraisal of the behaviour in question [9]. This notion indicates that attitude predicts an individual behavioural intention and actual behaviour. The present study posits that satisfaction and performance will influence students' attitudes. Besides being a construct commonly studied in marketing studies, attitude is also used in educational studies to determine consumer behaviour [10]. Education literature has recognized the relationship between attitude and satisfaction [11], and the relationship between attitude and performance [12]. However, studies on the relationship between satisfaction and attitude and performance and attitude are still scarce. The current study uses satisfaction and perceived performance to identify the students' attitudes toward online learning. It is important to study students' attitudes since attitude can influence the students' behaviour in an online learning setting. Maintaining a positive attitude could enhance online learning continuance.

2.3 Perceived Ease of Use (PEOU)

Perceived ease of use is the degree to which a person believes using a system would be free of effort [13]. Similarly, perceived ease of use refers to the perception of whether performing a particular task would require effort from the users' part [14]. Users might adapt quickly to the new technology if they perceive it to be easy [15]. In the current study, perceived ease of use is defined as the student's perception of the degree of effort required to conduct online learning sessions.

Past studies revealed that perceived ease of use positively influences satisfaction. A study on online learning by Al-Rahmi et al. [16] confirms the presence of such a relationship. On the effect of ease of use and performance, Davis and Wiedenbeck [17] found that ease of use has a positive relationship with computer usage performance. Moreover, the ease of using a system will influence higher usage, leading to better performance. Hence, the present study proposes the following hypotheses:

H1: There is a positive relationship between PEOU and satisfaction.

H2: There is a positive relationship between PEOU and performance.

2.4 Satisfaction

Satisfaction is the students' perception of the learning experience and learning environment and how they aid their academic success [18]. According to Efiloğlu Kurt [19], satisfaction is the degree to which the user believes the system meets their initial purpose. Having a successful interaction with the online learning system will lead to high satisfaction while failing to have a good interaction with the system will lead to dissatisfaction. In the context of this study, students' satisfaction with prior experience is argued to influence their attitude towards the learning system. A review of the existing literature reveals that satisfaction positively influences attitude in the internet usage context [20]. Therefore, the present study proposes the following hypothesis:

H3: There is a positive relationship between Satisfaction and attitude.

2.5 Performance

Students' performance is the learners' ability to complete tasks and respond to the learning environment [21]. Factors that may influence learning performance are students' ability, motivation, and desire for knowledge [22]. In the current study, it is argued that a positive performance of using an online learning system will develop a positive attitude towards the learning system. The literature shows that performance positively influences attitude in the financial service context [23]. Hence, the current study proposes the following hypothesis:

H4: There is a positive relationship between Performance and attitude.

2.6 Mediation

Mediation analysis enhances the model and theoretical advancement [24]. Therefore, this study aims to enhance the model's predictive power by adding satisfaction and performance as mediators for the relationship between perceived ease of use and attitude. Studies in the literature showed that perceived ease of use positively correlates with satisfaction and performance, and satisfaction and performance positively influence attitude. Besides that, past work revealed that perceived ease of use positively influences attitude in the education context [25]. Hence, this study theorized that satisfaction and performance are suitable for mediation.

H5: Satisfaction mediates the relationship between perceived ease of use and attitude.

H6: Performance mediates the relationship between perceived ease of use and attitude.

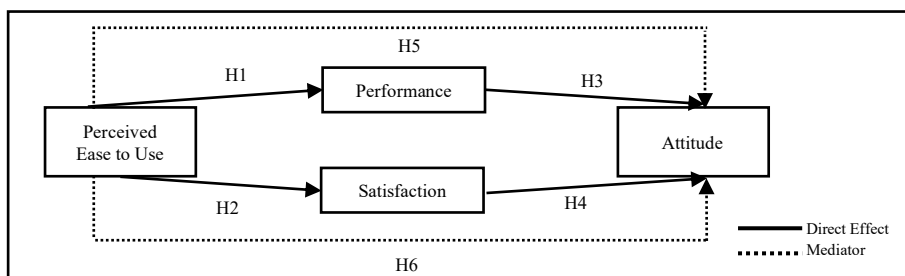


Figure. 1. Research Framework

3 Research Methodology

3.1 Instrument Development

The instrument for this study was developed based on latent constructs mentioned in the research model. All the construct items were adopted from previous studies. Items of perceived ease to use were adopted from Abdullah et al. [26], satisfaction adopted from Isaac et al. [27], while the items of performance were adopted from Damnjanovic et al. [28], and items measuring attitude were from Salloum et al. [29].

3.2 Sampling and Data Collection

Since the study only focused on UMT's Science degree students attending courses using online learning during the second semester of the 2019/2020 session, the purposive sampling method was used. Since the present study only looked at the theoretical effect of variables in the research framework, convenience sampling would suffice for this purpose [30]. The survey for the study was made using Google Forms and distributed online via the UMT Official Facebook, from 15 July 2020 to 11 August 2020, which was over one month. According to Hair et al. [31], the sample size should be determined using the power of analysis, which is based on the number of predictors. Gefen et al. [32] suggested that with a power of 80%, medium effect size, and $p = 0.05$, the

minimum sample size needed is 84. The sample size was not an issue for this study as a total of 1349 completed questionnaires were returned for analysis.

A total of 77.7% of the respondents in the study were female students, while the remaining 22.3% were males. Second-year students made up 37.1% of the respondents, 33% were first-year students, 27.1% were third-year students, and 2.9% were fourth-year students. With regards to electronic device usage, 80.1% of the respondents had more than one electronic device, 5.4% had a laptop, 4.0% had a smartphone, and 0.5% had a desktop. A total of 85.6% of the respondents had internet access at home, while 14.4% used mobile data.

4 Data Analysis

According to Hair et al. [33], the PLS-SEM approach was suitable for the study as it focused on the prediction between factors in the research model. As the study is focused on predictive purposes, the Smart Partial Least Squares (PLS) method was employed to test the hypotheses.

4.1 Common Method Bias (CMB)

The data for this study were collected from a single source where the independent and dependent variables were derived from the same respondents simultaneously. The procedural and statistical methods were applied to overcome the CMB issue of the study [35,36]. As for the procedural method, the study employed different anchor scales to measure the independent variables (1-5) and dependent variables (1-7) [35,37]. For the statistical method, the marker variable technique was conducted to test the common method bias (CMB) [38]. The unmeasured marker variables were used as an exogenous variable predicting every endogenous variable in the model. All the significant effects of the model without the marker variable remained significant in the model with marker variables. Hence, we can conclude that the data did not have a CMB problem.

4.2 Measurement Model

The present study employed a two-stage approach proposed by Hair et al. [33]. The approach consists of a measurement model and a structural model. According to Ngah et al. [39], two validities should be confirmed in the measurement model, namely convergent validity and discriminant validity. Convergent validity can be achieved if the loading reaches the value of 0.708, the average variance explained (AVE) must exceed a value of 0.5, and the Composite Reliability (CR) must be higher than 0.7 [33]. Table 1 illustrates the results of the convergent validity test. All the loadings, AVE, and CR were higher than the threshold values, thus confirming that the convergent validity is not a problem for this study.

Table 1. Convergent Validity

Variable	Item	Loading	CR	AVE
Perceived ease to use	PEU1	0.913	0.935	0.826
	PEU2	0.923		
	PEU3	0.891		
Satisfaction	S1	0.950	0.966	0.905
	S2	0.950		
	S3	0.955		
Performance	PER1	0.947	0.945	0.852
	PER2	0.957		
	PER3	0.862		
Attitude	ATT1	0.913	0.929	0.814
	ATT2	0.911		
	ATT3	0.883		

Note: ATT4 was deleted due to discriminant validity

Next, the discriminant validity was measured by the heterotrait-monotrait (HTMT). Table 2 depicts the values of HTMT are lower than the required threshold value of 0.9 as suggested by Franke & Sarstedt [40]. Hence, the discriminant validity was not an issue in this study.

Table 2. Discriminant Validity: HTMT Ratio

	1	2	3	4
Perceived ease to use (1)				
Satisfaction (2)	0.829			
Performance (3)	0.777	0.817		
Attitude (4)	0.865	0.893	0.813	

Once the measurement model was examined and the model's reliability and validity established, the next step was to evaluate the structural model. The process involved evaluating the relationships between the variables and the structural model's predictive abilities. Hair et al. [33] suggested that before assessing the structural model, collinearity should be examined to ensure that collinearity is not a problematic factor. The results show that there is no collinearity among the predictor constructs in the structural model as the VIF values are clearly below the threshold of 5 [31].

The hypotheses were tested by running a bootstrapping technique with resampling of 5000. The results show that for the direct effect, all of the purpose hypotheses are supported. With PEU \rightarrow SAT ($\beta = 0.763$, $p < 0.001$) and PEU \rightarrow PER ($\beta = 0.702$, $p < 0.001$), thus confirming that there are positive effects between the variables representing the PEU, SAT and PER. Thus, H1 and H2 of the study are supported. For H3 and H4, the values confirm that there are positive effects between SAT and PER with ATT ($\beta = 0.621$, $p < 0.001$) and ($\beta = 0.260$, $p < 0.001$), hence supporting H3 and H4. Figure 2 and Table 3 present the results for the direct effects of the study.

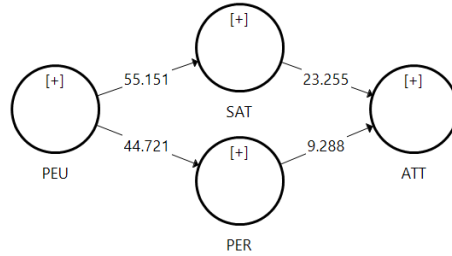


Figure 2. Structural Model

Table 3: Hypothesis Testing

Hypothesis	Relationship	Beta	SE	T Value	P Value	LL	UL	Decision	VIF
H1	PEU -> SAT	0.763	0.014	55.151	0.000	0.739	0.785	Supported	1.000
H2	PEU -> PER	0.702	0.016	44.721	0.000	0.674	0.726	Supported	1.000
H3	SAT -> ATT	0.621	0.027	23.255	0.000	0.577	0.665	Supported	2.369
H4	PER -> ATT	0.260	0.028	9.288	0.000	0.213	0.305	Supported	2.369

The present study also looked at the assessment of the coefficient of determination (R^2), predictive relevance (Q^2) through the blindfolding technique, and effect size (f^2). The R^2 value of 0.583 for SAT, 0.492 for PER, and 0.698 for ATT indicate that PEU explains 58.3% of the variance of the SAT, and PEU explains 49.2% of the PER variance. As for SAT and PER explain 69.8% of the variance of ATT. As for predictive relevance, a value of Q^2 higher than 0 indicates that the model has good predictive relevance [31]. From the blindfolding technique, the study found that Q^2 is 0.524, 0.417, and 0.565 for the SAT, PER, and ATT, respectively, confirming that the model has good predictive power for the subject matter of the study.

Lastly, the effect size of f^2 was assessed. According to Cohen [41], an effect size of 0.35, 0.15, and 0.02 are considered as large, medium, and small effect size, respectively. PEU was found to have a large effect size towards the SAT and PER with a value of 1.396 and 0.970, respectively. The SAT has a large effect size (with a value of 0.539,) on ATT. On the contrary, the PER has a small effect (0.094) on ATT. Table 4 illustrates the results for R^2 , Q^2 , and f^2 of the study.

Table 4: Effect Size

Relationship	R^2	Q^2	f^2	Decision
PEU -> SAT	0.583	0.524	1.396	Large
PEU -> PER	0.492	0.417	0.970	Large
SAT -> ATT	0.698	0.65	0.539	Large
PER -> ATT			0.094	Small

Aligned with Preacher and Hayes [42], the study used the method of bootstrapping the indirect effect to test the mediation effect. LL and UL do not straddle a 0 in between, indicating a mediation effect between the independent variable and dependent variable [42]. The results indicate that PER has a mediation effect for the relationship between PEU \rightarrow PER \rightarrow ATT ($\beta = 0.182$, $t = 8.764$; LL = 0.143, UL 0.224, $p < 0.001$), thus supporting H5. As for H6 (PEU \rightarrow SAT \rightarrow ATT) ($\beta = 0.474$, $t = 20.754$; LL = 0.428, UL 0.518, $p < 0.001$), indicated that satisfaction has a mediation effect for the relationship between PEU and ATT. Table 5 shows the results of the mediation effect of the study.

Table 5. Mediation Analysis

Hypothesis	Relationship	Beta	SE	T Value	P Value	LL	UL	Decision
H5	PEU \rightarrow PER \rightarrow ATT	0.182	0.021	8.764	0.000	0.143	0.224	Supported
H6	PEU \rightarrow SAT \rightarrow ATT	0.474	0.023	20.754	0.000	0.428	0.518	Supported

5 Discussion and Conclusion

The study revealed that perceived ease to use positively influences students' satisfaction (H1). The finding confirms the results reported by Al-Rahmi et al. [16]. The study also found that perceived ease to use positively impacts students' performance (H2). This result supports the finding by Davis and Wiedenbeck [17]. Thus, the result indicates that when an online learning system is easy to use, students' satisfaction level and performance will improve.

As for H3 and H4, students' satisfaction and performance were found to influence students' attitudes towards online learning. These findings align with those found by Chang et al. [20] where students' satisfaction significantly affects students' attitude in terms of internet usage and online learning. The present study also seconds Akhgari et al. [23], who highlight that satisfaction positively affects attitude. Hence, lecturers and university management need to create an excellent online learning system or environment to ensure that students are satisfied with the system; students' satisfaction with the system could increase their performance and positive attitude towards online learning.

Lastly, the results showed that students' performance and satisfaction mediated the relationship between perceived ease to use and students' attitude (H5 and H6). Students' positive attitude is crucial in determining whether students intend to continue using the online learning system. Therefore, the availability of satisfaction and the improvement of students' performance while using the online learning system can positively affect online learning. Besides that, students' satisfaction can be further enhanced with the improvement of the online learning system usability features.

The current study provides a new SOR model to explain the learning environment effect on students' attitude using online learning in the COVID-19 pandemic setting. By introducing new combination factors of the SOR model, the study enriched the capability

of the SOR model to explain students' attitudes using the online learning system. As online learning has become a new norm in Malaysia's higher education because of the COVID-19 pandemic, understanding the factors that can create student's positive attitudes towards online learning is crucial. Hence, the present study significantly contributes to the body of knowledge about students' attitudes in online learning amidst the COVID-19 pandemic. From a practical perspective, it is crucial for the top management of higher institutions in Malaysia and around the globe to provide online learning systems and platforms which are easy to use. Ease of use can positively impact learners' satisfaction and performance. Learners' increased satisfaction and performance will, in turn, enhance the formation of a positive attitude towards online learning among the learners.

The present study limited the variables studied to ease of use, satisfaction, and performance of science students studying at Universiti Malaysia Terengganu. Future studies should explore other variables which may influence students' attitude towards online learning and involve students from other universities, especially the higher-ranking universities in Malaysia.

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