



## **Undergraduates' Perception, Engagement and Learning Experience in Online Learning amid Covid-19 Pandemic**

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Due to the physical separation of lecturers and learners, many students have expressed dissatisfaction with their online learning experience. The growing prevalence of online education highlights the imperative to explore the factors influencing students' online experience. This study aims to explore the relationships between undergraduate students' perception, engagement and experiences in online learning. Employing a quantitative design, a cluster sampling technique was utilised to select a representative sample of 609 undergraduate students from various degree courses across four public and private universities in Malaysia. The survey questionnaires, derived from the Online Learning Perception Scale, Engagement in Online Learning Scale and Community of Inquiry Survey, were administered through internet survey. Structural Equation Modelling (SEM) was used to analyse the data. Findings revealed that students' perceptions of online learning and online engagements both directly affect their online learning experiences. The results also showed that students' perception of learning directly contributes to their online learning experience. Students' online engagement mediates the relationship between students' perception and their online learning experience. Recommendations for future studies and limitations of the study were also discussed.

Keywords: online learning, perception, engagement, learning experience, undergraduate

### **INTRODUCTION**

Covid-19 affected the world in 2020, and Malaysia was not spared when it became severe in March 2020, resulting in the Malaysian government's introduction of the Movement Control Order (MCO). All educational institutions were forced to be closed, including tertiary education institutions, which resulted in most education institutions

**Citation:** Tan, S. F., Ooi, L. H., Mellisa Ng, L. Y., & Sim, T. Y. (2024). Undergraduates' perception, engagement and learning experience in online learning amid Covid-19 pandemic. *International Journal of Instruction*, 17(2), 401-418. <https://doi.org/10.29333/iji.2024.17223a>

moving their delivery method online. This move was due to an unforeseen circumstance that was different from the typical online learning instruction, as the transition was not by choice but forced upon the education field in a very short time frame. This sudden increase in usage has influenced many students' perceptions and experiences towards online learning. It was found that most students did not have a pleasant and effective learning experience due to the sudden change. Most of the students, lecturers as well as institutions were not prepared (Amir et al., 2020; Mahiswaran et al., 2020; Sharin et al., 2021). Therefore, there is a need to enhance the students' online learning experience seeing that many universities are moving to learning online after the Covid-19 pandemic.

Findings have shown that students' perceptions influence their engagement (Malik, 2023; Mayordomo et al., 2022), satisfaction (Kuh, 2009) and academic performance (Farrell & Brunton, 2020). Satisfaction is also influenced by how the students perceive their learning experience, and it is associated with academic performance (Biner et al., 1997) and persistence rate (Joo et al., 2013). Some researchers also explored students' learning experiences by assessing their learning satisfaction (e.g., Al Soub et al., 2021; Park & Kim, 2020). These studies indicate that students' perceptions and learning experiences are interrelated. Researchers also reported that engagement predicts satisfaction, academic performance and perceived learning effectiveness (Martin & Bolliger, 2018; Panigrahi, et al., 2020). Studies by Kahu et al. (2014) and O'Shea et al. (2015) further explain that student engagement is important to develop a positive learning experience, eventually leading to course completion and satisfaction. However, low engagement would lead to low academic achievements and increased attrition rates (Brunton et al., 2018).

Existing literature demonstrated the positive impact of engagement on learning experience (e.g. Kahu et al., 2014). Besides, researchers have reported that students' perception significantly influences their level of engagement in online learning (e.g. Mayordomo et al., 2022). However, to the knowledge of the authors, no study has yet explored the mediating role of engagement between students' perception and learning experience. By exploring this mediating effect, our study seeks to uncover the underlying processes and mechanisms that connect students' perception and their online learning experience.

The results of this study will contribute to filling the existing research gap and provide a comprehensive understanding of the interplay between perception, engagement, and learning experience. Mediation analysis focusing on engagement will demonstrate the specific pathways through which students' perception affects their learning experience. Such insights will not only contribute to the theoretical understanding of online learning, but also have practical implications for educators and instructional designers.

## **Literature Review**

### **Social Cognitive Theory**

Social Cognitive Theory was founded by Albert Bandura (1986). This theory is used as a grand theory to build this research because it explains that learning occurs within a

social context with a dynamic and reciprocal interaction between humans' personal/cognitive, environmental, and behavioural aspects. According to this theory, knowledge is constructed when learners are engaged in activities, receive feedback, and participate in different forms of human interaction in social contexts (Bandura, 2001). Cognitive process is not an individual process. Learning occurs through the interaction the learners have with others and the context within which these interactions occur (Bandura, 2001). Learners are active agents who can influence and are influenced by their environment. They learn from observing and imitating others. They tend to undertake activities or environments they believe they can manage and avoid activities or environments that they consider exceed their capabilities. This theory is widely applied in conventional learning environments (e.g., Wu et al., 2010), where the learning environment comprises physical and social environments in a classroom setting. Piccoli et al. (2001) expanded the definition of a learning environment in the online learning context by including technology, content, interaction, learner control and learning model. These environmental influences are categorised into technological and social environments (Wu et al., 2010). The technological environment refers to the functionality and applicability of the technology system, whereas the social environment refers to the social interaction in the online learning environment. In this study, the environmental factor refers to the technologies the students use in their online learning and is measured by their perceptions of its usage in online learning. Based on this theory, the students' perception towards online learning environment (environmental influences) plays a crucial role in shaping their engagement (behaviours). When students have positive perceptions towards their online learning environments, they are more likely to engage cognitively and emotionally in the learning process. The online learning experience refers to the students' subjective evaluation of the learning process, including social presence, teaching presence and cognitive presence. Both students' perception towards online learning (environmental influences) and engagement (behaviours) significantly contribute to shaping the overall online learning experience (personal/ cognitive).

### **Perception towards online learning**

According to the Technology Acceptance Model (TAM) proposed by Davis (1989), the perception of online learning includes perceived usefulness and perceived ease of use and these perceptions will affect the learner's behavioural intentions and engagement in learning. Perceived usefulness refers to the learner's perception that online learning can effectively improve their learning. The more the learners believe that e-learning is helpful to them, the more likely they have an extrinsic motivation to use it. Perceived ease of use is the degree to which a learner believes that the online learning platform is easy to use and easy to learn. If learners believe that the platform is easy to use, they will be more willing to continue engaging with it.

Other than perceived usefulness and perceived ease of use (technological environment), learners' perception of interaction (social environment) also affects their learning. Interaction encourages learners to engage and participate more actively. Well-structured interactions throughout the learning process would allow them to participate more actively in producing knowledge and reduce the chances of learners becoming passive

(Bailey & Morais, 2005). Thus, student interactions enhance the learning experience (Moore, 1993). Besides, the interactions between students and lecturers encourages positive attitudes towards learning amongst students (Fulford & Zhang, 1993). Vitoria et al. (2018) also claim that students' positive experience with web-based learning, i.e. ease of access to learning websites, communication with their peers after class, and stable internet, gave a positive perception towards online learning. Aranyi et al. (2022) reported that students' perception regarding the IT equipment and lecturers' availability for communication is among the key factors affecting their experience in transitioning to online learning during Covid-19.

A study by Mayordomo et al. (2022) on online learners found that perception positively impacts students' emotional engagement. Students become engaged emotionally when they perceive that lecturers are providing feedback on their work. They become more involved in their studies, improving their cognitive engagement. Similar results were also reported by Hughes et al. (2020) as well as Chan et al. (2022). They found that students are more engaged if they perceive that the technology used was useful and easy to use. In sum, students' perception toward online learning influences their engagement in learning.

### **Engagement**

Engagement refers to the effort consistently put out by students in their learning process to attain their desired learning goals (Coates, 2006). Fredricks et al. (2004) stated that engagement is multidimensional, which involves behavioural, emotional and cognitive dimensions. Behavioural engagement is the observable behaviours exhibited externally by the students throughout the learning process (Schnitzler et al., 2020). Emotional engagement refers to the positive emotional response students experience while learning and their sense of belonging (Chiu, 2021). Cognitive engagement involves the cognitive processes students apply to learning, indicated by deep learning, self-regulation and understanding (Appleton et al., 2006). Student engagement increases students' desire to study, reduces their sense of loneliness, boosts their satisfaction and helps in their performance in online learning (Martin & Bolliger, 2018). Kahu et al. (2014) found that the universities are integral in creating a positive learning environment online to engage adult learners in distance learning, while O'Shea et al. (2015) further explained that student engagement is important to develop a positive learning experience which will eventually lead to course completion and satisfaction. Conversely, low engagements would lead to low academic achievements and increase attrition rates (Brunton, et al., 2018). Appleton et al. (2006) mentioned that most of the studies on engagement focused on behaviour engagement, which is an observable indicator. Less study was done on cognitive and emotional engagement, although there is evidence showing that both influence academic performance. Hence, this study will focus on cognitive and emotional engagements only.

### **Online Learning Experience**

The Community of Inquiry (CoI) Framework (Garrison et al., 2000, 2001, 2010; Garrison & Arbaugh, 2007) is one of the most popular theoretical frameworks for understanding online learning experiences. This framework includes three main elements, namely cognitive presence, social presence, and teaching presence. Cognitive

presence is “the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication” (Garrison et al., 2001, p. 89). Social presence (SP) is defined as “the ability of participants in a community of inquiry to project themselves socially and emotionally, as ‘real’ people (i.e., their full personality), through the medium of communication being used” (Garrison et al., 2000, p. 94). Teaching presence (TP) refers to “the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile outcomes” (Anderson et al., 2001, p. 8). All these three presences are essential for successful online learning. They work together to establish and maintain effective online learning experiences (Castellanos-Reyes, 2020). This framework was widely used to design the online learning environment (e.g., Fiock, 2020). It is also used to assess the students’ online learning experience (e.g., Choo, et al. 2020; Homer, 2022). In this study, CoI framework is used to explore the students’ learning experience in the online environment.

### **Research Objective**

Based on the above-mentioned literature, this study aims to determine the relationships between undergraduate students’ perception, engagement, and experiences in online learning.

### **Hypothesis**

1. There is a positive effect of perception of learning to engagement.
2. There is a positive effect of engagement to online learning experience.
3. There is a positive effect of perception of learning to online learning experience.
4. Engagement mediates the relationship between perception of learning and online learning experience.

### **METHOD**

A quantitative design was adopted to achieve the research objectives. An internet-based survey was used for data collection as it had more advantages compared to traditional modes of survey (Park et al., 2019). Rice et al. (2017) also supported online survey as it is considered more cost effective, accessible from various locations, timely, reliable and the anonymity of the participants could be better preserved. Moreover, it was an efficient and feasible option for data collection during the Covid-19 pandemic. Studies (Long, 1997; Krejcie & Morgan, 1970) suggest that when the sample size is greater than 500, it is considered adequate and optimal to estimate the study population. A total of 609 undergraduate students enrolled in various degree courses from four public and private universities in Malaysia were sampled. They were first to fourth year students where 239 were male students and 370 female students and their participation was entirely voluntary. Using the cluster sampling method, the samples were divided into major programmes namely, (a) pure arts, (b) applied arts, (c) engineering, (d) computing, (e) sciences and (e) other programmes. The data collection was conducted from early to mid 2022. These programmes were conducted fully online during the duration of the study where synchronous and asynchronous online learning including course delivery and activities were implemented. The four-point Likert scale online survey was divided into four sections: (a) student profile, (b) perceptions towards online learning, (c) engagement in online learning and (d) experiences in online learning. The

Likert scale ranged from strongly disagree (1) to strongly agree (4) and the instruments used in the data collection were Online Learning Perception Scale, Engagement in Online Learning Scale and Community of Inquiry Survey.

#### **Online Learning Perception Scale**

The Online Learning Perception Scale was used to measure the students' perceptions towards online learning. This instrument was adapted from existing instruments used in other studies (e.g. Almahasees et al., 2021; Gao et al., 2020; Vitoria et al., 2018). There were a total of 11 items in this instrument, 4 items to measure students' perceptions towards usefulness, 4 items to measure students' perceptions towards ease of use of online learning platforms and 3 items to gauge students' perceptions of their online learning interactions. This instrument was found to be a reliable and valid instrument (Gao et al., 2020). The adapted scale has a high internal consistency,  $\alpha = 0.93$ .

#### **Engagement in Online Learning Scale**

The Engagement in Online Learning Scale was used to measure the students' engagement in online learning. This instrument was adapted from the existing instruments (e.g., Dixon, 2015; Gao et al., 2020; Manwaring, 2017; Salas-Pilco et al., 2021). There were 16 items in this instrument, 9 items measuring cognitive engagement and 7 items measuring emotional engagement. The instrument was found to be a valid and reliable instrument (Gao et al., 2020). The adapted scale has a high internal consistency,  $\alpha = 0.82$ .

#### **Community of Inquiry Survey**

The Community of Inquiry Survey developed by Arbaugh et al. (2008) was used to measure the students' experiences in online learning. There were 34 items in this instrument, 9 items to measure the social presence, 12 items to measure the cognitive presence and 13 items to measure the teaching presence. The instrument has recorded a Cronbach Alpha value of  $\alpha = 0.97$ , which shows that it is a highly reliable. Responses of all these three instruments were gathered through a four-point Likert scale, which ranged from strongly disagree (1) to strongly agree (4).

#### **Data Analysis**

Structural Equation Modelling (SEM) is a statistical analysis tool that is versatile and used to measure "unobserved latent variables measured by multiple indicators and identifying the relationships between them" (Kim et al., 2020). It combines factor analysis and multiple regression analysis to analyse the structural relationship between the measured variables against the latent variables. SEM was chosen as a method of data analysis because it enables the research to examine the complex relationships between variables. It estimates the relationships between observed and latent variables (the measurement model) and among latent variables (the construct model). It also provides estimates of direct, indirect, or mediating effects.

#### **FINDINGS**

##### **Reflective Measurement Model Assessment**

This study proposed an integrated full model and a second-order model of perception of online learning which consists of three first-order constructs, namely perceived

usefulness (PU), perceived ease of use (EU), and perceived interaction (PI). Two-stage embedded approach was applied to assess the model. The assessment of a Reflective Measurement Model should be done by determining its reliability and validity (Henseler et al., 2009). The first criterion to assess is the internal consistency reliability, which refers to composite reliability. Based on the results in Table 1, the composite reliability of each latent variable was good as they are much higher than the minimum of 0.6. It confirmed the high levels of internal consistency in the latent variables. The size of factor loadings of all the indicators ranged from 0.689 to 0.931, which meant the indicators had greater than the minimum acceptable value of 0.4, and the latent variables were reliable.

Table 1  
Results of measurement model (stage one)

Latent Variable	Factor loading	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
<b>Perception of online learning</b>				
EU1	0.903			
EU2	0.927			
EU3	0.883			
PU1	0.900			
PU2	0.880	0.928	0.940	0.636
PU3	0.823			
PI1	0.931			
PI2	0.906			
PI3	0.913			
<b>Engagement in online learning</b>				
EGOL1	0.815			
EGOL2	0.726			
EGOL3	0.896	0.916	0.935	0.706
EGOL4	0.899			
EGOL5	0.830			
EGOL6	0.862			
<b>Experience in online learning</b>				
EXOL1	0.689			
EXOL2	0.724			
EXOL3	0.705			
EXOL4	0.735			
EXOL5	0.776			
EXOL6	0.828			
EXOL7	0.768			
EXOL8	0.744			
EXOL9	0.699	0.953	0.958	.572
EXOL10	0.813			
EXOL11	0.789			
EXOL12	0.750			
EXOL13	0.733			
EXOL14	0.747			
EXOL15	0.758			
EXOL16	0.788			
EXOL17	0.797			

The next step in assessing reflective measurement models addresses convergent validity and discriminant validity. The Average Variance Extracted (AVE) of the latent variables were above 0.5, indicating sufficient convergent validity. The Fornell-Larcker Criterion Method is more acceptable for the assessment of validity dealing with reflective items. According to Henseler et al. (2015), the value of the square root of AVE should be greater than its correlation with any other latent variables. Table 2 shows the diagonal values demonstrating that the measures of validity contained higher values than the correlation of any other constructs. Heterotrait-Monotrait ratio of correlations (HTMT) is also used to assess the discriminant validity in PLS-SEM. The value of HTMT ranged between 0.79 and 0.83, which is below the recommended threshold of 0.85, suggesting sufficient discriminant validity (Henseler et al., 2015).

Table 2  
Fornell-Larcker criterion and heterotrait-monotrait ratio of correlations (HTMT) (Stage one)

	Latent Variable	EGOL	EXOL	POL
Fornell-Larcker Criterion	EGOL	0.840		
	EXOL	0.771	0.757	
	POL	0.741	0.785	0.798
Hetero-trait-monotrait ratio (HTMT)	EGOL			
	EXOL	0.815		
	POL	0.799	0.833	

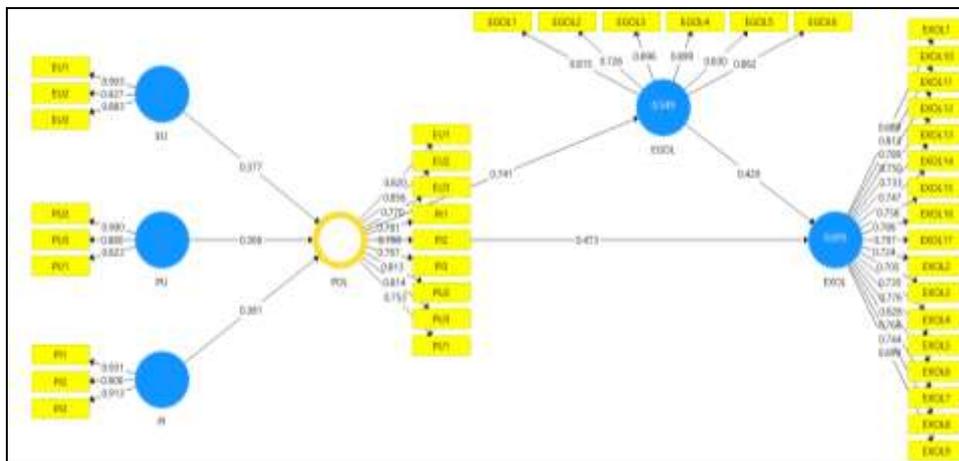


Figure 1  
Assessment of measurement model (stage one)

**Measurement Model**

In the study, perception of online learning was the higher-order construct (HOC) which consists of three lower-order constructs namely perceived usefulness, perceived ease of use, and perceived interaction. The results displayed in Table 3 proved the HOC validity was established.

Table 3  
Higher-order construct validity

HOC	LOCs	Outer weight	T-Statistics	P value	Outer loadings	VIF
POL	PU	0.392	54.410	0.000	0.920	3.077
	EU	0.351	40.242	0.000	0.896	2.838
	PI	0.381	2.48.085	0.000	0.854	1.835

Note: POL= Perception of online learning; PU= Perceived usefulness; PI= Perceived interaction

Table 4  
Fornell-Larcker Criterion and Heterotrait-Monotrait ratio of correlations (HTMT) (Stage two)

	Latent Variable	EGOL	EXOL	POL
Fornell-Larcker Criterion	EGOL	0.840		
	EXOL	0.771	0.757	
	POL	0.745	0.786	0.891
Heterotrait-Monotrait ratio of correlations (HTMT)	EGOL			
	EXOL	0.815		
	POL	0.829	0.861	

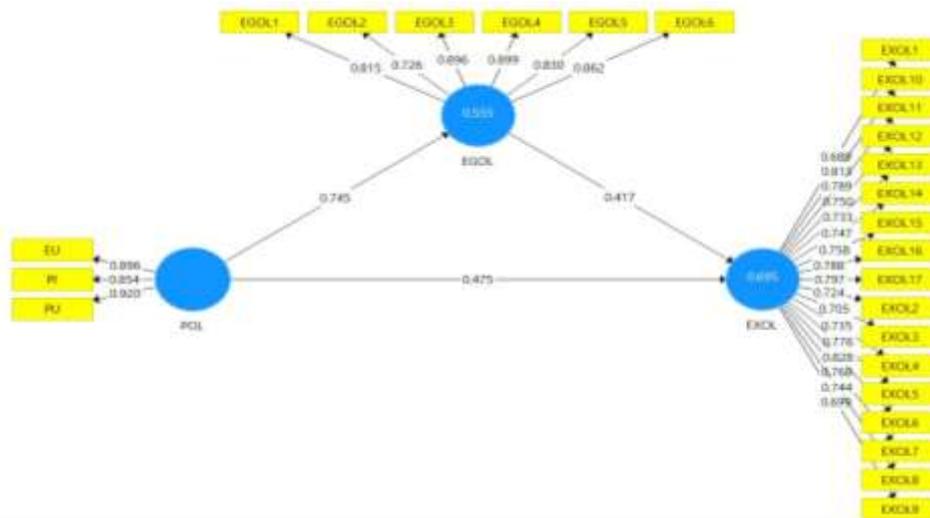


Figure 2.  
Assessment of measurement model (stage two)

**Assessment of Structural Model**

To assess a structural model, the values of Variance Inflation Factors (VIF) in the constructs should be firstly examined for the collinearity issue. Table 5 indicated that the values of VIF were between 1.03 to 1.71. As all the values of VIF were below the critical value of 5, the model showed no issue of collinearity. Therefore, the indicators and latent variables of the study can be used for analysis and interpretation.

Table 5  
Inner VIF values for collinearity assessment

	EGOL	EXOL	POL
EGOL		2.219	
EXOL			
POL	1.000	2.219	

Note: POL= Perception of online learning; EGOL= Engagement; EXOL = experiences

After checking for potential collinearity issues among the constructs, the researchers proceeded with the assessment of the structural model. The next step is to examine the coefficient of determination ( $R^2$ ), which justifies the variance explained in each endogenous construct. In the present study, experiences in online learning (EGOL) had a moderate  $R^2$  value of 0.555, meaning that perception towards online learning (POL) explained 55.5% of the variance in engagement in online learning (EGOL). Next, experiences in online learning obtained an  $R^2$  value of 0.695 which was above the substantial value of 0.67. In other words, perceptions of online learning (POL) and engagement in online learning (EGOL) explained more than two thirds (69.5%) of the variance in experiences in online learning (EXOL).

The analysis continued by calculating the inner model path coefficient. The results revealed that all three direct path coefficients were significant. First, perception of learning exerted a significant effect on engagement in online learning ( $\beta = 0.745$ ,  $t = 35.537$ ,  $p < .01$ ) and experience of online learning ( $\beta = 0.476$ ,  $t = 35.537$ ,  $p < .01$ ). The construct perception of learning (0.745) had the strongest effect on engagement in online learning. Construct engagement in online learning had a significant direct effect on the experience of online learning ( $\beta = 0.417$ ,  $t = 9.511$ ,  $p < .01$ ). Besides, perception of online learning also exerted a significant indirect effect on the experience of online learning ( $\beta = 0.311$ ,  $t = 9.212$ ,  $p < .01$ ).

### Mediation Analysis

Mediation analysis was executed to assess the mediating role of engagement in online learning (EGOL) on the relationship between perception of learning (POL) and experiences in online learning (EXOL). The results in Table 6 displayed that engagement in online learning (EGOL) served as a complementary mediator because the direct and indirect effect point in the same direction.

Table 6  
Assessment of structural model

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics ( O/STDEV )	P Values
EGOL-> EXOL	0.417	0.417	0.044	9.511	0.000
POL -> EGOL	0.745	0.746	0.021	35.682	0.000
POL -> EXOL	0.476	0.476	0.044	10.899	0.000
POL -> EGOL ->EXOL	0.310	0.311	0.034	9.212	0.000

Note: POL= Perception of online learning; EGOL= Engagement; EXOL = experiences

Therefore, the result proved that engagement (EGOL) was a complementary mediator that partially mediated the relationship between perception (POL) and learning

experience (EXOL). As a guideline,  $f^2$  values of 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively (Cohen, 1988) of an exogenous latent variable. Table 6 shows the  $f^2$  effect sizes of the constructs. The largest  $f^2$  effect size occurred for the relationships POL->EGOL (1.246). The relationship between POL and EGOL had the strongest path coefficient of 0.745 and the largest  $f^2$  effect size of 1.246. The relationship of POL->EXOL (0.330) had nearly a large  $f^2$  effect size. The relationship between EGOL and EXOL had a medium  $f^2$  effect size of 0.253. The results showed that all  $f^2$  effect sizes in the structural model were at least moderate.

The last step is to evaluate the predictive relevance of the PLS path model by running the blindfolding procedure. In the structural model,  $Q^2$  values larger than zero for a specific reflective endogenous latent variable indicate the path model's predictive redundancy for certain dependent constructs. Based on the result from the cross-validated redundancy approach (Table 7), the experience of online learning (EXOL) had the highest  $Q^2$  values of 0.371, whereas engagement (EGOL) had  $Q^2$  values of 0.365. In this study,  $Q^2$  values were above zero for all endogenous constructs, meaning that the model has achieved predictive accuracy for endogenous constructs.

Table 7  
 $f^2$  effect sizes

	EGOL	EXOL	POL
EGOL		0.253	
EXOL			
POL	1.246	0.33	

## DISCUSSION

The findings of this study demonstrated that the students' perception has a significant positive effect on their engagement. Students' perception in this study refers to perceptions towards their online learning environment, which includes the ease of use and usefulness of the online learning platform and their interaction in the online learning environment. This finding is in line with the Social Cognitive Theory, where the environmental factor (both technological environment and social environment) affects the students' behaviour (engagement in learning). These findings were also supported by Chan et al. (2022) and Hughes et al. (2020). They reported that students were more engaged when the digital tools used were useful and easy to use. Hence it is important to ensure that the technology provided to the students is easy to use and useful to them, so that the students are cognitively and emotionally engaged in learning online.

Perceived interaction was found to influence the students' engagement. This finding was in line with Moore's (1993) report, where the interaction in an online learning environment affected the students' engagement. If the students found it easy to communicate with others in the online environment, they would actively communicate with their peers and instructors. Similar results were also reported by Yu et al. (2020) and Elmer et al. (2020). They reported that the interaction enhanced the students' engagement. Thus, it is important to encourage interaction between students and their

peers or between students and instructors so that the students are more engaged in their online learning.

Students' perceptions of online learning and engagement during online learning significantly influences their online learning experience. These two variables explained more than two-thirds of the variance in the online learning experience. These findings aligned with the tenets of Social Cognitive Theory, emphasising the reciprocal and dynamic interaction between students' perceptions towards online learning environment (environmental influences) and engagement (behaviours) and learning experience (personal/cognitive). Similarly, Aranyi et al. (2022) reported that students' perception of online learning (in term of IT equipment and lecturers' availability to communicate) is among the key factors that contributes to their learning experience. During the Covid-19 pandemic, the students were isolated and could not meet face-to-face with their peers and instructors. The teaching and learning process was mediated through online technology tools like learning management systems and multimedia platforms. Therefore, the technological tools used to facilitate interactions between students and instructors were crucial in ensuring a pleasant online learning experience.

Students' engagement was also found to directly affect their online learning experiences, with a moderate effect size. Students' engagement in this study included cognitive engagement and emotional engagement. When the students are emotionally engaged, they are willing to participate in the learning activities. As they engage cognitively, they apply knowledge, select, and evaluate relevant information, and try to complete the learning tasks given. The completion of one learning task will stimulate their interest and enthusiasm to try the next learning task. If the students are actively engaged with the learning tasks, they are more likely to have a positive online learning experience.

Our findings also indicate that engagement acts as a mediator between student perception and learning experience. However, it is worth noting that there is a limited existing literature directly supporting this specific mediation pathway. Hence, the result of our study contributes to the understanding of the relationship between perception, engagement and learning experience in online learning environment.

Engagement was found to be a complementary mediator that partially mediates the relationship between perception and learning experience. This showed that besides engagement, there may be other variables that mediate the relationship between perception and learning experience. Therefore, further studies are needed to identify these mediators, which could include variables such as self-regulated learning strategies or learning resources. Exploration of these potential mediators will provide a more comprehensive understanding of the complex dynamic within the online learning environment.

The mediating role of engagement emphasizes the importance of students' active engagement in online learning as a critical factor in translating their perception of learning environment into their actual learning experience. Positive perceptions of online learning are more likely to result in higher levels of engagement, which, in turn,

contribute to a more positive and fulfilling learning experience for students. Thus, it is crucial to foster active student engagements in online learning environments to enhance the overall learning experience. Strategies such as promoting active learning, providing personalised feedback, and creating an interactive online learning environment can be implemented to enhance student engagement.

## CONCLUSION

This study presented a new perspective in examining the relationship between students' perception and engagement in their online learning experience. The findings showed that the students' perception has a significant positive effect on their engagement online. Besides, their perception and engagement are the determinants of an online learning experience. Engagement also acts as a mediator between perception and online learning experience. Overall, this study builds upon the current literature related to the online learning experience.

The findings of this study have implications for practice around learning experience in the context of an online learning environment. To create a positive online learning experience, the online learning environment created by institutions and academics needs to be carefully curated. Universities should consider students' study needs and technical ability when they design or choose technology tools used in their online learning. Students should be provided with opportunities to develop digital literacy skills to navigate online learning environments effectively. Universities can offer training programmes or resources to enhance their students' technology proficiency, information literacy and critical thinking skills in the digital context. Collaboration between several agencies, such as universities, policymakers and educational agencies is needed to ensure equitable access to technology, internet connectivity, and digital resources for all students, particularly those from disadvantaged backgrounds. Besides that, lecturers in an online learning environment should always encourage interaction. Icebreaking activities, online discussion forums, group activities, and peer assessment are among the strategies for fostering student-student interaction. Lecturers can interact regularly with the students by sending regular announcements, reminder emails and providing timely and consistent feedback to students. Students' engagement is an important predictor of students' online learning experience and a mediator between student perception and online learning experience. In order to enhance the students' engagement, the learning task given should be appropriate for the students. Tasks which are too difficult, or complex should be avoided as it would decrease their engagement. Conversely, the online learning activities should be constructed with high task value that reflects a balance between challenging activities and meaningful content. These tasks should encourage the students to be more engaged cognitively. Lecturers could also use humour and a positive tone in both text and non-text communications with students in order to encourage positive emotions among the students during online learning.

This study does present some limitations that should be addressed in further studies. The study only looked at undergraduates and future studies can be expanded to include postgraduate students. Learning styles and strategies might also be different for students from different age groups. Besides that, engagement is found to be a complementary

mediator between perception and learning experience. Hence there may be other variables that play a role in this mediation process. Future research can be conducted to explore these variables in order to provide a more comprehensive understanding of the factors influencing the online learning experience.

We truly hope that a rapid transition to emergency online teaching on a large scale will not happen again, even in different scenarios, such as natural disasters or conflict. However, we recognise that the lesson learned during the Covid-19 pandemic can serve as a valuable lesson to education practice and research, particularly in the face of ongoing digitalisation and the continued growth of online activities in our daily lives. As such, we believe that this knowledge can contribute to improve future education practices on a global scale.

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