Students' satisfaction and intention to continue online learning during the Covid-19 pandemic

Siti Ngayesah Ab Hamid, Hafizah Omar Zaki, Zizah Che Senik

Faculty of Economics & Management,
Universiti Kebangsaan Malaysia

Correspondence: Siti Ngayesah Ab Hamid (email: ctngayesah@ukm.edu.my)

Abstract

The Covid-19 pandemic has forced teaching and learning to be conducted online. Without proper preparation, students and academicians face various challenges, which may cause stress and drop out. Thus, this study was conducted to determine factors influencing students' satisfaction and intention to continue studying online. Three factors were hypothesized to influence satisfaction, namely the lecturer's performance, students' interaction, and course content. The study also examined the moderating role of internet connection on the relationship between satisfaction and continuance intention. Using purposive sampling, data were collected from undergraduate and postgraduate students. A total of 305 questionnaires were analyzed using Partial Least Square Structural Equation Modeling (PLS-SEM). The result of the analysis indicated that all three proposed factors are significant in influencing students' satisfaction, and satisfaction impacts continuance intention. Internet connection on the other hand moderates the relationship between satisfaction and intention. These findings have broadened the knowledge on the factors of students' satisfaction and continuance intention to study online during the pandemic. This study is among a limited number of studies available exploring the role of internet connection in the context of online learning. The study provides insights to academicians, higher learning institutions and policymakers on the continuance of online learning during and post-pandemic.

Introduction

The Covid-19 pandemic has caused significant challenges to academic institutions around the world. In the effort to contain the spread of the disease, most governments worldwide instructed a full closure of schools, universities, and academic institutions. At the peak of the pandemic in 2020, data show that almost 1.6 billion learners from 190 countries were affected by this closure (UNESCO, 2020). In the context of Malaysia, to ensure continuity of tertiary education, most universities have shifted the traditional in-class learning to the online platform (KPT, 2020). Even

when the country transition to the endemic phase in 2022, classes in tertiary education are still being conducted online, although some of them were given chances to use hybrid learning.

Among the online-lesson related concerns are challenges faced by students and academicians. At the early stage of the pandemic, lecturers are forced to teach in front of the computer screen, without early preparation of lesson plans and teaching materials (Bao, 2020). Students are also facing great challenges themselves to adapt to the online learning situation. Various problems were reported, including poor network quality, lack of familiarity with online learning applications, challenging situations when studying from home, difficulty paying attention, understanding the lesson, and limited interactions with friends (Al-Amin et al., 2021; Alnusairat et al., 2020; Nazilah et al., 2021). To make matters worse, this unprecedented situation affects the mental health of the students and has resulted in several suicide cases due to the student's struggle to attend online classes (Lathabhavan & Griffiths, 2020; Mamun et al., 2020). All of this uncertainty and difficulty in attending online classes are supported by various studies. A study conducted among 2038 students from 45 higher learning institutions in Bangladesh showed that one-third of the students did not want to attend online classes (Islam, 2020). A study in Malaysia showed that six out of ten students were satisfied with their online learning but did not intend to continue using it (Chung & Mathew, 2020).

Previous studies show a significant relationship between satisfaction and intention to use or continue using a product or service (Lai, 2004). In the context of online learning, Chiu, Chiu & Chang (2007) reveal that learners' satisfaction plays a significant role in influencing intention to continue web-based learning. However, in an unprecedented situation like the Covid-19 pandemic, Chung and Mathew (2020) show that satisfaction with online learning may not lead to increased intention to continue learning online. Other studies on the satisfaction related to online learning during the pandemic do not relate it to continuance intention (Alnusairat et al., 2020; Daultani et al., 2021). Not only that, most of these studies looked into factors influencing satisfaction from the technological readiness perspective (Dastane & Safie, 2020; Jiang et al., 2021; Wang et al., 2021). In addition, despite the importance of a good internet connection in influencing the smoothness of online learning, only limited studies could be found which looked into the influence of internet connection on online learning (Chung & Mathew, 2020). Thus, the objective of this study is to identify factors influencing students' satisfaction with online learning and its relationship with the intention to continue studying online. The study will also examine the role of internet connection in moderating the relationship between satisfaction and intention.

Literature review

Online learning or e-learning could be defined as the delivery of education or learning experiences via electronic technology (Sawang et al., 2013). It is an innovative approach to providing teaching and learning content through the use of modern technology connected by the internet (Pham et al., 2019). As students are not physically present, they can connect with the instructors and friends via the internet through various platforms, including Google Meet, Zoom, Microsoft Teams, Webex, and Google Classroom. Further, the emergence of web 2.0 applications, such as Facebook, Instagram, Whatsapp, and Telegram, have also helped make distance education easier.

Student satisfaction

Satisfaction is an important factor that leads to a number of outcomes in the delivery of a service. In the context of the online education service, studies found that student satisfaction contributes to improved achievement (Shin & Kang, 2015; C. H. Wang et al., 2013), continuance intention (Chiu et al., 2007) and loyalty (Pham et al., 2019). A satisfied student has been found to have more trust in the educational institution and would spread positive comments by word-of-mouth (Rahayu, 2018), which helps develop a university's brand image (Mahmoud & Grigoriou, 2017; Shehzadi et al., 2020). Satisfaction in online education is defined by Horzum (2015) as the fulfilment or level of pleasure experienced by students in the different aspects of learning that they received in the program. In general, students' satisfaction is closely related to their experience throughout the online learning curve. Students will be satisfied if the experience is favorable and dissatisfied if they encounter an unfavorable learning experience.

Previous studies have discovered various factors that could predict satisfaction. In the context of the online environment, student satisfaction is said to be affected by various issues, such as the course instructor, technology, and interactivity (Alnusairat et al., 2020). Daultani et al., (2021) posited four attributes of student satisfaction: course attributes, system attributes, instructor attributes, and interactive attributes. This idea is supported by Yunusa & Umar (2021) in their scoping review on online learning student satisfaction, who summarized the factors into three categories: communication dynamics, e-learning environmental factors, and situational factors. Hence, based on these findings, three factors are examined in this study: lecturer performance, student interaction, and course content.

Lecturer performance

In the online learning environment, lecturers are the principal actors in delivering the course content (Daultani et al., 2021). Lecturers are expected to promote, direct, and stimulate critical thinking in students more than just using traditional teaching methods (Baber, 2020). Critically, lecturers should ensure that teaching methods include student engagement and participation (Shea & Parayitam, 2019). In general, a lecturer's tasks fall into three main categories: pedagogical, social, and managerial (Zhang & Lin, 2020). Lecturers' success in delivering all these roles plays an important consequence in the students' learning outcomes (Baber, 2020).

However, in the early phase of the pandemic, lecturers are forced to teach online without preparation. Some of the lecturers are facing the challenges of working from home, which may affect their focus on teaching (Alnusairat et al., 2020). More importantly, most lecturers lack expertise in online technology (Alnusairat et al., 2020) and need to adjust to keep abreast with the changing environment (Baber, 2020).

Without the intervention of the pandemic, previous studies found a significant relationship between lecturers' performance and students' satisfaction (Shea & Parayitam, 2019). The lecturer's knowledge and attributes were stated as the most significant contributing factor toward students' e-learning satisfaction in India (Daultani et al., 2021), while their facilitating role is an important determinant of satisfaction in South Korea and India (Baber, 2020). Thus, based on these findings, it is hypothesized that:

H1: Lecturers' performance is positively associated with students' satisfaction.

Student interaction

Student interaction is one of the most important components of online learning (Horzum, 2015). It refers to the exchange of ideas and information among students with or without the presence of an instructor, which may happen in the form of group discussion, group projects, class participation, and others (Sher, 2009). Studies have shown that learning from peers is important as it helps maintain students' interest, enhances students' performance and competence (Chu & Chu, 2010) and affects students' achievement (Zhang & Lin, 2020). In the struggle of the Covid-19 pandemic, interaction plays a crucial role as students are secluded from the social presence in the classroom (Alnusairat et al., 2020; Baber, 2021).

Past studies have found mixed results on the effects of student interaction toward satisfaction. For example, in the context of a university in Mauritius, Parahoo et al., (2016) found a significant relationship between students' interaction and satisfaction, which is similar to the findings presented by Sher (2009). However, this is contrary to Zhang & Lin (2020), who were unable to conclude a significant impact of peer interaction on satisfaction. Thus, in order to understand the impact of this relationship, it is proposed that:

H2: Students' interaction is positively associated with satisfaction.

Course Content

Course content refers to the objectives of the program, teaching strategies, and evaluation method (Moore, 1991). Well-defined course content enables students to understand the objectives of the course and what they need to deliver (Shea & Parayitam, 2019). One way to enhance comprehension is by incorporating tasks beyond the classroom through a real-world project. A hands-on course content is said to motivate students to be involved in the class effectively and would likely be more satisfied (Shea & Parayitam, 2019). In the setting of online learning, students expect the course content and materials to be presented in a lively format, with a real-world example and link to practice needed skills (Siritongthaworn & Krairit, 2006).

Good course content and materials are important in shaping students' satisfaction. Paechter et al., (2010) stated that structured and coherent learning materials are a significant factor influencing students' satisfaction with the course. However, despite the significant relationship presented by most studies (Naveh et al., 2010; Parayitam et al., 2007), the weight of importance is different. For instance, although Siritongthaworn & Krairit (2006) supported the relationship between course content and satisfaction, they emphasized that the contribution of course content towards satisfaction is least significant compared to other factors. Thus, to examine the effect of course content on satisfaction in this study, it is hypothesized that:

H3: Course content is positively associated with satisfaction.

Intention

In understanding the intention to use new technology, recent studies have gone beyond initial acceptance by emphasizing the need to understand the continuous use (Joo et al., 2018). In the context of the varied learning environment, scholars have also highlighted the need to focus on continuance usage rather than just short-term usage (Daghan & Akkoyunlu, 2016). As a result,

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several studies on technology-based education have been expanded to cover continuance intention instead of only behavioral intention (Daghan & Akkoyunlu, 2016; Joo et al., 2018). Continuance intention, in short, could be understood as an intention to adopt or use a product or service again (Stone & Baker-Eveleth, 2013). Most studies on continuance intention have been developed based on the expectation-confirmation model adapted from the technology acceptance theory (Davis, 1989; Davis et al., 1989) and the theory of planned behavior (Ajzen & Fishbein, 1980).

Various studies have been conducted to examine the impact of satisfaction on intention. For example, in the context of e-learning in Saudi Arabia, Rajeh et al., (2021) proved that satisfaction indeed impacts intention. This finding is similar to that proposed by Taghizadeh et al., (2021) who confirm that satisfaction predicts continuance intention to use online learning among students in Oman, Iran, Bangladesh, Romania and Malaysia. It is also supported by Pozón-López et al., (2021), who found a positive relationship between students' satisfaction and their intention to use massive open online courses (MOOCs). Despite several studies being conducted on the impact of satisfaction towards intention, understanding of this relationship between the pandemic and the post-pandemic situation is still lacking. As such, in order to understand this, it is hypothesized:

H4: Satisfaction is positively associated with continuance intention.

Internet Connection

A good and stable internet connection is necessary for online learning. However, in less developed and certain developing countries, unreliable and the inexistence of internet connection posed a challenge to moving on to full online studies (Lapitan Jr. et al., 2021). In Malaysia, despite more than 80% internet penetration, the infrastructure gap between East Malaysia and West Malaysia is huge (Sia & Adamu, 2020). A study by Chung, Noor, and Mathew (2020) among Malaysian students indicated that more than 80% of the respondents stated the biggest challenge of online learning to be poor internet connectivity and limited broadband data. Some students even said that online learning during the pandemic is a bitter experience as the internet connection sometimes dropped during a crucial moment, such as attending online lectures, undertaking exams, and submitting course work (Basuony et al., 2020). Moreover, students stated being unable to interact and participate actively in the class due to the slow internet connectivity (Al-Amin et al., 2021).

Despite the important influence of a good internet connection on online learning, limited studies could be found incorporating this aspect in the model (Chung & Mathew, 2020). One of the studies available so far indicated that internet connection indeed has an impact on satisfaction and intention (Chung & Mathew, 2020). Results of the study showed that students with good internet connections were more satisfied with online learning compared to the other group facing internet connection problems. The study also stated that students with an average internet connection did not intend to continue studying online, while the intention to continue online learning increased for students with a good internet connection (Chung & Mathew, 2020). However, the study did not try to investigate the moderating role that may be played by internet connection on the relationship between satisfaction and intention. Thus, in order to understand this situation, in this study, internet connection is predicted to have a moderating role in the satisfaction-intention relationship. Thus, it is hypothesized:

H5: The positive relationship between satisfaction and continuance intention will be stronger with a good internet connection.

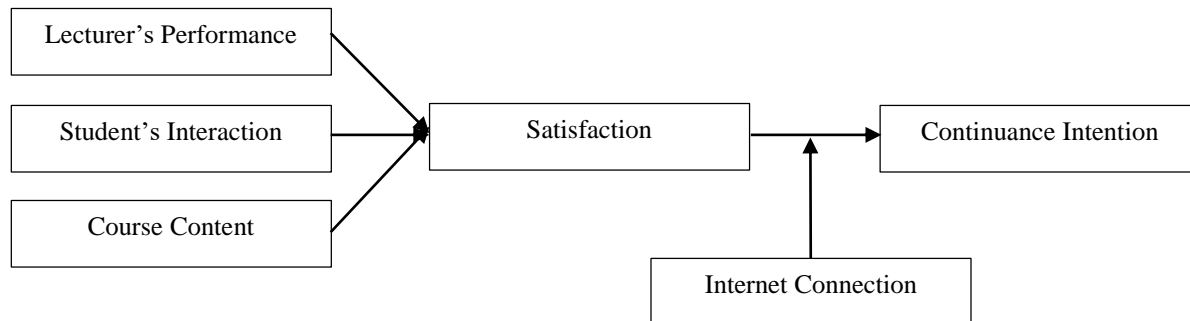Figure 1 diagrammatically explains the relationship among the constructs in this study.

Figure 1. Proposed conceptual model.

Methodology

Data collection

Using a survey method, data were collected from undergraduate and postgraduate students at the Universiti Kebangsaan Malaysia. The survey questionnaire was pre-tested with five potential respondents to ensure understanding and eliminate errors. The pre-testing also elicited comments on the contents, design, and format (Hulland et al., 2018).

A purposive sampling method was used to collect the data. Respondents were selected from those who are currently attending online classes during the Covid-19 pandemic in the year 2020. Questionnaires were distributed to students during the online class, and students were instructed to submit the online questionnaire once completed. A total of 305 usable questionnaires were collected after discarding 45 questionnaires due to several issues, such as non-response and straight lining. The sample size is considered sufficient as it exceeds the minimum size of 92 required by G-power analysis with a 0.15 effect size at an 80% power level (Hair et al., 2017). The respondents were primarily female (68.2%), between the age of 18 to 20 (66.9%), and currently undergoing their bachelor's degree programme (74.1%).

Research instrument

The measurement items were adapted based on the instrument created and tested by Taat and Francis (2020), Sher (2009), Pham et al., (2019), Wei & Chou (2020), as well as Chiu et al., (2007) as listed in Table 1. The seven-point Likert scale was used to measure the independent variables, while the five-point Likert scale was used to measure dependent variables. This practice was adopted as a procedural control to avoid common method variance during the data collection stage (Podsakoff et al., 2003). The questionnaire also included questions on respondents' profiles such as gender, age, and education level.

Table 1. Measurement items.

Constructs	Items
Lecturer's performance	Lecturers are excited to teach the class.
	The style of the lecturers' delivery caught my attention.
	The lecturers are student-friendly.
	Lecturers handle e-learning effectively.
	The lecturer encourage students to participate in the class.
Student interaction	There is a good collaboration among students during assignments.
	There is good communication among students for group assignments.
	There is an opportunity to share the learning experience with other students.
	A sense of community existed with fellow students.
Course Content	The course materials used in online learning are practical.
	The test and quizzes conducted through the online platform are reasonable in length and difficulty.
	The course materials provided during online learning are useful.
	The assignments assigned during online learning are reasonable in length and difficulty.
	The course materials provided during online learning challenge me to think.
Satisfaction	I am satisfied with the learning content and course structure.
	I am satisfied with the learning materials.
	I am satisfied with the group projects for the course assignment.
	I am satisfied with the instructional style.
	Overall, I am satisfied with the online learning session that I attended.
Intention	If given a choice, I will continue to use online learning next semester.
	I would recommend my friends to attend online learning sessions.
	I intend to continue attending online learning sessions.
Internet connection	I have a stable internet connection.
	I have sufficient internet data to attend an online class.
	I have a strong internet connection.
	I have no problem with my internet connection.
	I am able to easily access the Internet as needed for my studies.

Data analysis

The partial least square structural equation modelling (PLS-SEM) approach was used to test the data. The proposed research model was analyzed using SmartPLS version 3.3.3. Data was assessed in two stages: the assessment of the measurement model and the assessment of the structural model, as suggested by Hair et al., (2017).

Measurement model

In order to assess the reflective measurement model, factor loadings, composite reliability (CR), and average variance extracted (AVE) were scrutinized (Hair et al., 2017; Ramayah et al., 2018). Table 2 shows that all factor loadings exceeded the recommended value of 0.708 (Hair et al., 2017). The AVE scores are more than the cut-off value of 0.50 (Bagozzi & Yi, 1988), while the composite reliability value was greater than the threshold value of .70 (Gefen et al., 2000).

Table 2. Assessment of internal consistency and convergent validity

Construct	Item	Loading	CR	AVE
Lecturer's performance	Lect1	0.876	0.942	0.763
	Lect2	0.864		
	Lect3	0.867		
	Lect4	0.903		
	Lect5	0.858		
Students' interaction	Studint1	0.929	0.954	0.837
	Studint2	0.906		
	Studint3	0.924		
	Studint4	0.901		
Course content	Course1	0.854	0.912	0.722
	Course2	0.872		
	Course3	0.854		
	Course4	0.819		
Satisfaction	Sat1	0.900	0.944	0.770
	Sat2	0.848		
	Sat3	0.858		
	Sat4	0.891		
	Sat5	0.889		
Intention	Intention1	0.957	0.965	0.902
	Intention2	0.942		
	Intention3	0.951		
Internet connection	Internet1	0.934	0.968	0.860
	Internet2	0.864		
	Internet3	0.948		
	Internet4	0.937		
	Internet5	0.950		

The discriminant validity was examined using the Heterotrait Monotrait (HTMT) technique (Henseler et al., 2015). Table 3 shows that the HTMT of all the constructs does not violate the threshold value of 0.90. Thus, discriminant validity is established with HTMT$_{.90}$. In short, the measurement model confirms the presence of convergent and discriminant validity across the constructs of interest.

Table 3. Heterotrait Monotrait (HTMT) Criterion for Discriminant Validity.

	1	2	3	4	5	6
1 Lecturer's performance						
2 Students 'interaction	0.668					
3 Course content	0.812	0.758				
4 Satisfaction	0.809	0.803	0.863			
5 Intention	0.495	0.696	0.611	0.662		
6 Internet connection	0.618	0.681	0.727	0.755	0.591	

Structural model

Before analyzing the structural model, it is important to ensure no full collinearity issues exist in the model. Hence, the variance inflation factors (VIF) are examined to identify multicollinearity issues. Table 4 shows that the VIFs range from 1 to a maximum value of 2.904, which is below the most adopted threshold value of 3.33 (Diamantopoulos & Siguaw, 2006), indicating that multicollinearity is not an issue.

Table 4. Full collinearity test.

Construct	VIF
Lecturer's performance	2.328
Students' interaction	2.231
Course content	2.904
Internet connection	2.070
Satisfaction	1.000
Intention	

Following the guideline for non-parametric tests, a bootstrapping technique of 5000 resamples was then conducted to test the hypotheses. The bootstrapping results shown in Table 5 indicate that all the hypotheses are supported. The results show significant paths pertaining to the lecturer's performance on satisfaction (β=0.296, p<0.01), students' interaction on satisfaction (β=0.342, p<0.01), and course content on satisfaction (β=0.327, p<0.01), thus supporting H1, H2, and H3. The analysis also confirms that satisfaction has a positive effect on continuance intention (β=0.623, p<0.01), providing support for H4.

Table 5. Assessment of structural model.

Path Hypotheses		Std. beta	Std. error	t-value	Decision	R^2	f^2	Q^2
H1: Lecturer's satisfaction	=>	0.296	0.055	5.420	*Supported*		0.142	
H2: Students' satisfaction	=>	0.342	0.051	6.690	*Supported*		0.218	
H3: Course satisfaction	=>	0.327	0.060	5.409	*Supported*	0.729	0.150	0.556
H4: Satisfaction intention	=>	0.623	0.039	16.143	*Supported*	0.389	0.636	0.346
H5: Satisfaction*internet => intention		0.109	0.037	2.883	*Supported*	0.434	0.035	

The value of the f^2, on the other hand, shows that all the relationships possessed a substantive impact on the outcome. The f^2 value of the lecturer's performance (0.142) indicates a small yet significant effect size in generating the R^2 for satisfaction (Chin, 2010). Students' interaction (0.218) and course content (0.150) has a medium impact on satisfaction. On the other hand, satisfaction (0.636) has a large effect on continuance intention.

Lastly, in order to determine the predictive relevance (Q^2) of the model, a blindfolding technique was performed. The result shows that the value of satisfaction (0.556) and continuance intention (0.346) are larger than zero, indicating that the model has sufficient predictive relevance. Hence, it can be concluded that the predictors in the current model possess the capacity to predict satisfaction and intention in the given context.

Moderating effect of internet connection

To test H5, moderation analysis was performed with satisfaction as the independent variable and continuance intention as the dependent variable. Results in Table 5 demonstrate a positive interaction between satisfaction and internet connection towards continuance intention (β=0.109,

$p<0.01$), thus H5 is supported. Although the effect size f^2 is small (0.035), it is believed to be substantially significant to the implications of the study (Chin et al., 2003).

The significant interaction is further examined using an interaction plot, as suggested by Dawson (2014). The interaction plot in figure 2 shows that when the internet connection is good (dotted line), the relationship between satisfaction and continuance intention is stronger. Hence, H5 is supported.
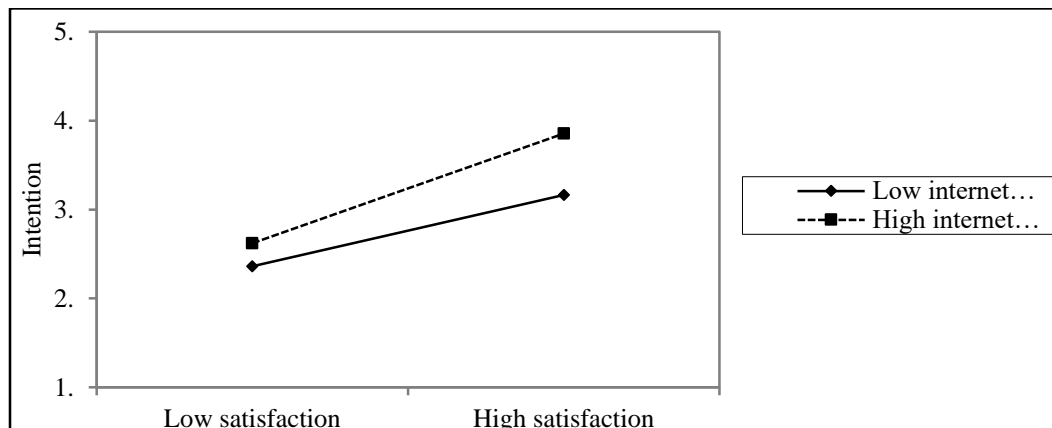

Figure 2. Internet connection moderates the relationship between satisfaction and continuance intention.

Discussion

Understanding factors influencing students' satisfaction is important as studies show that satisfaction contributes to influencing students' achievement (Shin & Kang, 2015) and loyalty (Pham et al., 2019). In view of this, the present study was conducted to determine factors influencing students' satisfaction with the online learning session conducted during the Covid-19 pandemic. Academically, the results of the study provide evidence that the lecturer's performance, students' interaction, and course content is strongly associated with satisfaction. These findings are consistent with the findings of Daultani et al., (2021), who found a significant relationship between lecturer's performance and students satisfaction and Parahoo et al., (2016), which demonstrated an impact of student interaction towards satisfaction. Among the three factors, the beta value shows that students' interaction plays a bigger role in influencing satisfaction, followed by the course content and lecturer's performance, which is in line with Parahoo et al., (2016). Thus, in the setting of online learning, it is important for the university management to provide platforms such as online forums, blogs, webinars, and chat groups where students can interact with each other to ensure continuous satisfaction (Parahoo et al., 2016). Further, lecturers also could play a role by providing group work and assignments so that students can be in active interaction with each other. On the other hand, in support of the significant role of course content in influencing satisfaction, it is important to ensure that the programme objective, teaching strategies, and materials are suitable for the online learning situation. Further, to increase satisfaction, lecturers also need to ensure their performance and interaction are suitable for the online and distance learning context and to familiarize themselves with the advanced technology and different methods

of communication. In addition, several practical activities also could be used including virtual simulation, virtual lab, augmented reality and virtual reality. Not only, for courses that have received micro-credential accreditation, it would also be a good time to run the program effectively ((MQA), 2021; KPT, 2021).

Moreover, the study exerts that satisfaction plays a significant impact on students' intention to continue studying online. This is similar to various studies conducted previously, which have proven the critical role of satisfaction in influencing continuance intentions (Daghan & Akkoyunlu, 2016; Sultan & Wong, 2018). Although the country has transitioned to the endemic phase, classes still continued through an online platform, thus, it is important for the university management to ensure that students are satisfied with their online learning sessions. In order to do this, the three factors discussed earlier, are important, as the study has proved that these factors indeed play a crucial role in influencing students' satisfaction, thus leading to continuance intention.

Finally, the study provides evidence to support the moderating effect of internet connection on the path relationship between satisfaction and intention. A good internet connection significantly increases the relationship between satisfaction and continuance intention, which implies that highly satisfied students would have a high continuance intention if the internet connection is good. However, if the internet connection is bad, the relationship between satisfaction and intention would also be affected. Hence, this provides strong evidence for various parties especially the government to be seriously involved to ensure the internet connection in the country is at an adequate level to enable online learning to be conducted comfortably. It is not only the responsibility of the university to ensure online learning could be continued, but it is also the obligation of the telecommunication provider to ensure the internet network service is of good quality and the role of the government to guarantee a good infrastructure throughout the country.

Conclusion

In conclusion, the study reveals factors influencing students' satisfaction towards online learning during the pandemic period, which are lecturers' performance, students' interaction and course content. The study also shows that satisfaction plays a role in influencing continuance intention, while internet connection moderates this relationship. Hence, it is important not only for the academicians and university management but also for the government and private sector to play their part to ensure that teaching and learning could be conducted smoothly using an online platform. Nonetheless, the study is not without limitations. The non-probabilistic sampling used may limit the generalizability of the findings, especially as it involves students in Universiti Kebangsaan Malaysia only. Future studies may involve more universities in Malaysia to get a better picture of the hypothesized relationships. In addition, several other constructs could also be included in future studies, such as supportive family and home conditions, which may affect students' intention to continue online studies.

Acknowledgement

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