

Investigating Factors Affecting Continuance Intention of Malaysian Higher Education Students Towards Online Distance Learning for Further Studies

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Abstract

Getting students to register for open and distance learning universities is challenging, but keeping them in the system is an even greater challenge. High attrition rates have been a noxious issue in open and distance learning. Hence, this study aims to assess the link between factors that will influence learners' desire to continue their studies in an open and distance learning university. The research framework is based on the four key independent variables: information quality, system quality, sociability quality, and self-managed learning; satisfaction as a mediating variable; and continuation intention as the dependent variable. The variables have been adapted from the Information System Success Model to fit the context of open and distance learning. Aside from the ISS Model, the mediating variable is derived from the consumer behaviour literature's Expectation Confirmation or Disconfirmation Theory. In addition, Planned Behavior and Social Cognitive Theories serve as the foundation for the study's other elements. The research methodology collected quantitative data using survey instruments. Structural Equation Modeling (SEM) statistics techniques were used for data analysis. Because of its capacity to analyze data, the PLS-SEM approach was used for the second step of data analysis. This study will provide important insights into how open and distance learning institutions may use useful retention tactics to increase the graduation rate of OUM students.

Keywords: Distance Learning, Online Learning, Health, ISS, EDT, PLS.

Introduction

Distance education mode also known as online distance learning (ODL) has become increasingly popular in recent years due to its convenience, affordability, and accessibility. Online learning is proven to be effective in achieving learning outcomes comparable to traditional classroom-based instruction. Simonson, Smaldino, and Zvacek (2019) note that ODL can be characterized by its flexibility, accessibility, and potential for learner-centeredness. They also highlight the importance of designing ODL courses and programs with attention to instructional design principles, learner support, and assessment. Online distance learning can take many forms, including fully online and hybrid-based blended

courses. a combination of online and face-to-face teaching, and Massive Open Online Courses (MOOCs) that are open to anyone interested in the subject.

According to Moore and Kearsley (2012), ODL is a learning and teaching process that uses a wide spectrum of technologies to achieve its goals. The 2017 Digital Learning Compass Distance Education Enrolment Report (Allen and Seaman, 2017) provides data on trends in online learning in the United States, including the growth of fully online programs and the increasing prevalence of blended or hybrid courses. The report found that the overall number of students enrolled in distance education courses has increased steadily over the past decade. In 2015, over 6 million students took at least one distance education course, which represents a 3.9% increase from the previous year. Online education is a crucial element of quality education, and it possesses distinct qualities that support the continuous growth of education. Some of these attributes include cost-effectiveness, convenience, flexibility, efficient repetition, accessibility to a diverse range of learners, extensive learning resources, and a low entry barrier (Ramayah, 2019).

There are several challenges faced by students in ODL, including time management, technical issues, and lack of social interaction (Azilawati and Norizan, 2020). The acquisition of proficiency in utilizing novel technological tools for online instruction by educators presents a challenge in cultivating student engagement in virtual learning environments. This assertion is supported by a study conducted by Zheng et al (2021) which revealed that students' participation and satisfaction with online classes were positively correlated with instructors' technical competence and their ability to utilize diverse technology-based pedagogical approaches. Furthermore, a survey conducted by the Babson Survey Group (2020) found that 68% of faculty members reported that their level of proficiency with online instruction tools was a barrier to providing high-quality online education. Consequently, it is imperative for institutions to provide adequate training and support to their teaching staff to ensure that they possess the necessary skills and knowledge to effectively utilize technology in online instruction, thereby enhancing the overall quality of virtual learning experiences for students. The issues of low retention and high dropout rates among online learners have become more noticeable with the swift advancement of online education. This study aims to investigate the role of information quality (IQ) and sociability quality (SCQ) in enhancing student satisfaction (SAT) and intention (INT) to continue with ODL among students enrolled in higher education institutions in Malaysia. A study by Azilawati and Norizan (2020) found that students' satisfaction with online learning platforms significantly influenced their intention to continue using them. Yeh and Huang (2018) found a factor that influences learners' satisfaction and continuance intention in ODL is IQ.

IQ plays a critical role in the success of ODL programs, and ODL institutions must prioritize the provision of high-quality information to students to ensure their satisfaction, engagement, and continued enrolment. The quality of the information provided to students can affect their ability to comprehend and apply knowledge, as well as their satisfaction with the learning experience (Alalwan et al., 2020). Students who perceive high IQ in ODL tend to have more positive attitudes toward online learning and are more likely to recommend it to others (Al-Fraihat et al., 2019). Their study found that sociability quality, including social interaction and social support, had a significant positive effect on learners' satisfaction and continuance intention.

Online Distance Learning programs in Malaysia reported high levels of satisfaction with the flexibility and accessibility of online courses, which are key features of ODL. (Alqurashi, 2019).

Kim and Frick (2011) found that information quality, such as the accuracy and timeliness of course materials, was a significant predictor of student satisfaction with online courses in Malaysia. Previous studies have highlighted the importance of information quality (IQ) and sociability quality (SCQ) in predicting student satisfaction and intention to continue with ODL. A study conducted by Al-Fraihat et al (2020) found that IQ was positively associated with student SAT and INT to continue with ODL. Similarly, Lee and Choi (2011) found that SCQ, which includes social presence and interaction, positively influenced students' SAT and INT to continue with ODL. Information quality and sociability quality significantly positively affected online distance learning students' satisfaction and intention to continue with online learning (Wu and Wu, 2019).

Literature Review

Information Quality

The quality of the information provided to ODL students has been identified as a crucial factor in determining their INT to continue using e-learning systems. Various studies have shown that IQ positively influences students' continuance intention, indicating a significant relationship between these variables. Chang & Hsu (2011) found that students who perceived higher information quality were more likely to continue using the e-learning systems. Information quality had a positive effect on both satisfaction and loyalty, indicating that providing high-quality information could lead to higher satisfaction and loyalty among e-learning users (Lee and Choi, 2011). A study by Al-Rahmi and Zeki (2014) found that students who perceived higher information quality were more likely to use e-learning systems. Information quality plays a critical role in enhancing students' intention to continue using ODL and providing high-quality information can lead to higher satisfaction, loyalty, and usage among e-learning users.

Satisfaction

Satisfaction can be defined as the degree to which a student's expectations are met or exceeded regarding the quality of the ODL experience (Chiu & Wang, 2008). One of the key factors that contribute to satisfaction in ODL is perceived usefulness, which is the degree to which students perceive the learning experience as useful in achieving their goals (Al-Fraihat et al., 2020). Studies have found that perceived usefulness is positively correlated with student SAT (Kuo et al., 2014; Al-Fraihat et al., 2020). SAT with ODL is perceived ease of use, which refers to the degree to which students find the ODL platform easy to use and navigate (Kuo et al., 2014; Al-Fraihat et al., 2020). Studies have found that students who perceive the ODL platform as easy to use are more likely to be satisfied with their ODL experience (Kuo et al., 2014; Al-Fraihat et al., 2020). Perceived usefulness and ease of use, other factors that have been found to contribute to student satisfaction in ODL include interaction with instructors and other students, course content and materials, and the quality of technical support (Chiu & Wang, 2008; Al-Fraihat et al., 2020).

Sociability Quality

Sociability Quality in ODL is social presence, which is the degree to which students feel like they are part of a social community in the online learning environment (Garrison & Anderson, 2003). Social presence can be facilitated through various forms of interaction, such as discussion forums, group projects, and live chat sessions (Garrison & Anderson, 2003). Kirschner & Karpinski (2010) found that sociability refers to the degree to which students feel

connected to their instructors and peers in the online learning environment. Studies have found that social presence is positively correlated with student satisfaction and continuance intention in ODL (Kirschner & Karpinski, 2010; Al-Fraihat et al., 2020). The sociability that has been found to influence student satisfaction and continuance intention include instructor and peer support, a sense of community, and collaborative learning (Al-Fraihat et al., 2020; Kirschner & Karpinski, 2010).

Research Hypotheses

The quality of the information provided to ODL students has been identified as a crucial factor in determining their INT to continue using ODL. Various studies have shown that IQ positively influences students' continuance intention, indicating a significant relationship between these variables. A study conducted by Chang and Hsu (2011) in Taiwan found that IQ was a significant predictor of continuance intention. Lee and Choi (2011) investigated the relationship between e-learning system service quality and users' satisfaction and loyalty in Korea, finding that IQ had a positive effect on both SA and loyalty. Al-Rahmi and Zeki (2014) also found IQ to be a significant predictor of INT to use of e-learning among university students in Malaysia. Chu and Hwang (2011) investigated the INT to continue using e-learning systems among college students in Taiwan and reported that IQ positively influenced intention. Kuo and Chen (2015) examined the factors influencing the INT to use MOOCs among Taiwanese college students and found that IQ significantly predicted INT. These findings suggest that providing high-quality information to ODL students is essential to enhance their INT to continue using e-learning systems.

H1: There is a relationship between information quality and intention among online distance learning students to further study using online distance learning.

In the realm of ODL, it is important to examine the relationship between IQ and SAT among students to further their studies. A number of studies have explored this relationship and found significant support for H2. Wang and Li (2017) investigated the factors influencing continuance intention to use ODL among undergraduate students in China and found that IQ positively influenced user SAT. Similarly, Huang and Liaw (2018) examined the factors affecting learner SA in Massive Open Online Courses (MOOCs) and found that IQ was a significant predictor of learner SAT. Liao and Chen (2019) found that IQ was a significant predictor of learner SAT in their study investigating the factors influencing learner SAT in online courses. Rezaei and Daneshfar (2018) examined the factors influencing learner SAT in online higher education in Iran and found that IQ was also a significant predictor of learner SAT. Finally, Chen, Hu, and Liao (2018) investigated the factors affecting the continuance intention to use MOOCs among Chinese learners and found that IQ positively influenced user SA.

H2: There is a relationship between information quality and satisfaction among online distance learning students to further study using online distance learning.

A study by Yang and Liu (2017) found that SA was positively related to students' INT to continue using ODL platforms. Similarly, a study by Kuo and Belland (2016) found that SA with ODL was a significant predictor of students' intention to continue using online learning. Furthermore, several factors have been identified as influencing students' SA and INT to

continue with ODL. For instance, a study by Liaw and Huang (2013) found that course content, instructor support, and technology support were all important predictors of SA with ODL. Another study by Sangra et al. (2015) found that perceived usefulness, ease of use, and perceived enjoyment were all significant predictors of students' intention to continue using ODL platforms. A study by Sun et al. (2018) found that perceived value, which includes factors such as the quality of instruction, program reputation, and personal and professional benefits, was a more significant predictor of INT continuing with ODL than SA. Similarly, a study by Lin and Lin (2020) found that social presence, or the degree to which students feel connected to their instructors and peers, was a significant predictor of INT continuing with ODL.

H3: There is a relationship between satisfaction and intention among online distance learning students to further study using online distance learning.

Wang et al. (2020) found that sociability quality, specifically social presence, social interaction, and social support, is positively related to students' satisfaction and intention to continue with online learning (Arbaugh & Duray, 2002; Alqurashi, 2019; Chen & Jang, 2010; Hung et al., 2018; Kang & Im, 2017; Lin & Lin, 2020). For instance, Kang and Im (2017) and Lin and Lin (2020) found that social presence was a significant predictor of intention to continue with online learning, while Alqurashi (2019) and Hung et al. (2018) found that social interaction and social support, respectively, were positively related to students' intention to continue with online learning. Arbaugh and Duray (2002) and Chen and Jang (2010) found that social interaction and social support, respectively, were significant predictors of students' satisfaction and intention to continue with online learning. Both social presence and social support were significant predictors of students' intention to continue with online learning and mediated the relationship between students' satisfaction and intention (Wang et al., 2020).

H4: There is a relationship between sociability quality and intention among online distance learning students to further study using online distance learning.

Several studies have shown that there is a positive relationship between sociability quality and satisfaction among online distance learning students who intend to further study using online distance learning. Specifically, social interaction, social presence, and social support have all been found to be significant predictors of students' satisfaction with online courses (Arbaugh and Duray, 2002; Kim and Frick, 2011; Hung et al., 2018; Wu and Wu, 2019). These findings suggest that enhancing sociability quality may lead to greater satisfaction and intention to continue with online learning and highlight the importance of promoting social interaction, social presence, and social support in online distance learning environments.

H5: There is a relationship between sociability quality and satisfaction among online distance learning students to further study using online distance learning.

Research suggests that information quality has a significant effect on the intention of online distance learning students to further their studies and that this relationship is mediated by satisfaction. Specifically, several studies have found that information quality is a significant predictor of both satisfaction with online courses (Lin and Lin, 2020; Wang et al., 2020) and intention to continue using online learning platforms (Wu and Wu, 2019; Yeh and Huang, 2018). Furthermore, satisfaction has been shown to mediate the relationship between

information quality and the intention to continue with online learning (Chang and Hsu, 2011; Wu and Wu, 2019). These findings suggest that enhancing information quality may lead to greater satisfaction and intention to continue with online learning and highlight the importance of promoting high-quality information in online distance learning environments.

H6: There is a mediating effect of satisfaction on the relationship between information quality and intention among online stance learning students to further study using online distance learning.

Research has shown that sociability quality is positively related to both satisfaction with online courses (Alqurashi, 2019; Hung et al., 2018) and intention to continue using online learning platforms (Kang and Im, 2017; Wang et al., 2020). Furthermore, satisfaction has been found to mediate the relationship between sociability quality and the intention to continue with online learning (Chen and Jang, 2010; Hung et al., 2018). Lin and Lin (2020) found that social presence had a significant positive effect on both satisfaction and intention to continue with online learning. Social interaction was found to be a significant predictor of students' satisfaction with online courses (Albaugh and Duray, 2020). Park and Choi (2009) found that social support from peers and instructors was positively related to students' satisfaction with online learning. Social presence and social support were both significant predictors of satisfaction with online learning, and that satisfaction partially mediated the relationship between social presence/support and intention to continue with online learning (Lee and Choi (2011).

H7: There is a mediating effect of satisfaction on the relationship between sociability quality and intention among online stance learning students to further study using online distance learning.

Figure 1 depicts the research framework which is that Information Quality, Sociability Quality and Satisfaction are Independent Variables (IV), while Intention is a Dependent Variable for this research.

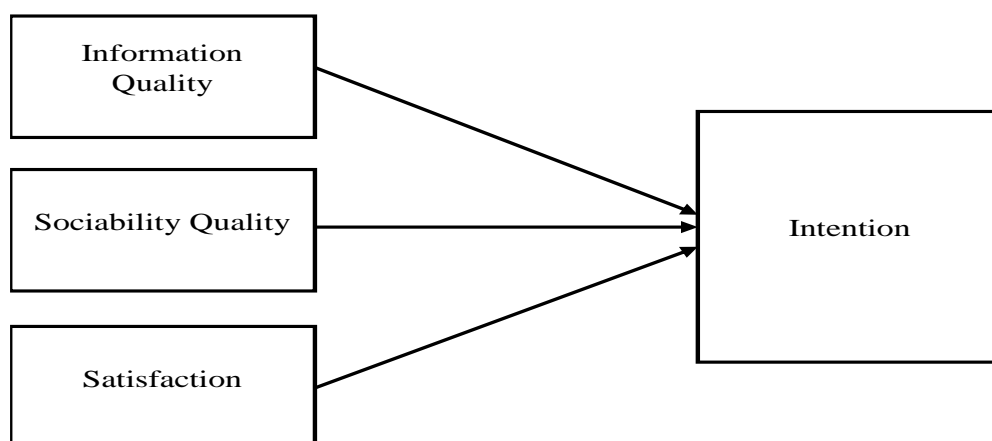


Figure 1: Theoretical Framework

Methodology

The participants for this study were students enrolled in open and distance learning higher education institutions in Malaysia. The researchers collected primary data through a survey instrument that consisted of 18 observed variables, including exogenous, mediating, and endogenous variable measurements. To develop the measurement items used in the survey questionnaire, previous studies were thoroughly assessed to obtain reliable and valid measurements regularly used in research. The survey was sent to the targeted respondents through email, and the non-probability sampling technique of purposive sampling was used to collect data because a sample frame was unavailable. A total of 475 questionnaires were distributed, and 391 were returned, giving a response rate of 82.32%.

The responses were sufficient for data analysis using Structural Equation Modelling (SEM) after removing outliers and screening the data, leaving 363 clean questionnaires ready for analysis. The constructs measured in the survey questionnaire were information quality (IQ), sociability quality (SCQ), satisfaction (SAT), and intention (INT), with IQ and SCQ constructs, consisting of four measurement items and SA and INT consisting of five measurement items. A five-point Likert scale ranging from strongly disagree to strongly agree was used to measure all the constructs' measurement items.

This study aims to enhance response quality and rate while minimizing the frustration of the participants (Babakus & Boller, 1992; Sachdev & Verma, 2004). The data collected were screened and cleaned with the help of SPSS 18 prior to the actual analysis. As suggested by Hair, Hult, Ringle, & Sarstedt, (2017), the data analysis was carried out using partial least squares–structural equation modelling (PLS-SEM), and the software Smartpls4 (Ringle, et al., 2022) was used for this purpose. The PLS-SEM technique was adopted for this study due to its assessment ability (Black et al., 2022).

Respondents profiles

The profile of the respondents provides information on their gender, age, marital status, level of education, and employment status. Out of the total respondents, 71.1% were male, while 28.9% were female. In terms of age, the majority of respondents (49.9%) were under the age of 30, followed by 42.4% who were between 31 to 40 years old. A small percentage of the respondents were aged between 41-50 (5.5%) and 51-60 (2.2%). As for marital status, 58.4% of the respondents were married, 36.9% were single, and only 4.7% were divorced. In terms of educational background, most of the respondents (52.9%) held a Bachelor's degree, followed by 23.7% who had a Diploma. A smaller percentage of the respondents held a Master's degree (20.1%) or a Doctorate (3.3%). Finally, the employment status of the respondents showed that the majority of them (54.5%) were employed in the private sector, while 36.9% worked in the public sector. Additionally, 8.3% of the respondents were entrepreneurs.

Data Analysis

Common Method Bias

In the management field, a common problem faced by researchers is the issue of common method bias, where variance in the study may not represent the variables, but instead reflect the measurement method used. To assess whether this was a concern in the present study, the researchers employed Harman's single-factor test method. The results showed that the principal factor only explained 38.72% of the variance, indicating that there was no common method bias in the study. This finding is consistent with the recommendation of Podsakoff

and Organ (1986), who suggest that when the principal component fraction accounts for less than 50% of the variance, there is no significant issue of common method bias.

Measurement Model

The study utilized the PLS-SEM algorithm to evaluate and confirm the validity and reliability of the constructs. According to Hair et al. (2021), two critical aspects of PLS-SEM are the reliability and validity of the outer goodness model. First, the specified model (Figure 2) was established, and after assessing the reliability and validity of the outer loading, one item from the IQ, one item of SCQ, two items of SAT, and one item of INT constructs were removed due to having a loading of less than 0.7. This resulted in the Average Variance Extracted (AVE) being below the threshold of 0.5, which indicated inadequate construct validity. Additionally, the Hetrotrait-Monotrait (HTMT) ratios did not meet the requirements due to low item loadings.

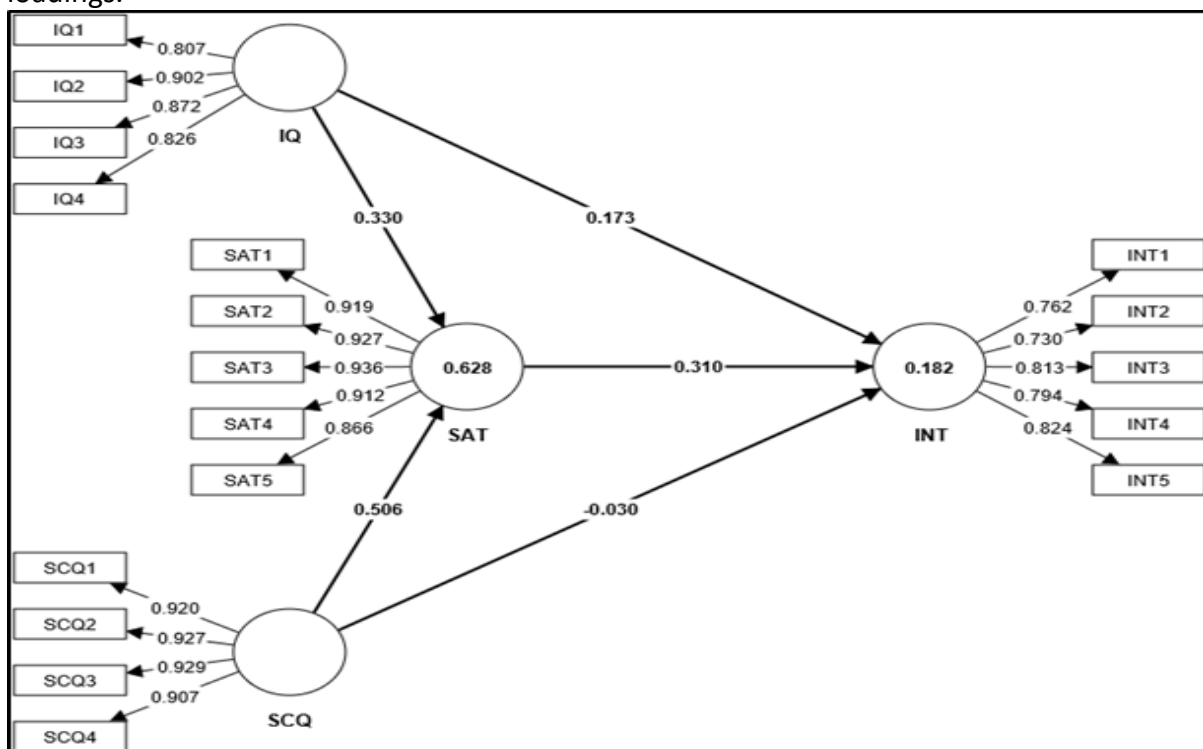


Figure 2: Specified Model

After creating the re-specified model (Figure 3) and deleting the lower loading items, all constructs achieved an AVE of at least 0.5, with a minimum of 0.609 and a maximum of 0.858 (Table 1). This showed that all constructs had established convergent validity. Moreover, all constructs' composite reliability ranged from 0.832 to 0.887, which exceeded the recommended threshold of 0.7 (Hair et al., 2017). The study also assessed the discriminant validity to ensure its presence by evaluating the cross-loading measurement items.

The assessment results showed that all item loadings were higher than their respective cross-loadings (Table 1). The discriminant validity was further assessed by examining the Hetrotrait-Monotrait (HTMT) ratios, which indicated that all four constructs' ratios were less than 0.9 (Table 2) as suggested by (Henseler et al., 2014). Therefore, the study demonstrated the reliability and validity of all latent constructs, as recommended by (Hair et al., 2021).

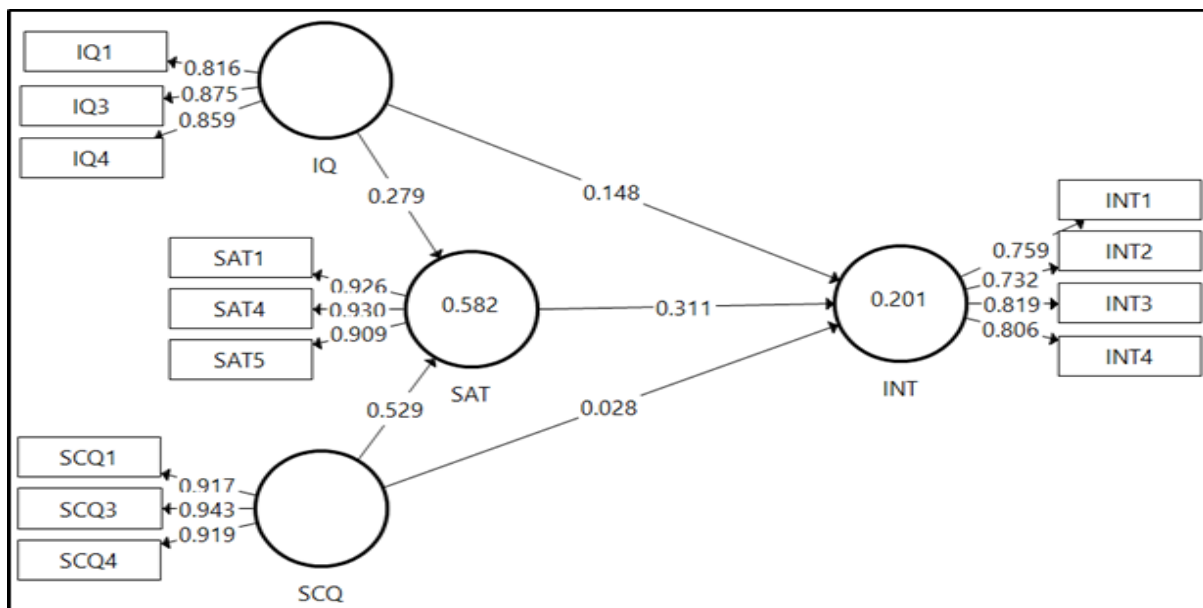


Figure 3: Re-specified Model

Based on the findings of the study, it can be concluded that the PLS-SEM algorithm was effective in evaluating and confirming the validity and reliability of the constructs. The study identified the importance of assessing the reliability and validity of the outer goodness model in establishing construct validity. After removing lower-loading items, all constructs achieved adequate AVE and composite reliability values, which demonstrated their convergent validity. Furthermore, the study found that the cross-loading measurement items had higher loadings than their respective cross-loadings, and all four constructs' HTMT ratios were less than 0.9, indicating discriminant validity. Overall, the study provided evidence for the reliability and validity of the latent constructs, supporting the use of the survey instrument in measuring information quality, sociability quality, satisfaction, and intention in the context of open and distance learning in Malaysia.

Table 1 presents the construct reliability and validity and cross-loading results for the study's three constructs: INT, IQ, and SCQ. The table reports the loadings for each of the four items measuring INT, the three items measuring IQ, the three items measuring SAT, and the three items measuring SCQ. The table shows that all items have high loadings (greater than 0.7) on their respective constructs, indicating good construct validity. Additionally, the composite reliability (CR) values are all above the recommended threshold of 0.7, indicating good internal consistency reliability. The average variance extracted (AVE) values are also high, indicating good convergent validity. Overall, the results suggest that the measurement model used in the study has good reliability and validity, supporting the use of these constructs in the analysis of the research questions.

Table 1

Construct Reliability & Validity and Cross Loading

Construct	Loadings	INT	CA	CR	AVE
INTENTION	INT1	0.759	0.810	0.861	0.609
	INT2	0.732			
	INT3	0.819			
	INT4	0.806			
INFORMATION QUALITY	IQ1	0.816	0.809	0.887	0.723
	IQ3	0.875			
	IQ4	0.859			
SATISFACTION	SAT1	0.926	0.817	0.832	0.850
	SAT4	0.930			
	SAT5	0.909			
SOCIABILITY QUALITY	SCQ1	0.917	0.876	0.884	0.858
	SCQ3	0.943			
	SCQ4	0.919			

Table 2 shows the HTMT (Hetrotrait-Monotrait) ratios between the constructs of INT, IQ, SAT, and SCQ. The HTMT ratio is a measure of discriminant validity, which assesses whether the constructs in the model are distinct from each other. A value of less than 0.9 indicates that there is sufficient discriminant validity between the constructs. In this case, the HTMT ratios are all below 0.9, suggesting that the constructs have good discriminant validity, meaning that they are distinct from each other.

Table 2

Hetrotrait-Monotrait (HTMT) Ratio

	INT	IQ	SAT
IQ	0.408		
SAT	0.428	0.784	
SCQ	0.345	0.882	0.808

Structural Model

The structural model was evaluated by calculating the path coefficient (β) and coefficient of determination (R^2) value, using the Partial Least Squares (PLS) technique to analyze 5000 sub-samples for path coefficient significance. The results are presented in Table 3, which includes the path coefficient, t-statistics, p-value, and confidence interval for hypothesis testing. Hypothesis 1 suggested that IQ has a positive influence on INT. However, the statistical result indicated that this influence is not significant ($\beta=0.148$, $t=1.683$, $p=0.093$), thus not supporting H1. Hypothesis 2 predicted that IQ has a positive influence on SA, which was supported by the statistical result ($\beta=0.279$, $t=5.003$, $p=0.000$). Hypothesis 3 suggested that SA has a positive influence on INT, which was also supported by the statistical result ($\beta=0.311$, $t=3.036$, $p=0.003$). Hypothesis 4 suggested that SCQ has a positive influence on INT, but the statistical result indicated that this influence is not significant ($\beta=0.028$, $t=0.268$, $p=0.789$), thus not supporting H4.

Hypothesis 5 predicted that SCQ has a positive influence on SAT, which was supported by the statistical result ($\beta=0.529$, $t=8.789$, $p=0.000$). To assess the mediating relationship hypotheses, the researchers considered the estimated path coefficient statistically significant

when the p-value is less than or equal to 0.05, or when 0 is not straddled between the lower and upper-level confidence intervals. Hypothesis 6 suggested that satisfaction mediates the relationship between information quality and intention, which was supported by the statistical result ($\beta=0.087$, $t=2.625$, $p=0.009$, $LLCI=0.031$ $ULCI=0.157$). Similarly, Hypothesis 7 predicted that satisfaction mediates the relationship between sociability quality and intention, which was supported by the statistical result ($\beta=0.164$, $t=2.663$, $p=0.008$, $LLCI=0.054$ $ULCI=0.289$).

Table 3

Hypotheses Testing Results

	Beta	T Statistics	P Values	2.50%	97.50%	Decision
				-		
IQ -> INT	0.148	1.683	0.093	0.012	0.313	<i>Not Supported</i>
IQ -> SAT	0.279	5.003	0.000	0.165	0.387	<i>Supported</i>
SAT -> INT	0.311	3.036	0.003	0.120	0.502	<i>Supported</i>
				-		
SCQ -> INT	0.028	0.268	0.789	0.166	0.242	<i>Not Supported</i>
SCQ -> SAT	0.529	8.789	0.000	0.401	0.639	<i>Supported</i>
IQ -> SAT -> INT	0.087	2.625	0.009	0.031	0.157	<i>Supported</i>
SCQ -> SAT -> INT	0.164	2.663	0.008	0.054	0.289	<i>Supported</i>

Table 3 presents the results of the path analysis conducted to examine the relationships among the constructs. The table shows the beta coefficients, t statistics, p values, and 2.50% and 97.50% confidence intervals for each path. The results indicate that the path from IQ to INT was not significant, with a beta coefficient of 0.148 and a p-value of 0.093, indicating that the data did not support the relationship between these two constructs. However, the path from IQ to SAT was significant, with a beta coefficient of 0.279 and a p-value of 0.000, indicating that IQ had a positive influence on satisfaction.

The path from SAT to INT was also significant, with a beta coefficient of 0.311 and a p-value of 0.003, indicating that satisfaction had a positive influence on the intention to continue using online distance learning. However, the path from SCQ to INT was not significant, with a beta coefficient of 0.028 and a p-value of 0.789, indicating that self-regulated learning strategies did not have a significant influence on the intention to continue using online distance learning. The path from SCQ to SAT was significant, with a beta coefficient of 0.529 and a p-value of 0.000, indicating that self-regulated learning strategies had a positive influence on satisfaction with online distance learning. The paths from IQ to SAT to INT and SCQ to SAT to INT were both significant, with beta coefficients of 0.087 and 0.164, respectively, indicating that satisfaction and self-regulated learning strategies had indirect positive influences on intention to continue using online distance learning.

Table 3 summarizes the hypotheses testing results. The VIFs, which indicate inflation factors of inner values, were all below the threshold of 5 and the highest value was 3.326 (Table 4). This low level of collinearity allowed for an accurate interpretation of the structural model coefficients. The R^2 value for the endogenous construct of intention was 0.201, indicating a moderate level of explained variance (Figure 3).

Table 4
VIF Collinearity

	INT	SAT
IQ	2.813	2.627
SAT	2.454	
SCQ	3.326	2.627

Table 4 presents the Variance Inflation Factor (VIF) values for the constructs of INT, SAT, IQ, and SCQ, which measure the degree of collinearity among the variables. The VIF values for IQ, SAT, and SCQ are all below the recommended threshold of 5, indicating that there is no significant multicollinearity issue among the constructs. This suggests that the constructs are independent and can be considered separate variables in the model. However, the VIF value for SAT in relation to IQ is 2.454, which is close to the threshold, indicating that there may be some correlation between these variables. Nonetheless, the VIF values overall indicate that there is no significant collinearity problem among the variables in the model.

The mediating construct, satisfaction, had an R^2 value of 0.582, indicating that the model could explain 58% of the variance in satisfaction. The model was also able to make predictions outside of the sample, and the PLSpredict procedure was used to evaluate the model's out-of-sample predictive power (Shmueli et al., 2016, 2019). The Q^2 values showed that the PLS-SEM predictions were better than the naïve mean value predictions (Table 5). Additionally, the root means square error (RMSE) of the PLS-SEM predictions was lower than that of the linear model (LM) prediction benchmark in six out of seven cases, demonstrating the model's predictive power (Table 5).

Table 5
PLS predicts

	RMSE PLS	RMSE LM	PLS-LM	$Q^2_{predict}$
INT4	0.632	0.635	-0.003	0.185
INT2	0.937	0.966	-0.029	0.365
INT1	0.944	0.949	-0.005	0.026
INT3	0.898	0.906	-0.008	0.046
SAT4	0.428	0.443	-0.015	0.509
SAT5	0.514	0.518	-0.004	0.418
SAT1	0.438	0.412	0.026	0.526

Table 5 shows the results of the PLS predictions for the constructs of INT and SAT. The table presents the root mean square error (RMSE) for PLS and linear regression (LM), the PLS-LM difference, and the $Q^2_{predict}$ value. INT, the RMSE PLS values range from 0.632 to 0.944, while the RMSE LM values range from 0.635 to 0.966. The PLS-LM difference ranges from -0.029 to 0.005, indicating that PLS performs slightly better than LM in some cases and slightly worse in others. The $Q^2_{predict}$ values range from 0.026 to 0.365, indicating that the PLS model explains between 2.6% to 36.5% of the variance in the constructs. SAT, the RMSE PLS values range from 0.428 to 0.514, while the RMSE LM values range from 0.412 to 0.443. The PLS-LM difference ranges from -0.015 to 0.026, indicating that PLS performs slightly better than LM in some cases and slightly worse in others. The $Q^2_{predict}$ values range from 0.418 to 0.526, indicating that the PLS model explains between 41.8% to 52.6% of the variance in the constructs. Overall, the PLS model performs reasonably well in predicting the constructs

of intention and satisfaction, with some variation in performance across different measures of the constructs.

An importance-performance analysis (IPMA) was conducted to further support the managerial implications of the study. This analysis combined the importance of latent variables that explain adoption and their performance, as shown in Table 6.

Table 6

Importance-Performance Map Analysis (IPMA)

	Total Effect	Performance
IQ	0.275	79.028
SAT	0.305	79.795
SCQ	0.122	83.342

Table 6 presents the results of the Importance-Performance Map Analysis (IPMA), which shows the total effect of each construct on the dependent variable (INT) and the performance of each construct. The table shows that SAT had the highest total effect on INT (0.305), followed by IQ (0.275), and SCQ (0.122). This suggests that both IQ and SAT are important factors influencing students' intention to continue using online distance learning, while SCQ has a relatively weaker effect. The table also shows the performance of each construct, with SCQ having the highest performance score (83.342), followed by SAT (79.795) and IQ (79.028). This suggests that the respondents perceived SCQ as having the highest performance in the study, while IQ and SAT were perceived to have slightly lower performance scores. Overall, the results of the IPMA suggest that both IQ and SAT are important factors influencing students' intention to continue using online distance learning in Malaysia, while SCQ has a relatively weaker effect but is perceived to have the highest performance score by the respondents.

Satisfaction had the strongest total effect (0.305) on intention, followed by information quality (0.275) and sociability quality (0.122). In terms of performance, sociability quality had the highest performance value (83.342), while information quality had the lowest performance value (79.028). Therefore, while sociability quality had the highest performance for intention, it also had the lowest importance value. This indicates that the management of ODL higher education institutions should focus on improving the importance of sociability quality among their students in order to positively influence the importance of sociability quality on continuance intention to use online distance learning systems. Based on the results presented in the study, several conclusions can be drawn. First, the study found that IQ does not have a significant influence on INT to use online distance learning systems, while SA does have a significant positive influence on INT. Additionally, SA has a positive influence on satisfaction (SAT), which in turn has a positive influence on INT.

The study also found that SCQ does not have a significant influence on INT, but does have a significant positive influence on SAT. Furthermore, SAT was found to be the strongest predictor of INT, followed by IQ and SAT. The study's findings also suggest that the management of ODL higher education institutions should focus on improving the importance of sociability quality among their students in order to positively influence the importance of sociability quality on continuance intention to use online distance learning systems. Finally, the study's results demonstrate the predictive power of the structural model, as evidenced by the Q2 values and RMSE comparisons. Overall, the study provides valuable insights into

the factors influencing students' intention to use ODL systems, which can inform the development of more effective and user-friendly systems in the future.

Discussion

The study utilized the PLS-SEM algorithm to evaluate and confirm the validity and reliability of the constructs. The researchers employed Harman's single-factor test method to assess whether there was an issue of common method bias in the study. The study found that the PLS-SEM algorithm was effective in evaluating and confirming the validity and reliability of the constructs. After removing lower-loading items, all constructs achieved adequate AVE and composite reliability values, which demonstrated their convergent validity. Furthermore, the study found that the cross-loading measurement items had higher loadings than their respective cross-loadings, and all four constructs' HTMT ratios were less than 0.9, indicating discriminant validity. The statistical analysis results of the path coefficients, t-statistics, p-value, and confidence interval are presented in Table 3, which includes the path coefficient and coefficient of determination (R²) value. The study found that IQ did not have a significant influence on INT, while IQ and SAT had a positive influence on SAT and INT, respectively. Additionally, SA had a positive influence on INT, and SCQ had a positive influence on SA and INT.

A study by Al-Rahmi and Zeki (2014) on e-learning adoption among Malaysian university students found that IQ was a significant predictor of intention to use e-learning. Similarly, a study by Chang and Hsu (2011) on ODL continuance INT among college students in Taiwan found that IQ positively influenced continuance intention. These findings are in line with the current study's finding that IQ had a positive influence on SAT among online distance learning students in Malaysia. The results suggest that IQ and SAT are both important factors in promoting students' intention to further study using ODL. For instance, Wang and Li (2017) conducted a study on the factors influencing continuance intention to use ODL among undergraduate students in China and found that SAT positively influenced continuance intention.

However, the finding that IQ did not significantly influence INT is surprising, given the importance of high-quality information in ODL environments. It is possible that this result may be specific to the context of the study, and further research is needed to confirm whether it is applicable to online distance learning in Malaysia. However, a study by Ramayah et al. (2014) investigated the factors influencing the intention to use learning management systems (LMS) among university students in Malaysia. The authors found that IQ was positively related to students' INT using a learning management system (LMS). Ahmad and Hussain (2017), examined the factors influencing the intention to use mobile learning among university students in Malaysia, the authors found that IQ was a significant predictor of the INT to use mobile learning.

On the other hand, the positive influence of satisfaction on intention is consistent with previous research in the field of online learning. This suggests that efforts to improve students' satisfaction with online distance learning may be an effective way to promote their intention to continue using this mode of learning. A study by Wang and Li (2017) on undergraduate students in China found that satisfaction had a significant positive effect on students' intention to continue using online distance learning. The findings also indicate that system and service quality are important factors in promoting student satisfaction and intention to further study using online distance learning. This highlights the importance of

ensuring that online learning platforms are reliable and user-friendly, and provide high-quality support and services to students.

Theoretical Implications

As a result, a growing body of research has focused on the factors that influence students' satisfaction and intention to continue with online learning. One key factor that has emerged from this research is the importance of sociability quality, which includes social interaction, social presence, and social support. Studies have consistently shown that sociability quality is positively related to students' satisfaction and intention to continue with online learning. For instance, Wang et al (2020) found that social presence and social support were significant predictors of students' intention to continue with online learning and mediated the relationship between satisfaction and intention. Kang and Im (2017); Lin and Lin (2020) found that social presence was a significant predictor of intention to continue with online learning, while Alqurashi (2019); Hung et al (2018) found that social interaction and social support, respectively, were positively related to students' intention to continue with online learning. Another important factor that has been found to influence satisfaction and intention to continue with online learning is information quality. Studies have consistently found that information quality is a significant predictor of both satisfaction with online courses and intention to continue using online learning platforms (Lin and Lin, 2020; Wang et al., 2020; Wu and Wu, 2019; Yeh and Huang, 2018). Moreover, satisfaction has been shown to mediate the relationship between information quality and the intention to continue with online learning (Chang and Hsu, 2011; Wu and Wu, 2019).

The theoretical implications of these findings are significant. First, they suggest that sociability quality and information quality are important factors that should be considered when designing and delivering online distance learning courses. For example, instructors could incorporate strategies to promote social interaction, such as online discussion forums and collaborative projects, or ensure that course materials are accurate and up-to-date. Second, these findings suggest that satisfaction plays a critical role in determining students' intention to continue with online learning. Therefore, instructors and course designers should strive to create an online learning environment that promotes satisfaction, which could in turn increase students' intention to continue with online learning. In conclusion, the importance of sociability quality and information quality in online distance learning cannot be overstated. By promoting social interaction, social presence, and social support, and ensuring high-quality information, instructors and course designers can create an online learning environment that is both satisfying and engaging, ultimately leading to greater intention to continue with online learning.

Managerial Implications

The findings of the studies discussed above have important managerial implications for online distance learning institutions.

- It is important for institutions to focus on enhancing the quality of the information provided to students. This includes not only the course content but also the technology and instructor support. Institutions should invest in technology that is user-friendly and easy to navigate, as well as provide sufficient instructor support to ensure that students are able to receive timely feedback and assistance when needed. By enhancing the quality of information, institutions can increase student satisfaction and intention to continue using online learning platforms.

- Institutions should focus on promoting sociability quality in online distance learning environments. This includes promoting social interaction, social presence, and social support. Institutions can create online communities where students can interact and support one another, as well as provide opportunities for students to engage with their instructors in real-time. By promoting sociability quality, institutions can increase student satisfaction and intention to continue with online learning.
- Institutions should consider the diverse needs and preferences of their students. For example, some students may prefer asynchronous learning, while others may prefer synchronous learning. Institutions should provide a variety of learning options to accommodate these preferences, as well as provide flexibility in terms of course schedules and deadlines. By accommodating the diverse needs of students, institutions can increase student satisfaction and intention to continue with online learning.
- Institutions should continuously evaluate and improve their online distance learning programs. This includes gathering feedback from students and instructors and monitoring the program's effectiveness in terms of student outcomes. By continuously evaluating and improving their programs, institutions can ensure that they are providing high-quality online learning experiences that meet the needs of their students.

In conclusion, the managerial implications of the findings of these studies suggest that institutions should focus on enhancing the quality of the information provided to students, promoting sociability quality in online distance learning environments, accommodating the diverse needs and preferences of their students, and continuously evaluating and improving their programs. By doing so, institutions can increase student satisfaction and intention to continue with online learning, as well as promote positive student outcomes.

Limitation

The study presents valuable insights into the factors influencing the intention to continue using online learning among university students in Malaysia. The findings reveal a positive relationship between perceived usefulness, perceived ease of use, and curriculum with the intention to continue using online learning. However, the study has limitations in the scope of factors considered and the generalizability of its findings. Future research could address these limitations by incorporating a broader range of factors that may impact students' intention to continue using online learning in Malaysia and exploring the generalizability of the study's findings to other populations and contexts. Additionally, the study's reliance on self-reported data may have introduced response bias, and future research could incorporate objective measures to complement self-reported data. Overall, while the study provides valuable insights, future research could build on these findings to further enhance our understanding of the factors influencing the intention to continue using online learning among university students in Malaysia.

The study only considered a specific set of factors (e.g., IQ, SAT, SA, SCQ) in examining the intention to continue using online learning. There may be other important variables that were not included in the analysis, such as social influence, personal characteristics, or environmental factors, which could also influence students' intentions. The study also focused on university students in Malaysia, which limits the generalizability of the findings to other populations and contexts. Future research could explore the applicability of these findings to different student groups or cultural contexts. The study only relied on self-reported data, which may be subject to response bias or inaccuracies. Future research could incorporate objective measures or multiple sources of data to provide a more comprehensive

and reliable understanding of the factors influencing the intention to continue using online learning.

Conclusions

This study examined the factors influencing the intention to continue using online learning among university students in Malaysia. The findings revealed that IQ did not have a significant influence on intention (INT), while IQ and SAT positively influenced satisfaction (SAT) and intention (INT), respectively. Additionally, system quality (SA) and course quality (SCQ) had a positive influence on satisfaction (SAT) and intention (INT). These findings suggest that both cognitive abilities (IQ) and satisfaction (SAT) play important roles in promoting students' intention to continue using online learning. The study highlights the need for high-quality information, system reliability, and user satisfaction to foster students' intention to further study through online distance learning.

Future research could explore a wider range of factors that may impact students' intention to continue using online learning, such as social influence, personal characteristics, technological factors, and environmental aspects. This would provide a more comprehensive understanding of the drivers behind students' intentions. To enhance the generalizability of the findings, future studies could replicate the research with diverse student populations and in different cultural or educational settings. This would help validate and expand upon the current study's findings. In a future study, the complement of self-reported data and minimising response bias, future research could consider incorporating objective measures, such as behavioural observations or usage data from online learning platforms. This would provide a more robust and objective assessment of students' behaviour and intention. Conducting longitudinal studies would allow researchers to track students' intentions and behaviour over time, providing insights into the dynamic nature of their engagement with online learning. Longitudinal studies could reveal how intention and satisfaction change throughout the learning process and identify factors that influence students' persistence or attrition.

This research presents a comprehensive investigation into the factors influencing university students' intention to continue using online learning in Malaysia. By examining cognitive abilities (IQ) and satisfaction (SAT) alongside system quality (SA) and course quality (SCQ), the study offers a holistic understanding of the determinants impacting students' persistence with online distance learning. A significant theoretical contribution of this research lies in the inclusion of cognitive abilities, represented by IQ, as a predictor of students' intention. Unlike previous studies that focused mainly on technological and user-related factors, this research recognizes the potential influence of students' intellectual capacity on their intention to use online learning platforms. By incorporating IQ into the analysis, the study expands the knowledge base and enhances the theoretical framework surrounding students' behavioural intentions in the context of e-learning. Furthermore, this research extends its relevance beyond Malaysia, making it valuable for other regions and countries facing similar challenges and opportunities in adopting online learning in higher education systems. The study's focus on cognitive abilities, satisfaction, and quality aspects offers a foundation for comparative studies and cross-cultural analyses. This broader perspective can deepen our understanding of the universality of the identified predictors and guide the implementation of effective e-learning practices worldwide.

In conclusion, this research makes significant theoretical and contextual contributions by comprehensively exploring the factors influencing students' intention to continue using

online learning in Malaysia. By including cognitive abilities and uncovering the role of satisfaction and quality factors, the study advances the existing knowledge in the field of e-learning. The insights gained from this research can inform the development of targeted interventions and policies that enhance the overall online learning experience, benefiting both students and educational institutions. Its contextual relevance in the Malaysian educational landscape and potential applicability to other regions make it a valuable contribution to the broader body of knowledge on distance education.

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