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The Successful Factors of Online Learning for Malaysia Higher Education Students: Smart PLS-SEM Analysis



Nurhaiza Nordin , Nur Naddia Nordin , Nur Ilyana Amiiraa Nordin,
and Nur Faiz Nordin

Abstract The purpose of this study is to look at the factors that contribute to the success of online learning in Malaysian higher education institutions. To evaluate the results, 352 samples were gathered and analysed using the Smart-PLS-Structural Equation Modeling (SEM) approach. Usability, technological competence, financial aid, and the function of the lecturer all play a part in motivating effective online learning for higher education institutions, according to the report. Except for technical abilities in online learning, all elements affect sustained good efficacy. The result revealed that all direct relationship were supported by the data except technical competencies. The study will help improve the online learning system and the study higher education institution are increasingly adopting learning as both an alternative channel for existing student to traditional classroom learning and as a way to expand their reach to new student. Adopting online learning and associated technology necessitates a considerable investment in terms of personnel, money, energy, and space, all of which must be justified by administrators and those in positions of educational leadership. For the recommendation, ministry of higher education should ensure that student can assess the internet and web where ever they are and ensure this is a the successful factors of online learning among higher education student.

Keywords Online learning · Financial assistance · Technical competencies · Usability · Role of lecturer · Smart PLS

1 Introduction

Schools and higher education institutions have been threatened by significant changes in different environments due to the COVID-19 and Malaysia Movement Control

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Order (MCO). With digital devices and the Internet, students today grow up. Therefore, its practices are distinct from those of previous generations. As such, identifying these differences and designing educational products suitable for their learning styles, features and attitudes are the challenges faced by educational practitioners and designers. Technology such as internet most important in the education across the globe. Online learning is becoming increasingly popular. Over 6.5 million students took at least one online course in 2011, according to the annual report (Allen and Seaman 2011a, b).

Even if the distribution method has improved, it is still relatively young. The current study will look at a variety of characteristics that influence adult learners' performance and satisfaction in an online learning environment. Many research has been done exploring conventional delivery models such as classroom; comprehensive knowledge is still emerging about the online classroom. Online learning is usually used by working adults aged 25 to 50 years (Moore and Kearsley 2005).

Traditional face-to-face programmes lack the flexibility and adaptability that online education provides, which is especially important for students who must balance work, school, and family obligations. Almost every course nowadays has an online component, with the bulk of them using web-based technologies to provide course materials including syllabuses and assignments. Allen and Seaman (2011a, b). In several respects, online courses differ from traditional courses. Face-to-face education allows the instructor to assess a student's level of topic understanding based on nonverbal behaviors, allowing for classroom changes. Face-to-face education allows the instructor to assess a student's level of topic understanding based on nonverbal behaviours, allowing for classroom changes.

Teachers are unable to comprehend how nonverbal factors such as E-Learning styles, cognitive styles, self-efficacy, tenacity, self-regulation, emotional capabilities, and other factors may all influence a student's performance when utilising online learning; writing is the primary form of communication. (Berenson et al. 2008). According to Dabbagh (2007), self-motivated, self-directed, holding an internal control locus, and possessing above-average executive functioning, communication, interpersonal, and technological abilities are all characteristics of the ideal academically successful online student. Not every student possesses each of these skills. Moreover, with conventional, instructor directed, passive method of learning, some adult learners may be more relaxed. There is disagreement on the best learning styles for online learning performance. External factors such as suitable course/instructional design are significant, and faculty should take these factors into account when designing courses (Cercone 2008). There is a push for empirical studies that document the efficacy online learning of interventions based on direct systematic observation.

Schools and higher education institutions have been threatened by significant shift in different environments due to the COVID-19 pandemic and the Malaysia Movement Control Order (MCO). With digital devices and the Internet students today grow up. Therefore. Its practices are distinct from those of previous generations.

This study was conducted including public and private universities, with student participation for higher education institution. A web-based survey was developed

with online learning classes to investigate the factors of successful of online learning with using the indicator of role of lecturer, usability, technical competencies and financial assistance. The research aimed to collect 352 higher learning responses. Thus in this paper, the objective of this study is to investigate the factors of successful of online learning for higher institution students during the pandemic COVID-19.

The structure of this study is followed by literature review, proposed research method, research methodology, results and discussion and conclusion and recommendation.

1.1 Literature Review

Historically, schooling has concentrated on attending school, listening to lecturers and taking test (Albarrak 2007). This traditional teaching approach is evolving and new approaches are being introduced day by day. The introduction of IT in education is seen as an essential way to meet the needs of students, universities and society as a whole.

Education has historically been focused on attending classes, listening to lectures and taking exams (Albarrak 2007). This conventional method of teaching is changing and new techniques are being established day by day. The incorporation of IT into educational is seen as an important way of addressing the needs of students, universities and society as a whole. Fry (2001) suggests that, in order to compete in a competitive market for higher education, universities must accept new technological innovation that are capable of transforming education and industry. The steady and rapid growth of ICTs has led to the introduction in the education systems of e-learning programmes.

Education is now the primary subject of new and advanced higher education technology development and use. E-learning has been described in different literatures in distinctive way (Wagner, Hassanein and Head 2008). E-learning may generally be described as an educational system that uses technological resources such as the Internet, the intranet, the satellite and others to provide information. The primary objective of e-learning systems is to improve and enhance the link between students and lecturers in the entire educational system (Nycz and Cohen 2007). E-learning programmes are also used in distance learning education in various countries to enable students to obtain online degrees.

In various countries, e-learning programmes are also used in distance learning education, allowing students to receive degrees online. In 2006, around 3.5 million students took online courses at various stages of their higher education in the United States (Nagy 2005). Most of the universities all around the world, have provided e-learning systems to enhance the overall education systems and to enhance student success. In a complex and sophisticated environment, such as a learning management system or an online platform, the e-learning systems used can be as a basic projector or an interactive screen (Abouzahra 2011).

There is a push for empirical studies that document the success of online learning based on direct systematic observation. According to a 2011 study on online education conducted by the Sloane Consortium, 51% of academic authorities (i.e. deans/provosts) say that online learning is on par with face-to-face training, while 14% believe it is considerably superior. Studied by Swan (2003) it's still important to look at evidence of learning outcomes, as well as learn more about student characteristics and instructional design approaches.

According to recent studies Jones et al. (2011), studied on the utilisation of online learning tools, it enhances student and faculty achievement. They may, for example, shift the lecturer's role from information supplied to facilitator, allowing students to become more self-directed learners (Moore et al. 2011). Simaim (2011) found that is either too broad or multi-purpose, and it does not reflect students' perspectives on the impact of online learning services in higher education settings. Some researchers looked into the impacts of online data access on both lecturers and students, but none looked into the impact on the student-lecturer interaction. As a result, this study looks at the personal and emotional aspects of the student-lecturer interaction from the student's perspective, as well as the impact on students' expectations of online learning services.

According to Samia et al. (2019), some of the repercussions of that radical change are discussed and deconstructed, the most prominent of which being the shrinking and neglect of various sciences/fields. They believe that, in their current state, universities in this region face a serious challenge in generating indigenous knowledge that meets the needs of citizens in this region, knowledge that is informed by the culture, history, and geography of the region and responds to the specific needs of citizens in this region.

Usability is about the manner in which information is distributed and the material itself in e-learning (Feldstein 2002). Usability is the degree to which a product may be used by particular users in order to achieve specific results, productivity and satisfaction goals within a specified use context. Aldwyn (2013) argues that accessibility is an important condition in order to function in the internet world. So, to improve its usability, web design should concentrate solely on website users. Web design must satisfy clear user expectation and must also ensure that users are fulfilled without any obstacles to successfully complete web tasks (Yan and Guo 2010).

There are a few primary questions that spring to mind: In terms of student performance and happiness, what constitutes a good online course? Are there certain characteristics that pupils possess that lead to excellent learning outcomes? What features of online courses/educational design help students succeed academically and which ones hinder them? (Dabbagh 2007). Clearly, compared to traditional learning environments, attrition rates for online courses remain high, with estimates ranging from 10% to nearly 50% higher. (Moody 2004; Park 2007; Park and Choi 2009; Tirell and Quick 2012). Students see online courses differently than traditional ones. Negative expectations, especially incorrect ones, can lead to poor learning outcomes, such as decreased motivation and persistence (Muilenburg and Berge 2005). Negative emotions, such as discontent, might arise as a result of online learning (Berenson et al. 2008), especially if courses are poorly designed and students do not exhibit

the abilities needed to study online. Online learning will not be acceptable to every student. If this type of learning environment is not right for them, identifying the characteristics that contribute to online success vs failure might assist predict future learning outcomes and prevent students from enrolling in online courses.

Recognizing unique features of individuals that contribute to online success vs failure can assist forecast future learning outcomes and avoid students from enrolling in online courses if this type of learning environment is not suited for them. In addition, knowing these learners' characteristics may help faculty create high-quality online courses that fulfil students' demands for suitable teaching techniques, support, and course structure and design, all of which can help students succeed and be satisfied (Dabbagh 2007).

In form of the financial technology (Fintech), there also have implication on education. FinTech has become a buzzword all over the world and has matured in recent years. Without a question, academia is a key player in the FinTech ecosystem. As a result, its participation in the development and use of financial technology is critical. FinTech firms require qualified personnel who are familiar with the industry's procedures. According to Malek and Kumar (2019), from the result, just as finance students make up a significant portion of customers of FinTech goods and services, they are also potential workers of FinTech firms. FinTech career possibilities are expanding, and finance students should take advantage of them.

Besides that, Nur Farida, Soesatyo and Aji (2021) found that the way a person treats, manages, and uses available money resources is referred to as financial behaviour. The goal of this study is to see how financial literacy and financial technology affect financial happiness by using financial behaviour as an intervening factor. The findings of this study show that financial literacy has no influence on financial behaviour, but the use of financial technology does. Financial literacy and the use of financial technology both have an impact on financial satisfaction. Financial conduct was also discovered to be a mediator between financial literacy and the usage of financial technology.

2 Proposed Research Model

The proposed research model consisting of factors related to students, teachers and management is elaborated in this section. In several studies, TAM was used to examine the actions of students and teachers using perceive usefulness (PU), perceive ease of use (PEU) and the intention to used and implement the online learning method (Selim 2003). The design of the proposed model is based on the TAM theory to influence the main factors such as PU, PEU and behavior intention (BI) on online learning. Four additional variable are included in this model design such as, usability, technical competencies, lecturer and financial assistance adopted from various empirical studies and literature. TAM was implemented in online learning acceptance as the most powerful and general theory than any other theories (Šumak et al. 2011). In Fig. 1 the proposed research framework supposed to be tested and

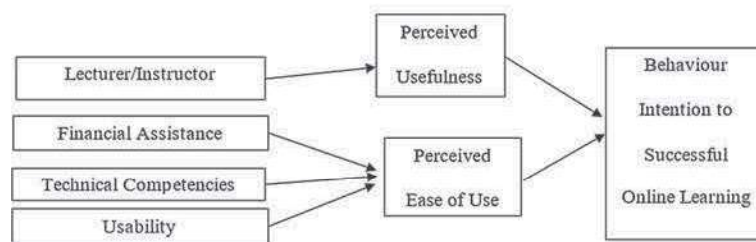


Fig. 1 Proposed research model

analyzed that shows the constructs grouped into four categories to investigate the factors influencing students, teachers which is usability, lecturer, financial assistance and technical competencies towards successful implementation of online learning.

3 Research Methodology

Design of the conceptual framework on exploratory research is built based on the literature. Each has four independence or exogenous variable. Using Smart PLS software the conceptual model for the proposed framework is developed. Independent variables are main factors that will impact of successful online learning effectiveness in the higher education institutions. The dependent variables is the successful of OL which is the key factor in generating quality students for higher education. This demographic contains only whole students for higher education institutions who create applications.

The study was carried out in Malaysia on a random group of 315 students. First a qualitative analysis was performed for the higher education institution focused on interviews and experiences with the students. In higher learning institutions, a survey questionnaire was developed based on the conceptual framework and distributed to the different students. The sample size of any statistical system has a direct effect on the statistical strength. In general, when the distribution of dependent variables is distorted and the effect size is small, a researcher requires a fairly large sample size to detect the true difference. Hoelter (1983) proposed developing a model with an average sample size of 200. Hair et al. (2017) noted that, in the case of SEM, there are four elements that influence the criteria of sample size; misspecification of the model, scale of the model, deviations from normality and estimation procedures. If the model integrates all applicable construct and indicator into the theory, the effect of sample size may be negligible on the model's ability to be accurately measured to detect design error. If the model contains all applicable constructs and indicators to the theory, the effect of sample size may be negligible on the model's ability to be accurately measured to detect design error.

Smart PLS-SEM is beneficial when used with small sample sizes, but some researchers abuse this advantage by depending on extremely small samples compared to the population. According to Green (1991), the effect size is 84 sample size for the sample size using four number of predictors, so the total sample size used matched to the study. The data obtained from the questionnaire was entered in the MS-Excell and stored as a.csv file while can be supported by various statistical tools to perform reliability testing. The factors defined on the basis of the description in the conceptual model (Fig. 1) were operationalized by four endogenous and one exogenous and the variable influencing the software quality. For this research analysis, one exogenous and the variable that influenced software quality were operationalized and used to collect the data. Four independent (exogenous) variables and indicators were defined for this research study such as role of lecturer, usability, financial assistance and technical competencies on the successful online learning.

One dependent variable is online learning efficacy, since the conceptual model used exploratory research. Selected for all indicators were a multi-item, five-point, bipolar Likert scale ranging from “strongly disagree” (1) to “strongly agree” (5). For each independent variable the item ratings were summed to form a summary rating scale. However, as this is the first study of its kind inside exploratory testing, all the things were explicitly written for this research. Measurement model and assessment according to Hair et al., the formal evaluation parameters follow a two-step process with separate evaluation of measurement models and structural model. Next, construct validity should be tested for the assessment of the reflective measurement model. The validity of the construct consisting of two important components is convergent validity and discriminant validity. The convergent validity assesses factor loading, composite reliability and Average Variance Extracted (AVE) and the discriminating validity evaluates cross loading, Fornell and Larcker and HTMT.

Assessment of Convergent Validity Convergent validity refers to as “the extent to which a measure (indicators) positively correlates with alternative measures (indicators) of the same construct”. Table 1 shows the specifics of each constructs used in the conceptual framework and indicators associated with each construct are listed in the column name “Item”. First the composite reliability is verified and any value below the threshold values of 0.7 needs to be assessed. This is established by checking the indicator reliability values. Any values in the indicator which is below 0.4 should be removed from the constructs and any value between 0.4 and 0.6 can be retained if it increases the AVE and CR values. After removing the indicators from the constructs, the details of the remaining constructs and its corresponding convergent validity scores have met the threshold values for $CR > 0.7$ and $AVE > 0.5$ respectively.

4 Result and Discussion

4.1 Validity and Reliability Tests

Test for validity and reliability were performed to assess the questionnaire's consistency and reliability. A validity check was performed to assess the importance of the Pearson correlation coefficient at a meaningful level (α) of 5%. The test used one-sided measures with a 0.05 ° of significance. The evaluation parameters were 1) if the r count $>$ r table declared the instrument valid; and 2) if the r count $<$ r table declared the instrument non-valid. Because all instruments in the validity test had r count meaning (α) 5% $>$ r table with 5% meaning, the instrument used was valid.

Table 1 Internal consistency, convergent validity, composite reliability and AVE

Construct	Indicator	Loadings	Cronbach's alpha	Composite Reliability	AVE
Usability	U1	0.653	0.803	0.889	0.733
	U2	0.938			
	U3	0.945			
Technical competencies	T1	0.751	0.916	0.927	0.615
	T2	0.704			
	T3	0.787			
	T4	0.668			
	T5	0.818			
	T6	0.861			
	T7	0.779			
	T8	0.881			
Financial assistance	F1	0.863	0.726	0.817	0.551
	F2	0.853			
	F3	0.792			
	F4	0.326			
Lecturer	L1	0.823	0.855	0.901	0.694
	L2	0.792			
	L3	0.841			
	L4	0.874			
Successful factors	S1	0.876	0.867	0.910	0.716
	S2	0.893			
	S3	0.699			
	S4	0.799			
	S5	0.842			

Source: Authors' own estimates based on survey data

For this analysis, which analyzed the accuracy of the testing instrument, the reliability test used Cronbach's alpha values. Because the alpha value of the Cronbach was 0.881, the research instrument was either accurate or reliable in qualifying. The validity and reliability tests performed demonstrate the validity are reliability of the research instrument.

4.2 Analysis with Smart PLS

Using Smart-PLS method assisted by Smart PLS 3.0 a model of influential design change factors was built in the construction projects. Then, the model's validity and reliability were evaluated. The validity was checked by convergent and discriminating validity while Cronbach's alpha and composite reliability was checked for reliability. The rule of thumb for convergent validity is 1) the loading factor >0.7 in which the leasing factor $0.6-0.7$ is still appropriate for exploratory work, 2) the loading factor >0.5 and 3) the average derived variance (AVE) >0.5 . Table 1 displays smart PLS measurement model for design modifications.

Table 1 displays the load factor values, Cronbach's alpha values, composite reliability values and AVE values. George and Mallery (2003) reported that Cronbach's alpha is excellent with more than 0.7 ($\alpha > 0.9$). In the current analysis, that is excellent is more than 0.9 . In addition, AVE will be equal to or greater than 0.5 and composite reliability are more than appropriate within the current study range. Moreover, the discriminant validity is shown in Table 2. Using Smart PLS, a structural model was evaluated after evaluation of the measurement model. Direct and indirect effects were analyzed to attain this objective. Consideration of the route coefficient and the value "t" verified the hypothesis. In addition, it investigated R-Squared (R^2) and quantitative significance (Q^2).

Table 2 Discriminant validity (HTMT)

	Financial assistance	Lecturer	Successful OL	Technical competencies	Usability
Financial assistance	0.743				
Lecturer	0.210	0.833			
Successful OL	0.326	0.460	0.825		
Technical competencies	-0.006	0.061	-0.122	0.784	
Usability	0.331	0.409	0.714	-0.129	0.856

Table 3 Hypothesis testing direct effects

Hypothesis	Relationship	Std Beta	Std Error	t-values	p-values	f ²	VIF
H1	Financial Assistance → Successful OL	0.086	0.076	1.134	0.027	0.015	1.132
H2	Lecturer → Successful OL	0.202	0.082	2.449	0.015	0.074	1.229
H3	Technical Competencies → Successful OL	-0.057	0.094	0.612	0.541	0.007	1.034
H4	Usability → Successful OL	0.595	0.082	7.223	0.000	0.592	1.338

Note: We use 95% confidence interval with a bootstrapping of 5,000

4.3 Structural Model

We evaluate multivariate skewness of Mardia (multivariate skewness and kurtosis, as indicated by Hair et al. (2017) and Cain et al. (2017)). The findings showed that the data we obtained were not regular multivariate kurtosis of Mardia ($\beta = 62.566$, $p < 0.01$), so we recorded the path coefficients, the standard errors, t-values and p-values for the structural model using a 5,000 sample re-sample bootstrapping procedure following the suggestion on Hair et al. (2019). Hahn and Ang (2017) also criticized that p-value are not a good criterion for evaluating the validity of the hypotheses and proposed using a mix of metrics such as p-values, confidence ratio, and effect sizes. The description of the parameters we have used to test the hypotheses formed in shown in Table 3.

First we tested the effect of the 4 predictors on successful OL, the R^2 was 0.553 which shows that all the 4 predictors explained 55.3% of the variance in successful OL. Financial assistance ($\beta = 0.086$, $p < 0.05$), Lecturer ($\beta = 0.202$, $p < 0.01$), technical competencies ($\beta = -0.057$, $p > 0.10$) and usability ($\beta = 0.595$, $p < 0.01$). Thus H1, H2 and H4 were all positively related to successful figureOL, thus H1, H2 and H4 were supported but H3 are negatively related to the successful OL and not significant, thus H3 were rejected.

5 Conclusion and Recommendation

The aim of this study is to investigate the factor of successful of implementation of online learning during pandemic COVID-19 on higher learning institutions. Only two constructs are accepted from the four hypothesis tested, and the t-value obtained shows that they are statistically important. This research also discussed the validity and reliability of the measures used, and the results indicates strong convergence validity and discriminant validity. The successful factors of implementation of online learning is support by the financial assistance, role of lecturer and usability. The most importance factors of the successful of OL is usability, which is the usability of the

website. This factors is most important to support the successful of the online learning and supported by Yan and Guo (2010).

Besides that, role of lecturer also important to ensure a successful of the online learning. Role of lecturer to ensure student understand what they teach and they will make sure student can adapted what they teach (Moore et al. 2011). Technical assistance with the financial aid from the government during the pandemic of COVID-19 also positive influence a successful factors of online learning. With this aid of assistance from government and also family support help student in the online learning. Thus, it is influence the successful factors of online learning. During pandemic COVID-19, most of us have a financial problem, thus with the financial aid from the government and family help student success in the education. Technical competencies is negatively correlated with successful of online learning. This is because, several student are from the rural area, thus there have a problem in the technical to ensure they can receive the information, lecturer notes or other from the universities and lecturer. This support by Ayub and Iqbal (2011), they find that students were actually satisfied with e-learning mode of teaching. Another studied by Lee et al. (2009); Alsheri et al. (2019) have shown that quality of knowledge is the most significant dimension followed by the navigation of the e-learning system. Hong et al. (2003); and Rafaeli and Sudweeks (1997) reported that students' interest in research was increased by an e-learning program or a website with a harmonious color and context configuration.

The results shows that, all the theories are backed by empirical research and in accordance with previous observations and theoretical context for the factors of successful online learning in higher learning institutions in Malaysia. For the recommendation, ministry of higher education should ensure that student can assess the internet and web where ever they are and ensure this is a the successful factors of online learning among higher education student. Limitation of this study is only using a several factors that influence the successful factor of online learning, there should add some indicator such as financial technology, role of government especially ministry of education and role of parents and family support. Thus the results may be more useful in the future research.

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