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Post-COVID-19 e-learning acceptance and its impact on community college students in Kelantan, Malaysia: A quantitative analysis

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Abstract

The purpose of this study is to explore the relationship between student motivation, student mindset, computer competency, and behavioural intention to continue using e-learning in the post-COVID-19 era among students at the community colleges in Kelantan, Malaysia. This quantitative study used a self-administered online survey questionnaire, and a convenience sampling method was employed to reach the respondents. Partial least square structural equation modelling (SmartPLS) 4.0 was then used for data analysis. The results of the current study reveal that community college students have a high behavioural intention to continue using e-learning in the post-COVID-19 era, and that behavioural intention positively correlates with student motivation and computer competency. However, there is limited evidence to support the relationship between student mindset and their behavioural intention to continue using e-learning in the post-COVID-19 era. Practically, the findings from this study can be an essential landmark to the management of Community Colleges in determining the direction of future learning in community colleges.

Keywords: Community college, Computer competency, E-learning, Post-COVID-19, Student mindset, Student motivation.

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1. Introduction

Recently, e-learning has been recognised as the most important component in all educational institutions, especially after the outbreak of the COVID-19 pandemic. The outbreak of the pandemic has forced education systems around the world to fully implement online learning since it is the most efficient mean of learning compared to the traditional classroom approaches [1, 2]. This situation has caused a paradigm shift, resulting in online teaching and assessment practices continuing

to gain importance at the tertiary level [3]. Past studies have listed many benefits of online learning. Among these are remote and flexible teaching and learning, engagement with diverse audiences, the promotion of cost-effective methods, the use of tools to measure learning outcomes, increased access to a wealth of materials and resources, and facilitated collaboration between students and educators [3-5]. In Malaysia, the severity of the COVID-19 pandemic in 2020 has forced the government to introduce procedures and methods such as social distancing, smart working, and the closure of social and commercial activities to prevent the spread of the pandemic. As a result, all types of educational institutions were required to conduct teaching and learning sessions via online home-based learning [6].

Some institutions and courses are in a particularly favourable position in the implementation of online learning because no practical skills are needed. However, according to Bianchi, et al. [7], online learning is not recommended for courses that require practical skills, which has been one of the obstacles to online learning. Inadequate Internet access and poor infrastructure and service availability, including low-speed Internet connectivity, a lack of technical as well as computer skills, inadequate handling of online learning among teachers, weak administrative support, and inadequate content design are some of the online learning barriers [3, 8-10]. Moreover, even though many studies have highlighted the importance of student and teacher qualities to foster online learning acceptance. Online education during the pandemic was forced rather than intentionally accepted [11]. The circumstances surrounding the COVID-19 pandemic were remarkable, and there was cause for concern over the unfavourable effects of lockdowns and lengthy quarantine periods on the education and mental health of students [12].

Community colleges are higher learning institutions that are operated under the Department of Polytechnic and Community College, Ministry of Higher Education Malaysia and they have been operating since 2001. The Community colleges offer certificate-level studies to provide a pathway for students with moderate academic achievement at the school level to continue their studies at a higher level as well as contribute to the labour market, especially in technical and vocational education training (TVET)-related fields. Before the COVID-19 pandemic, teaching and learning sessions were entirely conducted in person [13]. However, the Movement Control Order (MCO) and the closure of educational institutions forced community colleges to carry out teaching and learning activities online. Although e-learning is believed to be the most effective technique during the COVID-19 pandemic, its implementation was difficult and challenging due to multiple constraints faced by students, lecturers, and even colleges.

There is a lack of research on the sudden shift to online learning that occurred during the COVID-19 pandemic [1], particularly on how students' use of online learning during the pandemic affected their future intention to use e-learning in the post-COVID-19 era. As a result, the primary goal of this study was to examine the factors that contributed to students' acceptance of e-learning and the connection between those factors and their readiness to continue using it after the COVID-19 pandemic among students at community colleges in Kelantan, Malaysia.

Several sections make up the present paper. The first part of the paper discusses online education during the COVID-19 pandemic. The learning method in community colleges prior to the pandemic, e-learning issues, and gaps in earlier related research are then discussed. Afterward, a discussion of relevant theories and earlier studies is addressed, along with the methodological approach, data collection, and data analysis.

2. Literature Review and Hypotheses Development

The acceptance to use a particular technology has long been extensively studied across various disciplines, with implications for business, education, and everyday life [14]. In the field of education, Sayeed and Onetti [15] suggest that the factors influencing the acceptance of technology can be theoretically classified into technology, organisation, and people. Furthermore, several studies have revealed that technology acceptance is not solely influenced by technological benefits and aspects, but has evolved into a multifaceted process involving user attitude and personality, social influence, trust, and various facilitating conditions [16].

Several theoretical stances serve as inspiration for the development of research instruments that evaluate the intention to adopt or use new technologies. Models such as the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT) and Diffusion of Innovation (DOI) theory are commonly used to evaluate technology adoption, acceptance, and use. Nevertheless, in current technological research, TAM is the most prevalent theory utilised to understand technology adoption intention. The model focuses on analysing how the attitudes of students or teachers towards information and communication technology (ICT) influence technology acceptance [1].

2.1. Students' Motivation

Motivation is an important factor that affects student attitudes and learning behaviour at all levels of education. Previous studies have shown that the effectiveness of technology adoption in the field of education greatly depends on student motivation to use the system [1, 2, 17, 18]. A study by Rahman, et al. [2] emphasises that student motivation is one important indicator in helping students to understand the importance of continuing their studies online. Lamb, et al. [19] suggest that student motivation to learn in an online environment relates to learning outcomes. However, an abrupt shift may have harmed student motivation to learn [20]. For instance, during the COVID-19 pandemic, universities and students were forced to shift to online learning. Even though a motivated learner would have taken an active role in class discussions and tasks despite a shift in methods [1], a forceful shift towards online learning when students are not ready may result in a lack of motivation, leading to a detrimental effect on their mental health [21]. Since student motivation is important when it comes to their behavioural intention to use online learning, which will help them boost their performance and create a more positive attitude, the following hypothesis was offered in this study:

H₁: Student motivation towards e-learning positively influences their behavioural intention for future e-learning usage in the post-COVID-19 era.

2.2. Students' Mindset

Allport [22], supported by Pickens [23], provides a simple definition of attitude, which is a mindset or a tendency to act in a particular way according to an individual's experience and personality. Hochanadel and Finamore [24] when discussing the fixed and growth mindsets explain that the growth mindset refers to students who value effort and perceive ability as a malleable skill, whereas the fixed mindset refers to students who believe intelligence is inherent and unchangeable, thereby exerting less effort to succeed.

Previous studies have been focusing on student attitudes, with less emphasis on student mindset. The TAM model was utilised by Park [25], Hussein [26], and Mailizar, et al. [27] to develop a model and prove the relationship between student mindset and behavioural intention to use e-learning. The studies demonstrate that student mindset is the key construct in predicting university students' behavioural intention to use e-learning. Other studies on e-learning in Malaysia conducted before the COVID-19 pandemic also utilised the TAM model to prove the significant relationship between student attitude and student behavioural intention to use technology [28, 29]. Moreover, a study by Rahman, et al. [2] on student behavioural intention to use e-learning during the post-COVID-19 era in *pondok* schools revealed that student mindset positively impacts student characteristics, which led to the acceptance of e-learning usage in the era. As a result, the following hypothesis was offered in this study:

H₂: Student mindset towards e-learning positively influences their behavioural intention for future e-learning usage in the post-COVID-19 era.

2.3. Computer Competency

In general, the capacity to use information technology is referred to as computer competency. Technology adoption takes time and calls for a paradigm shift among all users. As a result, it is crucial to consider users' preparation, their behaviour, and how they view the technology adoption process [30]. The ability to use computers effectively is essential for students to succeed in higher education. Previous research demonstrates that computer competency significantly improves technology adoption and serves as a predictor of students' intent to continue utilising technology for learning [2, 30, 31]. However, Shuster and Pearl [32] opine that the competency of students increased with each successive group of students. They discovered that the levels of computer skills between the groups of traditional nursing students and registered nurses were significantly different. Thus, they believe that students' behavioural intention to use technology for learning is greatly influenced by their level of computer competency, yet this may vary. As a result, the following hypothesis was offered in this study:

H₃: Students' computer competency positively influences their behavioural intention for future e-learning usage in the post-COVID-19 era.

3. Research Methodology

3.1. Participant

The respondents in this study were students between 19 and 36 years old from four community colleges in Kelantan, Malaysia. The total population for this study was 310 students, and they were selected through the convenience sampling method. The survey was distributed to the respondents through an online platform from early May to the end of August 2022. The survey received a response from 118 respondents, resulting in a response rate of 38.06 per cent. To protect the privacy of the respondents, their names were not disclosed.

Table 1 presents the demographic data of the respondents of the current study. Based on the table, the majority of the respondents were female students (74.6 %) aged between 19 and 20 years old (88.1 %). Most of the respondents were from Jeli Community College (47.5 %), followed by Pasir Mas Community College (24.6%), and the rest were from Rantau Panjang Community College and Kok Lanis Community College. The majority of the students came from the lower socioeconomic group, with 64.4 per cent of their parents having an income of less than MYR2,000 per month, 21.2 per cent of their parents having an income between MYR2,001 and MYR4,850 per month, while only 14.4 per cent belonged to middle- and high-income groups.

3.2. Instruments and Procedures

Five categories made up the questionnaire's structure: (1) demographics, (2) behavioural intention to use e-learning, (3) student motivation, (4) student mindset, and (5) computer competency. The first part of the questionnaire addressed the demographic profile, computer device ownership, and Internet access of the respondents. The second section was composed of two parts that used a 5-point Likert scale to evaluate students' behavioural intentions to use e-learning. Five questions on student motivation made up section three, and three items assessing student mindsets made up section four. The items in sections 2, 3, and 4 were modified from research by Baber [1]. The final part, Section 5, contained five computer competency assessment items that were all adapted from Selim [33].

The current study's questionnaire was originally written in English before being translated into Malay. To ensure the content validity of the designed questionnaire, a senior academic from Universiti Malaysia Kelantan and three lecturers from community colleges were recruited for the review process. Then, using partial least squares structural equation modelling (PLS-SEM), the data for this research were examined. In the area of behavioural science, partial least squares (PLS), a subset

of structural equation modelling (SEM), is a powerful tool for comprehending expected behaviours. This strategy was selected because it allows for the concurrent analysis of numerous dependent relationships [34].

Table 1.
Profile of respondents (n = 118).

Item	Option	Frequency	Percent
Gender	Female	88	74.6%
	Male	30	25.4%
Age	19–20 Years	104	88.1%
	21–22 Years	10	8.5%
	Above 23 years	4	3.4%
College	Jeli community college	56	47.5%
	Rantau Panjang Branch community college	8	6.8%
	Pasir mas community college	29	24.6%
	Kok Lanan community college	25	21.2%
Program	Certificate of fashion and apparel	22	18.6%
	Certificate of pastry	34	28.8%
	Certificate of logistics service	8	6.8%
	Certificate of business operation	29	24.6%
	Certificate of creative multimedia advertising	25	21.2%
Parents' income	MYR2,000 and below	76	64.4%
	MYR2,001–MYR4,850	25	21.2%
	MYR4,851–MYR10,970	11	9.3%
	MYR10,971 and above	6	5.1%

4. Data Analysis and Findings

Smart-PLS 4.0, a variance-based SEM for hypothesis testing, was used to evaluate the data because it is effective for studies that forecast relationships between variables [35]. To begin with, the current study assessed the normality of the collected data using multivariate skewness and kurtosis, as suggested by Hair, et al. [35]. After running the normality test, the results revealed that the data gathered was not multivariate normal with Mardia multivariate skewness ($\beta = 2.176, p < 0.01$) and Mardia multivariate kurtosis ($\beta = 26.685, p < 0.01$), thus SmartPLS, which is a non-parametric analysis software, was deemed appropriate software to be used in the current study.

4.1. Common Method Variance

Common method variance (CMV) can cause major issues when only a single data source is used [36], especially when the same individual responds to both the predictor and criterion variables at the same time. To address the CMV problem, the study employed full collinearity testing, as proposed by Kock [37]. Table 2 shows the results of the test analysis. This approach involved regressing each variable on a common variable while accounting for the variance inflation factor (VIF). The VIF value of less than 3.3 indicated that there was no deviation from a single baseline. Fortunately, single-source bias was not a significant issue in our data, as indicated by the analysis's VIF which was less than 3.3 in our analysis.

Table 2.
Full collinearity testing.

Construct	BI	SM	MS	CC
VIF value	1.773	2.325	1.676	1.917

Notes: BI= Behavioural intention; SM= Student motivation; MS= Student mindset; CC=Computer competency.

4.2. Measurement Model

Two steps must be taken when performing SEM analysis. Prior to verifying a structural model or hypothesis testing, a measurement model with convergent and discriminant validity should be confirmed. When loadings and average variance explained (AVE) are larger than 0.5 and composite reliability (CR) is greater than 0.7, convergent validity is said to be attained [34].

The evaluation of the construct validity of all the variables in the current study is shown in Table 3. According to Table 3, all scores were higher than the minimum value suggested by the literature, proving the study's convergent validity. Once convergent validity was established, the next step was to confirm discriminant validity after verifying convergent validity. According to Franke and Sarstedt [38], the values of the heterotrait-monotrait ratio (HTMT) must be below 0.85 if discriminant validity is confirmed in a study. Table 4 demonstrates that there was no issue in determining the discriminant validity of the study since all HTMT values were lower than the most conservative set of values.

4.3. Structural Model

Prior to assessing the structural model, it is essential to make sure there are no collinearity issues. To this end, each construct's VIF value was examined, and it was found that all values were below the 3.3 threshold value set by Diamantopoulos and Sigauw [39], as shown in Table 2. This demonstrates that there were no collinearity problems in the

research. Moving on to the main findings, the path coefficient of the study is presented in Table 5. As recommended by Joseph, et al. [34], effect sizes (f^2), standardised beta (β), and t-values obtained using a 5,000 resampled bootstrapping procedure are evaluated to assess the structural model.

Regarding the hypothesis, it was found that student motivation ($\beta = 0.445$, $t = 3.462$, $LL = 0.228$, $UL = 0.649$, $p < 0.01$) and computer competency ($\beta = 0.256$, $t = 2.559$, $LL = 0.088$, $UL = 0.418$, $p < 0.01$) were significantly related to behaviour intention to continuously use e-learning in the post-COVID-19 era. Hence, H1 and H3 were supported. However, it was discovered that there was no link between student mindset and behavioural intention ($\beta = 0.032$, $t = 0.287$, $LL = -0.153$, $UL = 0.216$, $p > 0.01$). As a consequence, H2 was not supported, according to the result.

For f^2 , Cohen [40] suggested that effect sizes of 0.02 are small, 0.15 are medium, and 0.35 are large. In the recent study, student motivation and computer competency were found to have medium and small effect sizes, respectively, indicating that only two of the three hypotheses were supported. The study's exogenous factors, which include student motivation, student mindset, and computer proficiency, may have contributed to the explanation of 43.6% of the variance in behavioural intention. This is indicated by the coefficient of determination (R^2) value of 0.436.

Table 3.
Convergent validity.

Construct	Loading	CR	AVE
<i>Behavioural intention to continuously use e-learning (BI)</i>			
(BI 1) I intend to continuously use e-learning in the near future.	0.932	0.967	0.880
(BI 2) I predict I would continuously use e-learning in the near future.	0.935		
(BI 3) I plan to continuously use e-learning in the near future.	0.961		
(BI 4) I intend to continuously use e-learning for learning as often as needed.	0.922		
<i>Student motivation (SM)</i>			
(SM 1) In an online class, I prefer assignments and questions that challenge me so that I can learn new things.	0.787	0.871	0.693
(SM 3) I want to do well in the online class because it is important to show my ability to my family and friends.	0.871		
(SM 4) I like to be one of the most recognised students in the online class.	0.836		
<i>Student mindset (MS)</i>			
(MS 2) I learn best by construction (i.e., by participation and contribution).	0.911	0.922	0.855
(MS 3) I learn better by construction than by absorption.	0.938		
<i>Computer competency (CC)</i>			
(CC 1) I enjoy using personal computers.	0.828	0.891	0.621
(CC 2) I use personal computers for work and play.	0.715		
(CC 3) I was comfortable with using the PC and software applications before I took up the e-learning-based courses.	0.863		
(CC 4) My previous experience in using the PC and software applications helped me in the e-learning-based courses.	0.761		
(CC 5) I am not intimidated by using the e-learning based courses.	0.764		

Note: Item for SM 2 and MS 1 was deleted due to low loading.

Table 4.
Discriminant validity (HTMT).

Construct	1	2	3	4
Behavioural intention				
Computer competency	0.608			
Student mindset	0.488	0.635		
Student motivation	0.726	0.766	0.738	

Table 5.
Path coefficient.

Hypotheses	Relationship	Beta	Std. error	t-value	p-value	LL	UL	f^2	Decision
H1	SM → BI	0.445	0.129	3.462	0.001	0.228	0.649	0.178	Supported
H2	MS → BI	0.032	0.113	0.287	0.387	-0.153	0.216	0.001	Not supported
H3	CC → BI	0.256	0.1	2.559	0.005	0.088	0.418	0.065	Supported

Note: LL, Lower limit; UL, Upper limit at 95 % and 99 % confidence interval

Furthermore, in light of recent criticism of the blindfolding method, Shmueli, et al. [41] propose the use of PLS predict to improve the predictive capability. Table 6 reveals that all root mean squared error of prediction (RMSE) for PLS-SEM was lower than linear model (LM), confirming the high predictive power of the model.

Table 6.
PLS predict.

Item	Q ² predict	PLS-SEM_RMSE	LM_RMSE	PLS-LM
BI1	0.365	0.95	1.013	-0.063
BI2	0.289	1.063	1.116	-0.053
BI3	0.344	0.983	1.056	-0.073
BI4	0.347	0.959	1.029	-0.070

Note: BI=Behavioural intention.

5. Discussion

This study was designed to explore the relationship between student motivation, student mindset, and their computer competency and the behavioural intention to further use e-learning during the post-COVID-19 era among students at community colleges in Kelantan, Malaysia. The results of the current study revealed that students at community colleges in Kelantan have a high behavioural intention (mean = 3.4195) to use e-learning in the future, which was positively associated with student motivation and computer competency. The positive relationship between behavioural intention and student motivation is aligned with past studies by Baber [1], Rafiee and Abbasian-Naghneh [17], and Rahman, et al. [2]. The current study also concludes that student motivation is an important indicator that could significantly raise students' awareness of the importance of continuing with online learning. However, this result contradicts the results of a study conducted by Rosmilawati, et al. [13] on community college students in Perak during the COVID-19 pandemic. The contradictory results could be attributed to the differences in the programs offered, as most of the programs at Perak Community College involved practical skills.

In addition, the current study discovers that computer competency has a favourable impact on student willingness to embrace e-learning. Students who are proficient in using computers are more at ease with online learning, including e-learning, to advance their education. This finding is consistent with previous research by Reddy, et al. [31] and Rahman, et al. [2], which has highlighted the significance of computer competence and computer self-efficacy on users' behavioural intention to utilise technology.

The relationship between student mindset and learning was initially predicted to be positive, but the findings of the current study contradict this. It is believed that student mindset is reflected through their behaviour. As the learning philosophy in Asia is still based on absorption [42], some students' behaviour of passively listening to lectures instead of taking an active role in discussions, thereby hindering critical thinking and the development of a growth mindset. This issue has been further exacerbated during the COVID-19 pandemic, which has significantly impacted university and college students. Student lack of intention to give responses and feedback on topics discussed during online classes is one of the realities that lecturers, including those at community colleges, have had to deal with. Nevertheless, the results of this study reveal that there is no evidence to support the relationship between student mindset and behavioural intention.

6. Conclusion

The increased use of the Internet and web-based technologies in education is a global trend that has an impact on all types of educational institutions. The COVID-19 pandemic has compelled governments all around the world to replace classroom-based learning in favour of home-based instruction. Although online learning was the most suitable approach to learning during the COVID-19 pandemic, its implementation was fraught with limitations.

In light of this, the goal of this study was to identify the variables impacting the behavioural intention of community college students in Kelantan to use e-learning after the COVID-19 pandemic. A total of 118 students from four community colleges in Kelantan, Malaysia participated in the study, and self-administered questionnaires were distributed online. The data collected from the questionnaire, which consisted of 16 indicators, were analysed using the partial least squares structural equation modelling (PLS-SEM). The association between behavioural intention on the adoption of e-learning after the COVID-19 pandemic was examined using three variables (student motivation, student mindset, and computer competency). In general, the current findings discover that two of the three variables, student motivation and computer competency, positively correlate with one another. However, there was no proof linking student mindset and their future intention to use e-learning during the post-COVID-19 era.

The study has several drawbacks. First, there were time constraints. The data collection period of the current study was limited, which has affected the percentage of the study's responses rate. Less than 40 per cent of respondents successfully responded to the questionnaire. Second, only community colleges in Kelantan were consulted for the study's conclusions and consequences. Therefore, when extrapolating the results of this study to other user groups or organisations, this restriction must be considered. Despite its limitations, the results of this study offer various ramifications for educational insinuations.

On top of that, the current study recommends that all community colleges in Malaysia be included in future research to gain a better view of the acceptance of e-learning among community college students. Moreover, research among the lecturers at community colleges is also critical in order to get a comprehensive view of the e-learning system. The decision to maximise benefits from e-learning or to only conduct physical learning in the post-COVID-19 era depend not only on the students, but also on the readiness of lecturers and organisations to provide adequate facilities, equipment, and systems to support and smoothen the e-learning process.

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