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PAPER

Teachers' Use of Cloud-Based Learning Management Systems in Malaysian Secondary Schools

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ABSTRACT

This paper discussed the study of the factors that determine the behavioural intention (BI) of teachers utilisation of cloud-based learning management systems (LMS) in Malaysian secondary schools. A survey methodology was introduced in this inquiry using 322 participants from 18 secondary schools in the country. Also, this research employed a structured questionnaire consisting of 43 questions that addressed seven factors: performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), self-efficacy (SE), hedonic motivation (HM) and BI. The adoption of quantitative methodology was meant to allow the research to gather extensive numerical data to understand the problematic adoption of Google Classroom applications in Malaysian high schools. However, the data collected were analysed descriptively and inferentially. These research findings showed that there were relationships that existed between the independent variables and teachers' BI towards the utilisation of cloud-based LMS in Malaysian secondary school settings. The results of this study are relevant from both academic and managerial perspectives, providing solutions for future research in educational technology.

KEYWORDS

teachers, cloud, learning management systems (LMS), Malaysia, schools

1 INTRODUCTION

The acceptance of technology-based learning in Malaysia has activated the government's steps to individualise schooling, prepare learners for the future and offer standard experiential learning in the country. For instance, this includes empowering over ten thousand two hundred and eleven (10,211) primary and secondary government schools with digital resources, providing Internet connection and implementing a cloud-based Google Classroom virtual learning environment (VLE) as a tool for instruction. Also, Google Classroom is a cloud-based online application that is part of Google Suite for instruction and has been mostly used by tutors and learners within educational establishments since its inception in 2014. Research shows

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that Google Classroom is an effective application for making learning more effective. Studies show that Google Classroom is a more affordable application than other commercially accessible learning management systems (LMS). Likewise, teachers and students are content with Google Classroom usage and its ability to promote active participation, accountability, flexibility, originality and time-saving tasks. Besides, some studies have recommended the examination of issues that arise in the use of online applications that focus on primary and secondary school teachers. This online application acts as a single platform that links teachers' use of other Google applications to transform instruction into a collaborative activity for increased student participation [20].

Previous research shows that positive behaviour by tutors is germane to ensuring the use of a virtual learning environment (VLE). Also, constructs such as teacher belief, institutional characteristics, social environment, technical infrastructure and teachers' characteristics influence the utilisation of VLE. Teachers encounter numerous challenges when using Google Classroom. Also, a recent study by [18] shows that teachers' refusal to use Google Classroom was influenced by internal and external factors. This study refers to internal obstacles as the attitudes, beliefs and tendencies of teachers. However, the external obstacles refer to outer constructs beyond the teacher's control that hamper the accomplishment of their online teaching methodologies. [13] suggested that teachers and learners encounter challenges and opportunities while adopting online learning. Besides, there is confusion among teachers regarding the utilisation of technology and online teaching strategies. There is also concern that some media resources, such as pre-recorded videos, neglect important social connections. The [7] study recommends that teachers' behaviour towards technology and peer opinion play immense roles in predicting the level of Google Classroom use in school settings.

The [6] study used the unified theory of acceptance and use of technology (UTAUT) model to identify the constructs of PE, EE, SI and FC. It was suggested that professional development opportunities, technical support and peer support could be effective ways to increase teachers' acceptance and use of Google Classroom. Likewise, a meta-analysis of over 74 publications on the UTAUT [14] from 2003 to 2013 has revealed that the UTAUT is a robust, reliable and accurate model for determining the acceptance and use of technologies. UTAUT includes four independent variables, namely PE, EE, SI and FC, which are direct constructs of intention to use and BI. This theoretical framework was utilised in the current research to examine its absolute consideration of teachers' behaviour in using cloud-based LMS such as Google Classroom [9].

This study is significant to school administrators, teachers and students by creating awareness of the adoption of Google Classroom for online teaching and learning activities both locally and internationally. There is a scarcity of literature addressing Google Classroom issues in Malaysian high schools. However, the minimal compliance with the adoption of the Google Classroom application for teaching and learning in Malaysian secondary schools becomes problematic to society in this post-COVID-19 era, and it is a display of tutors' unpreparedness for similar unforeseen challenges like the COVID-19 pandemic that disrupted schools' academic sessions. Educational technologies gained more prominence in schools during the COVID-19 pandemic, and this post-COVID-19 era presents more challenges in the teaching and learning scenario. Hence, schools all over the world must introduce new learning technologies like Google Classroom to adapt students to online teaching methodologies.

Besides, it is still inconceivable to reconcile the ineptitude of some tutors locally and internationally for their refusal to fully adopt educational technologies for instructional activities [15].

2 VIRTUAL LEARNING ENVIRONMENT (VLE) AND GOOGLE CLASSROOM

The Malaysian Ministry of Education (MOE) has employed virtual learning environments (VLEs) in schools nationwide, with the help of 1Bestarinet and Frog VLE for over one thousand two hundred and eleven (1,211) schools across the country [16]. This application is an online learning management system (LMS) that imitates the normal four walls of the classroom through the integration of online visual equivalence. For instance, tutors can assign, test and mark lessons virtually in the Google Classroom application. Also, the students can submit homework and view their results online in a Google Classroom [1]. However, a study by [11] shows that many teachers are resilient to the use of technologies for teaching and learning processes. Besides, inadequate knowledge, excess workload, weak internet connectivity and a scarcity of computer facilities reduce teachers' resilience to use technologies. A [6] study shows that tutors perceived usefulness and perceived ease of use were positively associated with their intention to use Google Classroom. Similarly, a study by [9] shows that tutors perceived usefulness and ease of use were positively associated with their actual use of Google Classroom.

Additionally, [5] shows that the perceived ease of use and perceived usefulness of Google Classroom were positive. Another study conducted by [21] shows that perceived ease of use and perceived usefulness had a positive effect on tutors acceptance of Google Classroom. Besides, SI had no significant effect. The results of this study show the importance of ensuring Google Classroom is perceived as useful by tutors. Also, efforts to increase SI through peer support or professional development are not effective in increasing teachers' acceptance of the application.

The [12] study emphasised the relevance of positive teacher behaviour towards VLE as a predictor of technology adoption. Besides, it was recommended that subsequent studies on technology adoption consider organisational and technological constructs to widen the scope of the inquiry. However, research [4] shows that excess workload, weak Internet connectivity and inadequate technology competence hamper teacher's use of VLEs. It was recommended that tutors be forerunners in the administration of VLE for teaching and learning processes [26]. Other studies have also showcased problems like weak network connections, scarcity of technical support, inadequate training, time and teacher's competency [10] [2].

There is potential relevance of VLE and Google Classroom [22]. However, tutors are not conscious of the importance of integrating Google Classroom into teaching and learning processes. Studies by [10] show that the use of VLE among teachers in Malaysia remains minimal. Also, [15] shows that inadequate acceptance of VLEs among tutors is a sign that there are problems with the teacher's acceptance of this technology. Educators' resilience to technology use is a main impediment to its successful introduction for classroom instruction, with constructs such as inadequate training, support and understanding of technology utilisation [17] [23] [8] [17] [19] [24].

2.1 Research objectives

The following are the research objectives that will be used to address the research gap:

1. To determine the significant relationships between PE and BI to use the Google Classroom platform.
2. To determine the significant relationship between EE and BI to use the Google Classroom platform.
3. To determine the significant relationships between SI and BI to use the Google Classroom platform.
4. To determine the significant relationships between FC and BI to use the Google Classroom platform.
5. To determine the significant relationships between SE and BI to use the Google Classroom platform.
6. To determine the significant relationships between HM and BI to use the Google Classroom platform.
7. To determine the significant influence of PE, EE, FC, SE and HM on the BI to use the Google Classroom platform.

2.2 Research hypotheses

H1: There is a significant relationship between PE and BI to use the Google Classroom platform among Secondary School teachers.
H2: There is a significant relationship between EE and BI to use the Google Classroom platform among Secondary School teachers.
H3: There is a significant relationship between SI and BI to use the Google Classroom platform among Secondary School teachers.
H4: There is a significant relationship between FC and BI to use the Google Classroom platform among Secondary School teachers.
H5: There is a significant relationship between SE and BI to use Google Classroom among Secondary School teachers.
H6: There is a significant relationship between HM and BI to use Google Classroom among Secondary School teachers.
H7: There is a significant influence of PE, EE, FC, SE and HM on the BI to use the Google Classroom platform among Secondary School teachers.
Ha7a: There is a significant influence of PE on the BI to use the Google Classroom platform among Secondary School teachers.
Ha7b: There is a significant influence of EE on the BI to use the Google Classroom platform among Secondary School teachers.
Ha7c: There is a significant SI on the BI to use the Google Classroom platform among Secondary School teachers.
Ha7d: There is a significant influence of FC on the BI to use the Google Classroom platform among Secondary School teachers.
Ha7e: There is a significant influence of SE on the BI to use the Google Classroom platform among Secondary School teachers.
Ha7f: There is a significant influence of HM on the BI to use the Google Classroom platform among Secondary School teachers.

2.3 Significance of the research

This study is significant to the literature in the area of teachers' readiness to use Google Classroom for teaching and learning processes. The result of this research provides materials to assist the Malaysian Ministry of Education (MOE) in managing the teachers' readiness towards adopting Google Classroom for instructional activities. This study is also relevant to Malaysian educational settings as it fills the gap in literature on technology adoption in the Malaysian educational system. The findings of this study are relevant to MOE, policymakers, lecturers, contractors, school administrators and secondary school teachers. This study was likewise conducted for the benefit of academic-related endeavours to enhance the level of acceptance of Google Classroom for instruction.

3 METHODOLOGY

This study used a quantitative methodology that introduced a researcher-designed questionnaire for data-gathering activities. The questionnaire was validated at the expert level, and it was also pilot tested to establish its Cronbach alpha reliability coefficient. The result of the validation and piloting showed that the questionnaire was a valid and reliable instrument for data gathering. Besides, the quantitative method entails a descriptive survey design, which examined the BI of secondary school teachers in Penang towards the acceptance of Google Classroom. This study involved 18 secondary schools in the northeast area of Penang, due to accessibility and cost factors. Also, the population for the study was defined as teachers from National secondary schools in the northeast area of Penang who were teaching in the year 2019. Sample selection was determined using the [16] table.

The questionnaire was distributed to selected teacher participants from National secondary schools in the northeast region of Penang for data-gathering activities. The questionnaire was adopted and adapted from previous literature that addressed similar variables such as PE, EE, SI, FC, SE and hedonic motivation. The questionnaire contained queries seeking to know the teacher's background information and BI towards the Google Classroom application. The survey methodology was chosen due to its ability to gather large amounts of data. Data was collected using both a paper-based questionnaire and a web-based survey form developed using Google Forms. The collected data were analysed using the statistical package for social sciences (SPSS) version 24. Also, descriptive, correlational and regression statistical models were introduced in analysing this study's data.

Notwithstanding, the constructs in this research were adopted and adapted from numerous kinds of literature. For instance, the PE construct was derived from [6] and [9]. Also, the EE construct was deduced from [2] and [6]. The SI construct was derived from [11] and [10]. However, the facilitating condition construction was adopted and adapted from [20]. The SE construct was deduced from [19] literature. Hedonic motivational constructs emanated from [13] work. The BI construct was inspired by [2] and [16] research.

The questionnaire that was adapted for this research was originally in English. However, it was translated from English to Malay and then re-translated to English by an expert translator to ensure translation equivalence. The Malay language is a medium of communication for Malaysian secondary school teachers, which

warranted the translation of the questionnaire utilised for this study's data-gathering activities.

4 FINDINGS

This study's findings showed that most of the participants were Malay and female, between the ages of 31 and 40. However, the response rate of the survey was high, with a total of 322 responses received, exceeding the minimum sample size required for analysis.

The researchers used statistical testing to determine the normality of the data. Likewise, the histogram, Kolmogorov Smirnov, Shapiro Wilk estimates, skewness and kurtosis were introduced to check the normality of the data. The results showed that the data was consistent and had a normal distribution. Hence, this study's data is normal, especially for larger sample sizes.

The Q-Q plot showed that the data attained a normal distribution pattern. However, the Q-Q plot further indicates that 50% of the data is significantly on top. Thus, the findings showed that the data is normally distributed. Also, it was discovered that the BI results were normally distributed based on the analyses of the data and visual testing. This study's analyses were valid according to the contents derived from questionnaire data [16].

The value of Cronbach's alpha for PE was 0.940. The magnitude of Cronbach's alpha for EE was 0.924. The SI factor had 0.912 Cronbach alpha. The Cronbach's alpha for FC was 0.839 for the independent variable. The size of Cronbach's alpha for the next independent variable, SE, was 0.861. In comparison, in the revised object-total association section, both questions had a positive relationship with the sum above 0.3. Furthermore, when an element if removed, no item would be identified by a higher Cronbach alpha [15].

The remaining Cronbach alpha for the next independent variable, HM, was 0.936. The Cronbach's alpha for the next independent variable, BI, was 0.922.

A total of seven principal component analysis (PCA) elements were analysed using SPSS. The PCA value was set to 0.4 based on the small data set in this analysis. The data link was collected for element analysis in the PCA configuration. Subsequently, the ability to take samples was tested for Kaiser-Meyer-Olkin (KMO). The KMO value was 0.960, which is higher than the acceptance value of 6, and the Bartlett measurement was significant at $p = 0.000$. The Bartlett probability value also implies that there was an association between the factors. The principal component analysis (PCA) was used for this study's factor analysis, as it is a better choice for dataset summaries [16].

The PCA analysis shows six components with an Eigenvalue of more than 1. The Eigen value of component 1 was 11.71, which reflected 37.77% of the variance. Component 7 Eigenvalue was 1.41, which explained 4.56% of the variation. For this analysis, seven factors were known as parameters for factor collection. Thus, a total of 72.597% of the variation in data were explained.

In this study, seven PCA components with an Eigenvalue greater than 1 were generated. Component 1 had an average meaning of 11.71, which reflected 37.77% of the variable variance. The seventh (7th) factor had an Eigenvalue of 1.41, which explained the variance of 4.56%. For this factor analysis, the constructs were known as elements for factor analysis. However, the overall variance was 72.597%.

In this study, seven components with all factors were substantially loaded into one component. These seven components represented the factors of the study.

In conclusion, this analysis supported the use of the seven value items as a separate scale.

The result also showed that the loading value for the item SE5 was less than the cut-off value 0.5. Hence the item was eliminated. It was recommended that 20% of the total items can be removed [16].

Also, this study conducted a correlation analysis to assess the strength and direction of the relationship between the six independent variables (PE, EE, SI, FC, SE and HM). Likewise, the data were correlated based on the single dependent variable (BI) in relation to Google Classroom use among Penang secondary school teachers in the north-east part of Malaysia. The correlation analysis was performed using Pearson's product-moment correlation coefficient, which is a measure of the linear relationship between two variables. The results of the correlation analysis revealed that there was a positive and large correlation between all independent and dependent variables. For instance, the correlation between PE and BI was $r = .691$, $N = 322$, $p < .01$, which indicated a large positive correlation. Similarly, the correlation between EE and BI was $r = .704$, $N = 322$, $p < .01$, indicating a large positive correlation. The correlation between SI and BI was $r = .740$, $N = 322$, $p < .01$, revealing a large positive correlation. The correlation between FC and BI was $r = .550$, $N = 322$, $p < .01$, which indicated a large positive correlation. The correlation between SE and BI was $r = .683$, $N = 322$, $p < .01$, which showed a large positive correlation. Finally, the correlation between HM and BI was $r = .796$, $N = 322$, $p < .01$, which revealed a large positive correlation. These results suggested that all independent variables had a strong and positive relationship with the dependent variable.

4.1 Hypotheses testing

All six hypotheses of this research, which stated that there was a significant relationship between each independent variable, namely PE, EE, SI, FC, SE and HM, were supported by the correlation statistics for a positive and significant relationship. Also, dependent variables such as BI to use Google Classroom applications among secondary school teachers were supported by Pearson's correlation analysis. This showed positive and significant relationships between each independent and dependent variable, with values of r ranging from 0.550 to 0.796. This research examined the relationship between different independent variables and a single dependent variable, which is the BI to use the Google Classroom application among secondary school teachers. The correlation analysis was conducted using the Pearson product-moment correlation coefficient to understand the strength and direction of these relationships. The research hypotheses proposed that there was a significant relationship between each independent variable and the dependent variable. The results of the Pearson's correlation analysis supported these hypotheses and showed a positive and significant relationship between each independent and dependent variable.

Specifically, hypothesis one stated that there was a significant relationship between PE and BI to use the Google Classroom application among secondary school teachers ($r = 0.691$, $p < 0.01$). The results of the correlation analysis supported this hypothesis, as it showed a positive and significant relationship between PE and BI. Hypothesis two stated that there was a significant relationship between EE and BI to use the Google Classroom application among secondary school teachers ($r = 0.704$, $p < 0.01$). The results of the correlation analysis supported hypothesis 2, as it showed a positive and significant relationship between EE and BI. Hypothesis 3 stated that

there was a significant relationship between SI and BI to use the Google Classroom application among secondary school teachers ($r = 0.740$, $p < 0.01$). The results of the correlation analysis supported hypothesis 3, as it showed a positive and significant relationship between SI and BI. Hypothesis 4 stated that there was a significant relationship between FC and BI to use the Google Classroom application among secondary school teachers ($r = 0.550$, $p < 0.01$). The results of the correlation analysis supported hypothesis 4, as it showed a positive and significant relationship between FC and BI. Hypothesis 5 stated that there was a significant relationship between SE and BI to use the Google Classroom application among secondary school teachers ($r = 0.683$, $p < 0.01$). The results of the correlation analysis supported hypothesis 5, as it showed a positive and significant relationship between SE and BI. Hypothesis 6 stated that there was a significant relationship between HM and BI to use the Google Classroom platform among Secondary School teachers ($r = 0.796$, $p < 0.01$). The results of the correlation analysis supported hypothesis 6, as it showed a positive and significant relationship between HM and behavioural intention.

4.2 Multiple regression

Also, a multiple regression statistical model was introduced to analyse the influence of independent factors on dependent factors. In this research, the independent factors were PE, EE, SI, FC, SE and hedonic motivations. However, the dependent factor of this inquiry was BI. Hence, testing the significant influence of PE, EE, SI, FC, SE and HMs on BI required multiple regression analysis.

Besides, this study examined the R^2, which presented the variance of the dependent variable due to the independent variable. Notwithstanding, the data analysis showed that there was a 0.717 R^2 on the BI. This implies that 71.7% of the variance in BI was explained by PE, EE, SI, FC, SE and hedonic motivation. This research also examined the statistical significance of the model using ANOVA (see Table 1 for details). The result showed that the mean squared for regression was 16.771 and 0.126.

However, Table 1 for the hypotheses testing depicted that the model as a whole was significant. Besides, the calculated beta values for PE (0.64), EE (0.138), SI (0.235), FC (–0.005), SE (0.095) and HMs (0.393) were positive and significant.

Table 1. Hypotheses results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.221	.111		1.980	.049
	PE	.064	.053	.064	1.212	.227
	EE	.138	.054	.139	2.549	.011
	SI	.235	.051	.248	4.592	.000
	FC	–.005	.042	–.005	–.115	.909
	SE	.095	.051	.092	1.873	.062
	HM	.393	.052	.416	7.608	.000

Note: a. Dependent Variable: BI.

Based on table 1:

Hypothesis Ha7a represents the influence between PE and BI, which revealed $\beta = .064$, $t(322) = 1.212$ and $p > .05$. Hence, the hypothesis Ha7a was rejected.

Hypothesis Ha7b represents the influence between EE and BI, which revealed $\beta = 0.139$, $t(322) = 2.549$ and $p < 0.05$. Hence, hypothesis Ha7b was accepted.

Hypothesis Ha7c represents the influence between SI and BI, which revealed $\beta = .248$, $t(322) = 4.592$ and $p < .05$. Thus, hypothesis Ha7c was accepted. Hypothesis Ha7d represents the influence between FC and BI, which revealed $\beta = -.005$, $t(322) = -.115$ and $p > .05$. Based on this outcome, the hypothesis Ha7d was also rejected.

Hypothesis Ha7e represents the influence between SE and BI results, which showed that $\beta = .092$, $t(322) = 1.873$ and $p > .05$. The result caused hypothesis Ha7e to be rejected.

Hypothesis Ha7f represents the influence between HM and BI, which showed that $\beta = .416$, $t(322) = 7.608$ and $p < .05$. These values imply that hypothesis Ha7f was accepted.

5 CONCLUSION

This study showed that PE and EE had a positive and significant relationship with BI to use the Google Classroom application among Malaysian high school teachers. The research also revealed that SI, SE and HM had a significant positive relationship with BI. However, the study depicted FC as possessing a significant link with BI. Also, these study results assert that teachers envisage the use of Google Classroom to eventually increase student's active participation. Besides, this study showed that Google Classroom technology acceptance relies on how easy it is to use this application. Hence, this research suggests that school managers and the Malaysian Ministry of Education (MOE) should promote Google Classroom's ease of use.

This research showed that SI had a positive and significant relationship with BI to use Google Classroom among Malaysian high school tutors. This finding is consistent with a previous inquiry by [20], which showed that SI had a positive impact on the intentions of users to use e-learning systems. This shows that people's discernment of the impact of others on their behaviour could influence their decision-making. In this study, researchers assert that teachers are more likely to use new technologies when they see their colleagues use them with ease. Also, it was revealed that a supportive and encouraging learning community impacts teachers' intentions to use Google Classroom.

In this research, the FC factor showed no significant relationship with BI to use Google Classroom in Malaysian secondary schools. It is socially evident that technology infrastructure serves as FC for the use of educational technologies like Google Classroom and with this study's revelation, it is obvious that there exists minimal synergy between FC and BI to use Google Classroom for teaching and learning purposes in Malaysian secondary schools.

Notwithstanding, this study concludes that SE factors had a positive and significant relationship with BI to use Google Classroom among Malaysian high school tutors. This result is consistent with previous research [14] that asserts SE as possessing a positive impact on the intentions of users to use technologies. These findings showed that people's belief in their abilities determines their decision to elicit the behaviour.

Hedonic motivation demonstrated a significant positive relationship with BI to use Google Classroom among high school tutors. These findings are consistent with

previous research [13], which asserts that HM has a positive influence on the intentions of using technologies.

Also, this research showed that SI had a significant positive relationship with BI, which was consistent with the findings of [3]. These findings also agree with the study by [11] about factors affecting the adoption of technologies, where the results showed that SI had a significant relationship with BI. These findings indicated that the tutors' intention to use Google Classroom was significantly impacted by the SI. Thus, this study asserts that the teachers' BI to use the Google Classroom is also determined by their colleagues. However, this is based on the teacher's belief that their colleagues have adequate knowledge, experience and skill. This study suggests that school managers should provide opportunities for teachers to learn and share their experiences with their colleagues.

This research limitation exists in its absolute reliance on quantitative methodology for data gathering, which disallows the use of qualitative interviews. Hence, this research recommends that future studies introduce a third paradigm called mixed methodology to allow the gathering of both quantitative and qualitative data.

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