Asian Research Journal of Arts & Social Sciences

13(3): 20-36, 2021; Article no.ARJASS.65800
ISSN: 2456-4761

The Acceptance and Use of the Virtual Learning Environment (VLE) in Higher Education: A Contextual Study of Royal University of Bhutan

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Authors' contributions

This work was carried out in collaboration among all authors. Author KPG designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors DS, KW and SD managed the literature searches, reviewed them and worked for data collection for this study. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/ARJASS/2021/v13i330215
Editor(s):
(1) Dr. Ana Sofia Pedrosa Gomes dos Santos, UIDEF – Instituto da Educação, Universidade de Lisboa, Portugal.
Reviewers:
(1) Adriana Peña Pérez Negrón, Universidad de Guadalajara CUCEI, Mexico.
(2) Deepti Gupta, Panjab University, India.
Complete Peer review History: http://www.sdiarticle4.com/review-history/65800

Original Research Article

Received 12 December 2020
Accepted 15 February 2021
Published 01 March 2021

ABSTRACT

Aims: The study was conducted to explore the factors that influence the acceptance of Moodle (VLE) among students and to study the behavioral intention of students to use VLE in Royal University of Bhutan (RUB) based on modified technology acceptance model (TAM).
Study Design: This exploratory research incorporated a quantitative approach.
Place and Duration of Study: The study was conducted in nine constituent colleges under Royal University of Bhutan (RUB) in the period of one year (2019-2020).
Sample: A total of 384 samples were drawn from population size of 9590 students under RUB colleges proportionately by using Yamane (1967) formula of sample determination.
Methodology: The research used the modified TAM model to study the factors that influence the acceptance of virtual learning environment (VLE) and the behavioral intention of students to use VLE. This study mainly used primary data collected through a self-report online questionnaire adopted from context-based literature.
Results: The study observed that while the facilitating condition (FC) has a weak positive effect on perceived usefulness (PU) of VLE, the users' experience (E) has a very strong positive influence over it. However, self-efficacy (SE) and subjective norms (SN) do not affect PU. Similarly, SE, E

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and SN have a positive effect on perceived ease of use (PEU), but the effect of SE is observed to be very strong. However, FC does not affect PEU. PEU has a very strong positive effect on PU, and both PEU and PU strongly affect the behavioral intention (BI) to use VLE. BI also has a strong positive affect on actual system use (SU). The study also observed that students in RUB demonstrate a high degree of behavioral intention to use VLE which appears to be a strong indicator of actual system use.

Conclusion: The study concludes that the students' experience in using VLE is comparatively more important determinant of perceived usefulness than the technical and infrastructural support that enables them to use VLE; the better the experience of using VLE the more useful it appears. Similarly, students' ability and the perceive social pressure to use VLE do not influence the students' perception about the usefulness of it. However, if students are confident in their ability to use VLE, it appears easy to them, and if they perceive VLE to be user friendly, they consider it very useful. Students intend to use VLE when they are convinced that the system is useful and easy to use.

Keywords: Modified Technology Acceptance Model (TAM); Royal University of Bhutan (RUB); Facilitating Condition (FC); Subjective Norms (SN); Experience (E); self-efficacy; Perceived Usefulness (PU); Perceived Ease of Use (PEU); Behavioral Intention (BI).

1. INTORDUCTION

With the increasing use of internet and the advent of better educational technologies over time, Bhutan's quest for infusion of technology in learning and teaching is gradually taking its shape. Today, especially in tertiary educational institutes in Bhutan, the concept of blended learning is widely practiced. Blended learning is a way in which students get to learn both from electronic and/or online media as well as traditional face-to-face interaction with teachers.

Poon [1] maintains some of the benefits associated with blended learning: Blended learning has an ability to foster independence in learning and improves independent research skills significantly among the learners. It also improves the autonomy of learners and provides a time for reflective learning. The author also witnessed that the blended learning forsters a professional learning environment with better achievement of learning outcomes by students, and also offers flexibility for students and teachers to carry out their individual responsibilities [1].

It has not been long that tertiarly educational institution in Bhutan has formally started to have e-learning system in place which is used along with traditional face-to-face classroom learning. All the colleges under Royal University of Bhutan received a formal and mandetory directive to use the Moodle based Virtual Learning Environment (VLE) only after 2011 [2] though few colleges were already using the independent system of e-learning [3].

It is important to note that although blended learning model is observed to offer many benefits to both students and teachers alike as menthoned before, understanding the students' ability and skills to use the system (VLE in the context), and the acceptance of the same by the students is what determines the success of the said model. It is imparative to have an idea about students' preferences and intentions for using the system (VLE) not just to have a better design of the system and ensure the proper implementation of the same in different educational institutions in the couuntry but also to recognize deficiencies in the system and adress them to increase the acceptance of the system.

This study aims to explore factors that influence the acceptance and the use of Moodle based VLE system currently in use across different colleges under Royal University of Bhutan. The study also explores the behavioral intention of students to use VLE.

2. LITERATURE REVIEW

2.1 Virtual Learning Environment (VLE)

The higher education institutes in Bhutan consist of 9 constituent colleges under Royal university of Bhutan. Up until 2011, all the colleges under RUB used the independent system of e-Learning [3]. After 2011, a policy was issued whereby all the colleges under RUB were required to use Virtual Learning Environment [2]. VLE is a virtual space that comprises of various tools so as to support and manage learning [4]. It is also

defined as an online system that enables students to have an access over different learning tools and learning resources such as course descriptors, program information, discussion forums, document sharing system and many more [5].

For what is to be known as hybrid or blended learning method, Royal University of Bhutan formally adopted Moodle, an open-source software, in 2011 though Samtse College of Education was already using Moodle since 2004 [6]. The Moodle based VLE enables both face-to-face and online learning. However, according to Rennie and Mason [7], although all the colleges are virtually connected with VLE which is set up at their own location, the Royal University of Bhutan is unable to have a resilient information exchange across college with university wide solution due to limited bandwidth.

All the colleges under RUB use Moodle 3+ to launch VLE [8]. Moodle enables active learning, interaction among students and immediate feedback. However, besides the exploratory study on challenges associated with e-learning initiatives [3], and the study of integration of VLE into the pedagogy of higher education institutions [2], there is no study that explores the acceptance and the use of VLE among students in Royal University of Bhutan.

2.2 Acceptance of VLE

Studies suggest that the use of technology in learning and teaching has improved the ability of students for cooperative learning by making learning resources accessible, enabling efficient communication and sharing of online space for discussions [9] unlike the traditional setting in which students had to adhere to certain fixed classroom hours for learning. Researches also observed that with the use of technology, students become more creative, and also experiment more with resources and materials they use for academic projects, presentations and reports [10].

Although there is a good indication that the use of technology in learning has more benefits than not, students' acceptance and the use of the system is what matters the most in the first place. Some researchers argue that although young adults are becoming more adapt with the new technologies [11] the acceptance and the use of educational technology by young adults has not been thoroughly explored in academia [12]. Tarhini et al. [13] also argue that students can leverage on information technology for learning as it has a great potential to help them, but the effectiveness of a technology in learning depends on the acceptance and the use of a technology by the students. The objective of integrating technology in education will only be achieved given that students accept and use the system. Therefore, in order to develop and implement a better Virtual Learning Environment, besides improving the functionality of a system in place, it is also imperative to study the acceptance behavior of students about the VLE in place.

Raaij and Schepers [14] maintain that the most important factors that determine the acceptance and the use of VLE by students are closely linked to perceived usefulness and perceived ease of use of the system. Moreover, for the online learning environment to be more resilient, Dillenbourg [15] suggests that the design of the system should assure certain characteristics in the system. He recommends that the online learning platform should be easy to use, it should be accessible from different locations at different time and it needs to integrate different tools and resources for learning.

Besides many tools and techniques used by professionals to study the acceptance of technology system by its target users, the TAM model is one of the most used theoretical frameworks in academia [16]. Sumak et al. [17] support that the application of TAM in recent studies on the acceptance of e-learing systems is widely noticable across the globe.

2.3 Technology Acceptance Model (TAM)

For many years, researchers have been studying extensively about the acceptance and the use of new technology by individuals and organizations. Technology Acceptance Model (TAM) is one of the few models that are widely accepted for being efficient in predicting the acceptance of new technology by users [14]. Hendrick et al. [18] defines technology acceptance as "an individual's psychological state with regard to his or her voluntary or intended use of a particular technology."

TAM model proposes that there are three factors that define the motivation of the user to use a technology or a system [19]. They are Perceived Ease of Use (PEU), Perceived Usefulness (PU) and Attitude Towards Using a system. PEU can

be understood as the extent to which an individual believes to be free of physical and mental effort as a result of using a particular system. Similarly, PU is the extent to which an individual believes that one's job performance would be enhanced as a result of using a particular technology. Attitude towards a system is defined as an individual's negative or positive feelings about performing the actual behavior.

Davis [20] believes that the charactiersstics of a particular system would influence its perceived ease of use and perceived usefulness. Similarly, perceived ease of use and perceived usefulness are the determinants of actual attitude towards a system use. Subesquently, a user's attitude towards a particular system would determine his/her acceptance or rejection of a given technology.

TAM has gone through modifications over the years. Ratna and Mehra [21] claims that the attitude towards using (ATU) component was substituted with behavioral intention (BI) because perceived usefulness and perceived ease of use were observed to have direct influence on behavioral intention rather than attitude towards using. The modified version of TAM model proposed by Venkatesh and Davis [22] is presented in Fig. 1.

The modified model of TAM is inclusive of external variables which include characteristics of system in use, trainings that users of particular system have gone through and the involvement of users while designing the system, and the nature of the implementation process [22].

2.4 Research Model and Hypothesis

The research model is presented in Fig. 2. The hypotheses of the study are drawn based on literature review demonstrating the relationships between different variables as explained below:

The TAM model suggest that the Perceived Usefulness (PU) and Perceived Ease of Use (PEU) are an important indicators of technology adoption and they are influenced directly or indirectly by the external variables [23]. One of the external variables identified for the use in the module is Facilitating Condition (FC). FC is a support mechanism such as organizational and technical infrastructure to use a system [24]. Many studies vindicate the influence of FC on the perception about usefulness of a system and its ease of use [25,26]. Therefore, the study proposes the following hypothesis:

H1: Facilitating condition (FC) will have positive effect on perceived usefulness (PU).
H5: Facilitating condition (FC) will have positive effect on perceived ease of use (PEU).

Similarly, another variable used in the study is Self-Efficacy (SE). It is defined as an individual's beliefs about one's own ability and skills to use a particular system [27]. Many studies observed that there is a relationship of SE with PU and PEU [25,28]. If a person has a strong belief on his ability to use a system, the system would be perceived as more useful and easier to use. In the light of this background, the following hypothesis are proposed:

H2: Self-efficacy will have positive effect on perceived usefulness (PU).
H6: Self-efficacy will have positive effect on perceived ease of use (PEU).

The third external variable used in the study model is the user Experience (E). Olsson et al. [29] define it as the subjective experience of a user resulting from the interaction with the technological artifact. Previous studies suggest that more the interactive experience individuals have in using the system or a technology, the easier and more useful it appears to them [30,31]. Therefore, the following hypothesis is proposed:

H3: Experience will have positive effect on perceived usefulness (PU).
H7: Experience will have positive effect on perceived ease of use (PEU).

The study also used Subjective Norms (SN) as an external variable in the study. SN is understood as a belief a person has about whether certain behavior will be approved or disapproved by h/er peers or individuals important to him/her [27]. Literatures confirm the relationship of SN with PU and PEU [32,33]. If a person perceives a strong social opinion to use a certain system in his environment, s/he finds the system more useful and easier to use. Therefore, the following hypothesis is drawn:

H4: Subjective norms (SN) will have positive effect on perceived usefulness (PU).
H8: Subjective norms (SN) will have positive effect on perceived ease of use (PEU).

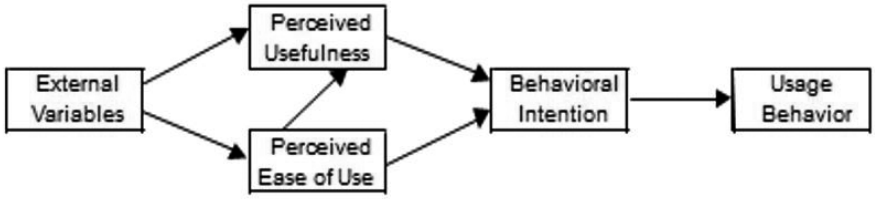

Fig. 1. Modified model of TAM
Source: Venkatesh and Davis [22]

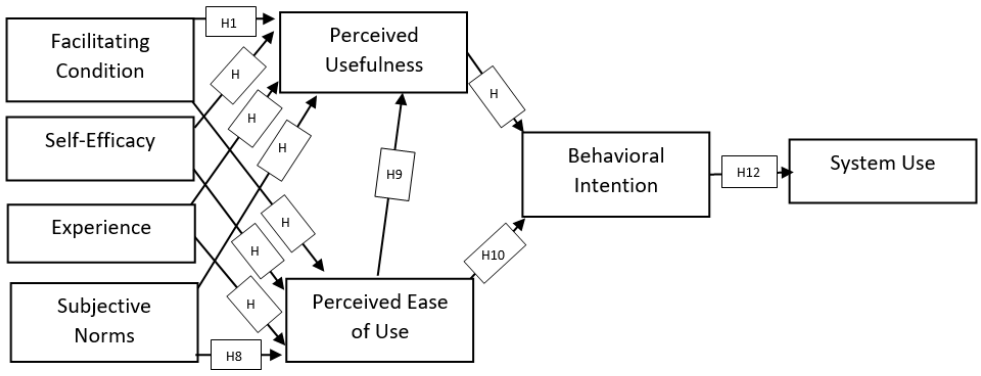

Fig. 2. Research Model (Extended TAM)
Source: Author's design in addition to extended TAM

The TAM model rests upon the foundation of the important beliefs such as PU and PEU that determine behavioral intention (BI) of individuals to use a system [34]. Ma and Liu [35], in their meta-analysis of empirical findings on acceptance of technology using TAM model, observed that PU and PEU constitutes a significant influence on an individual's intention to use a technology. Raaij and Schepers [14] conducted a study to evaluate Chinese students' acceptance and usage of VLE. The study concludes that the PU of a system directly influenced BI, where as the PEU had a indirect effect on BI. Similarly, the study on the acceptance of e-learning among university students in India observed a significant relationship between different components of the model [21]. With these insights from the literature, the following four hypotheses are proposed:

H9: Perceived ease of use (PEU) will have positive effect on perceived usefulness (PU).

H10: Perceived ease of use (PEU) will have positive effect on behavioral intention (BI) to use VLE.

H11: Perceived usefulness (PU) will have positive effect on behavioral intention (BI) to use VLE.

H12: Behavioral intention (BI) to use VLE will have a positive effect on system use (SU).

3. RESEARCH METHODOLOGY

3.1 Scope and Variables Covered

The target population of the study is students of nine constituent colleges under RUB who along with attending full time learning and assessments in the campus also use VLE for varied academic purposes. The objectives of the study are to explore the factors that influence the use of VLE platform and to study the behavioral intention of students to use the system by using extended technology acceptance model.

In order to measure the term variables in the research model (Fig. 2), an online instrument was designed, and items suitable to the context were adopted from previously published sources i.e., [34,36,23,37]. The modified TAM model proposes 4 dependent variables with certain unspecified extraneous variables (see Fig. 1),

based upon which the research model was designed as shown in Fig. 2. In total there were 28 items that measure different modified TAM variables. The 5-point Likert scale starting with (1) indicating strongly disagree, (2) disagree, (3) neutral, (4) agree and (5) indicating strongly agree is used to study the level of agreement of respondents with the particular statement against each construct of modified TAM model.

3.2 Sources of Data

For the purpose of this study, mainly the primary data was used. However, inferences were also made from reliable secondary sources, such as annual reports of concerned authorities dealing with subjects of this study, to support the statement of facts and figures in this study.

3.3 Population and Sample

The total size of the population is 9590 [38] which includes all the students of 9 constituent colleges under RUB. The details of the population distribution across nine colleges are given in Table 1.

The sample size for the study is calculated using Yamane (1967) formula of sample determination, i.e., n=N/(1+Ne2). To determine the number of respondents from each college, proportionate sampling technique is being used. Table 1 shows the proportion of samples in each college. For the population size of 9590, the calculated sample size is 384. Due to the distant geographical dispersion of colleges across different regions of the country, a convenient sampling technique was used to ease the process of data collection with the help of online survey instrument.

The sample is comprised of 212 male (55.2%) respondents and 172 female (44.8%) respondents. 26.6% of respondents are from first year, 37% are from the second year and 36.5% of respondents are from the final year in the university. From each sister colleges under RUB, the required number of samples are decided based on the total number of students that each college has.

3.4 Statistical Tools of Data Analyses

The data which has been collected from 384 samples is tabulated, analyzed, and interpreted with the help of various statistical tools. Descriptive statistics have been used to describe the basic features of the data in the study. The correlation analysis was performed in order to measure the convergent of the items of modified TAM questionnaire. In order to test the hypothesis of the study, a linear regression models were used. SPSS software was used to carry out these analyses.

4. RESULTS AND DISCUSSION

4.1 Reliability Constructs (RC)

The internal consistency of items that measure different constructs of the modified Technology Acceptance Model are computed to assess the reliability of each items under different constructs. Table 2 sums up the Crohbach's Alpha value of different constructs used in the model.

The Crohbach's Alpha value for all the constructs of modified TAM model is above 0.7 which indicates that the construct is reliable and items are consistent in intended measure.

Table 1. Sample proportion

Colleges	Population	Sample	Percentage
CLCS	1153	46	12%
CNR	848	34	9%
CST	965	39	10%
GCBS	1594	64	17%
GCIT	157	6	2%
JNEC	838	34	9%
PCE	1528	61	16%
SCE	873	35	9%
SC	1634	65	17%
Total	9590	384	100%

4.2 Correlation Analysis

To study the influence of different variables on the acceptance of VLE, a regression analysis was conducted after having inspected the correlation coefficients. Correlation gives an idea about significance and strength of hypothesized relationships between proposed study variables. Table 3 shows Pearson correlation between study variables. The analysis shows that all the variables have a significant correlation with each other at $p<0.05$.

4.3 Test of Hypothesis

After the assertion that there is a relationship between variables in the model as indicated by correlation analysis in Table 3, a regression analysis was conducted to test the hypothesis.

The summary of the result of regression for H1, H2, H3 and H4 is shown in Table 4. It is clear that 69.7% of variation in PU is explained by the predictor variables such as FC, SE, SN and E (R Square= 0.697). Table 5 explains the strength of influence the predictors have on perceived usefulness of VLE. The table shows that FC and E have a statistically significant relationship with the outcome variable at $p<0.05$. However, SE and SN do not share statistically significant relationship with PU ($p>0.05$). It is observed that E has more influence on PU as against FC. For instance, the unstandardized coefficients beta value reveals that a unit of increase in E will lead to .616 unit increase in PU and a unit increase in FC will lead to .147 unit increase in PU.

Similarly, a multiple regression model is used to test H5, H6, H7 and H8. The summary of the result is presented in Table 6.

The R Square value indicates that the predictors such as FC, SN, E and SE explain 62.3% of variation in the outcome variable (PEU). Table 7 shows that except for FC, all other predictor variables share a statistically significant relationship with the outcome variable. The unstandardized coefficients beta explains that SE has a stronger influence on PEU when compared to SN and E; a unit change in SE leads to .515 unit change in the PEU, and a unit change in SN and E will lead to .113 and .223 unit change in PEU respectively.

To test H9, a linear regression was used. The summary of the result of the regression analysis is provided in Table 8. The value of R square indicates that the predictor (PEU) explains 19.6% of the variation in PU. As appears in Table 9, it confirmed the H9 that PEU (PU) had a significant effect on PU, with $\beta = .576$, $p<0.05$.

The multiple regression analysis is also carried out to study the influence of PU and PEU on the behavioral intention (BI). Table 10 shows that PU and PEU explains 59.1% variation in BI (R Square = .591).

Finally, to test H12, a simple linear regression was used. The R Square value as shown in Table 12 indicates that the predictor (BI) only explains 22.1% of variation in the outcome variable (SU). Although the R Square value is low, BI is observed to have a significant impact on SU ($\beta=.415$, $p<0.05$) as indicated Table 13. Thus, the result supports H12.

Similarly, Table 11 shows that a unit change in PU and PEU will lead to .417 and .459 unit change in BI respectively. It is also clear that PEU has more influence on BI when compared to the influence of PU.

Table 2. Crohbach's alpha

Sl. No	Variables	Cronbach's alpha	N of Items
1	Facilitating Condition (FC)	0.773	3
2	Self-Efficacy (SE)	0.810	3
3	Subjective Norm (SN)	0.810	3
4	Experience (E)	0.832	3
5	Perceived Usefulness (PU)	0.859	4
6	Perceived Ease of Use (PEU)	0.831	3
7	Behavioral Intention (BI)	0.834	3
8	System Use (SU)	0.838	3

Table 3. Correlations

		1	2	3	4	5	6	7	8
1. Facilitatig condition	Pearson Correlation	1							
	Sig. (2-tailed)								
	N	384							
2. Self-efficacy	Pearson Correlation	.571**	1						
	Sig. (2-tailed)	.000							
	N	384	384						
3. Subjective Norms	Pearson Correlation	.483**	.635**	1					
	Sig. (2-tailed)	.000	.000						
	N	384	384	384					
4. Experience	Pearson Correlation	.634**	.597**	.537**	1				
	Sig. (2-tailed)	.000	.000	.000					
	N	384	384	384	384				
5. Perceived usefulness	Pearson Correlation	.633**	.576**	.519**	.818**	1			
	Sig. (2-tailed)	.000	.000	.000	.000				
	N	384	384	384	384	384			
6.Behavioural intention	Pearson Correlation	.538**	.580**	.473**	.741**	.696**	1		
	Sig. (2-tailed)	.000	.000	.000	.000	.000			
	N	384	384	384	384	384	384		
7. System use	Pearson Correlation	.422**	.414**	.482**	.587**	.556**	.598**	1	
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		
	N	384	384	384	384	384	384	384	
8. Perceived ease of use	Pearson Correlation	.533**	.751**	.576**	.633**	.653**	.701**	.516**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	
	N	384	384	384	384	384	384	384	384

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4. Multiple regression analysis model summary of PU as a dependent and E, SN, FC and SF as independent variables

Model summary				
Model	**R**	**R square**	**Adjusted R square**	**Std. error of the estimate**
1	.835[a]	.697	.694	.46981

a. Predictors: (Constant), experience, subjective norms, facilitating condition, self-efficacy

Table 5. Multiple regression analysis of PU as a dependent variable

Coefficients [a]						
Model		**Unstandardized coefficients**		**Standardized coefficients**	**t**	**Sig.**
			Std. error	**Beta**		
1	(Constant)	.199	.157		1.268	.206
	Facilitating Condition (FC)	.147	.036	.158	4.085	.000
	Self-Efficacy (SE)	.066	.043	.063	1.549	.122
	Subjective Norms (SN)	.067	.049	.052	1.374	.170
	Experience (S)	.616	.038	.652	16.274	.000
a. Dependent variable: Perceived Usefulness (PU)						

Table 6. Multiple regression analysis model summary of PEU as a dependent and E, SN, FC and SF as independent variables

Model summary				
Model	**R**	**R square**	**Adjusted R square**	**Std. error of the estimate**
1	.790[a]	.623	.619	.49148
a. Predictors: (Constant), Experience, subjective norms, facilitating conditions, self-efficacy				

Table 7. Multiple regression analysis of PEU as a dependent variable

Coefficients[a]						
Model		**Unstandardized coefficients**		**Standardized coefficients**	**t**	**Sig.**
		B	**Std. error**	**Beta**		
1	(Constant)	.538	.165		3.270	.001
	Facilitating Condition	.025	.038	.028	.651	.516
	Self-Efficacy	.515	.045	.526	11.503	.000
	Subjective Norms	.113	.051	.094	2.227	.027
	Experience	.223	.040	.251	5.616	.000
a. Dependent variable: Perceived Ease of Use (PEU).						

Table 8. Regression analysis model summary of PU as a dependent and PEU as an independent variable

Model summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.443[a]	.196	.194	.74438
a. Predictors: (Constant), PEU				

Table 9. Regression analysis of PU as a dependent variable

Coefficients[a]						
Model		**Unstandardized coefficients**		**Standardized coefficients**	**t**	**Sig.**
		B	**Std. error**	**Beta**		
1	(Constant)	1.159	.232		4.993	.000
	PEU	.576	.060	.443	9.660	.000
a. Dependent Variable: PU						

Table 10. Regression analysis model summary of BI as a dependent and PU and PEU as independent variables

Model summary				
Model	**R**	**R square**	**Adjusted R square**	**Std. error of the estimate**
1	.769[a]	.591	.588	.54596
a. Predictors: (Constant), perceived usefulness, perceived ease of use				

Table 11. Multiple regression analysis of SI as a dependent variable

Coefficients[a]						
Model		**Unstandardized coefficients**		**Standardized coefficients**	**t**	**Sig.**
		B	Std. Error	Beta		
1	(Constant)	.494	.147		3.367	.001
	Perceived Usefulness	.417	.043	.416	9.609	.000
	Perceived ease of use	.459	.046	.429	9.915	.000
a. Dependent variable: Behavioral Intention (BI)						

Table 12. Regression analysis model summary of SU as a dependent and BI as an independent variable

Model summary				
Model	**R**	**R square**	**Adjusted R square**	**Std. error of the estimate**
1	.470[a]	.221	.219	.68658
a. Predictors: (Constant), BI				

Table 13. Regression analysis of SU as a dependent variable

Coefficients[a]						
Model		**Unstandardized coefficients**		**Standardized coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.705	.150		11.342	.000
	Behavioral Intention (BI)	.415	.040	.470	10.415	.000
a. Dependent Variable: System Use (SU)						

4.4 Behavioral Intention of Students to Use VLE

To study the behavioral intention of students to use VLE, a simple descriptive method is used. Table 14 explains the behavioral intention of students about the use of VLE with the help of frequency count and percentage of respondents' agreement or disagreement with the items that measure behavioral intention.

Going by the degree of response across measures of the first behavioral intention item, it is clear that 68.2% of respondents generally agree that using VLE for learning purpose is a good idea and while 7% of respondents disagree to the statement. On the other hand, 24.7% of respondents are neutral about the statement.

Similarly, in total, 68.5% or respondents believe that they use VLE without someone having to force them to use it. 23.2% of respondents are neutral about the same and 8.4% of respondents do not agree to the statement.

With regard to the opinion of respondents regarding the behavioral intention to continue using VLE, 64.3% of respondents believe that given a choice they will continue to use VLE in future while 12.7% of respondents disagree about the same and 22.9% of respondents are neutral.

Table 14. Mean value analysis of items under behavioral intention construct

Items	BI1: Using VLE is a good idea		BI2: I use VLE without someone having to force me		BI3: If I have a choice, I will continue to use VLE in all the modules in the future	
Opinion	Frequency/ %	Categorial %	Frequency/ %	Categorial %	Frequency/ %	Categorical %
Strongly Disagree	9(2.3%)	7%	6(1.6%)	8.4%	14(3.6%)	12.7%
Disagree	18(4.7%)		26(6.8%)		35(9.1%)	
Neutral	95(24.7%)	24.7%	89(23.2%)	23.2%	88(22.9%)	22.9
Agree	159(41.4%)	68.2%	172(44.8%)	68.5%	139(36.2%)	64.3%
Strongly Agree	103(26.8%)		91(23.7%)		108(28.1%)	
Total	384(100%)	100%	384(100%)	100%	384(100%)	100%

Table 15. Mean scores

Descriptive statistics			
	N	Mean	Std. deviation
Bi1	384	3.86	.947
Bi2	384	3.82	.923
Bi3	384	3.76	1.072
Valid N (listwise)	384		

Overall, the mean values across all three items that measure behavioral intention to use VLE are above 3.7 as shown in Table 15. This indicates that respondents' degree of response is high across all three measure of behavioral intention to use VLE.

4.5 Discussion

Table 16 presents the summary of the hypothesis test. Except for H2, H4 and H5 the research findings support all other hypothesis. Facilitating condition and experience are observed to have a positive effect on perceived usefulness of VLE. However, self-efficacy and subjective norms are found to have no significant effect on perceived usefulness of VLE.

While self-efficacy, experience and subjective norms have a positive effect on perceived ease of use of VLE, facilitating condition does not have a positive effect on perceived ease of use. Perceived ease of use has a positive effect on perceived usefulness of VLE and both perceived ease of use and perceived usefulness have positive effect on behavioral intention to use VLE. Behavioral intention to use VLE also has a positive effect on the actual system use.

For what is against the findings of the study conducted by Venkatesh [25] which claims that facilitating condition such training, educational and technical support can positively affect perceived usefulness and perceived ease of use of a technology, this study found that facilitating condition positively affects perceived usefulness by 14.7%, but it doesn't have an influence over perceived ease of use of VLE. This observation is also against the findings by Ji et al. [39] and Kim [40] in which they claim that the facilitating condition has a positive effect on perceived ease of use. Nonetheless, may be the facilitating condition does not have a bearing over perceived ease of use because it has a direct effect on behavioral intention [41] and actual use of the system [17] and does not route through a mediator such as perceived ease of use.

On the other hand, self-efficacy is observed to have a very strong positive effect on perceived ease of use by 51.5% while it does not have an effect on perceived usefulness of VLE. As suggested by Angela et al. [36], the students perceive that the system is easier to use when they believe in their ability to use the system. Many previous studies also support that there is no effect of self-efficacy on perceived usefulness [42,30,27,36,31]. The finding suggests that the students' perception about the usefulness of the VLE do not directly relate to their ability to use the VLE system. Therefore, the ability to use VLE

is not an indicator of whether VLE is perceived as useful or otherwise.

Similarly, subjective norms positively affect perceived ease of use of VLE by 11.3%, but it does not affect perceived usefulness of VLE. Previous studies also observed that subjective norms do not have an effect on perceived usefulness [42,27,32,33]. Therefore, the social beliefs and expectations has a bearing upon perception about how easy or difficult it is to use the VLE system, but they do not influence the perception about the usefulness of VLE. However, the finding is contrary to the outcome of some of the studies which claim that there is a relationship between subjective norms and perceived usefulness of VLE [31,43].

Users' experience has a very strong positive effect of 61.6% on the perceived usefulness. It also has a positive effect of on 22.3% on perceived ease of use of VLE. The result is supported by various studies [27,44,31]. Therefore, the more experience students have on using VLE, the more useful the system they perceive.

Similarly, the perceived ease of use has a very strong positive effect of 57.6% on perceived usefulness of VLE. Many previous studies [45, 26,36] demonstrated a positive relationship between perceived ease of use and perceived usefulness of a system. Therefore, if students perceive that the VLE is easy to use they also believe that it is very useful.

The study also revealed that both the perceived ease of use and the perceived usefulness of VLE have a strong effect by 45.9% and 41.7% respectively on behavioral intention to use VLE. The finding is supported by many literatures [42, 36,27,32,46]. Similarly, behavioral intention has a positive affect by 41.5% on actual system use. Many previous studies also support this finding [47,19,24,48]. Therefore, the behavioral intention to use the VLE system determines the actual use of the system.

Table 16. Summary of hypothesis test

Hypothesis	Specification	Result
H1	Facilitating condition (FC) will have positive effect on perceived usefulness (PU)	Supported (β=.147, p<0.05)
H2	Self-efficacy (SE) will have positive effect on perceived usefulness (PU)	Not supported (β=.066, p>0.05)
H3	Experience (S) will have positive effect on perceived usefulness (PU)	Supported (β= .616, p<0.05)
H4	Subjective norms (SN) will have positive effect on perceived usefulness (PU)	Not supported (β= .067, p>0.05)
H5	Facilitating condition (FC) will have positive effect on perceived ease of use (PEU)	Not supported (β= .025, p>0.05)
H6	Self-efficacy (SE) will have positive effect on perceived ease of use (PEU)	Supported (β= .515, p<0.05)
H7	Experience (S) will have positive effect on perceived ease of use (PEU)	Supported (β= .223, p<0.05)
H8	Subjective norms (SN) will have positive effect on perceived ease of use (PEU)	Supported (β= .113, p<0.05)
H9	Perceived ease of use (PEU) will have positive effect on perceived usefulness (PU)	Supported (β = .576, p<0.05)
H10	Perceived ease of use (PEU) will have positive effect on behavioral intention (BI) to use VLE	Supported (β = .459, p<0.05)
H11	Perceived usefulness (PU) will have positive effect on behavioral intention (BI) to use VLE	Supported (β = .417, p<0.05)
H12	Behavioral intention (BI) to use VLE will have a positive effect of system use (SU).	Supported (β = .415, p<0.05)

5. CONCLUSION

This paper mainly aimed at creating knowledge about factors that influence acceptance and the use of Virtual Learning Environment (VLE) among students under Royal University of Bhutan with the use of modified Technology Acceptance Model (TAM) [22]. The modified TAM model rests upon the premise that the users' belief such as perceived usefulness (PU) and the perceived ease of use (PEU) of a certain system will directly influence the behavioral intention of a user to use the system, which in turn will influence the actual system use. The users' belief about the system (PU and PEU) is influenced by certain external variables. In this research the external variables are subjective norms, self-efficacy, facilitating conditions and users' experience.

The study concludes that the perceived usefulness of VLE by students is positively influenced by the facilitating condition and user experience. On the other hand, the perceived usefulness and subjective norms do not have an influence over the perceived usefulness of VLE. Similarly, the perceived ease of use is positively affected by self-efficacy, user experience and subjective norms, but facilitating condition do not have an affect over it. As supported by many literatures, the research also observed that the perceived ease of use has a very strong effect on perceived usefulness of VLE. Similarly, both perceived ease of use and perceived usefulness of VLE positively affects the behavioral intention to use VLE up to a similar extent. Behavioral intention to use VLE also has a positive effect on the actual system use. As a result of the mean value analysis and the frequency analysis, the research concludes that students generally have a high degree of intention to use VLE.

From a managerial standpoint, the findings suggest that it is imperative to ensure that the VLE system should be easy to use and useful as these variables have an important bearing on students' intention to use VLE. It is also observed that the perceived usefulness is significantly influenced by only two extraneous variables. Therefore, a future study can be conducted to identify variables that affects perceived usefulness of VLE. The study also recommends VLE system administrators and teachers to ensure that students' expectation and needs associated with VLE be addressed as user experience appears to be an important indicator of perceived usefulness of VLE.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Poon J. Blended Learning: An institutional approach for enhancing students' learning experiences. MERLOT Journal of Online Learning and Teaching. 2013;9(2). Accessed June 27, 2020. Available:https://jolt.merlot.org/vol9no2/poon_0613.pdf
2. Choeda, Penjor T, Dupka D, Zander P-O. The state of integration of the virtual learning environment and ICT into the pedagogy of the Royal University of Bhutan: A descriptive study. International Journal of Education and Development using Information and Communication Technology. 2016;12(1):71-88. Accessed February 2, 2021. Available:https://eric.ed.gov/?id=EJ1099582
3. Muramatsu K, Wangchuk Y. Current status of e-learning and its challenges at institutions of higher education in Bhutan. IPSJ SIG technical report, 2013. Published Online 2013;1-3. Available:https://ipsj.ixsq.nii.ac.jp/ej/?action=repository_action_common_download&item_id=89512&item_no=1&attribute_id=1&file_no=1
4. Technology and tools for online learning. Jisc. Published January 20; 2016. Accessed June 15, 2020. Available:https://www.jisc.ac.uk/full-guide/technology-and-tools-for-online-learning
5. Martins LL, Kellermanns FW. A model of business school students' acceptance of a web-based course management system. Academy of Management Learning and Education. 2004;3(1):7-26. DOI:10.5465/amle.2004.12436815
6. Penjor S, Zander P-O. Predicting virtual learning environment adoption: A case study. The turkish online journal of educational technology. 2016;15(1). Accessed February 2, 2021. Available:https://files.eric.ed.gov/fulltext/EJ1086194.pdf
7. Rennie F, Mason R. The development of distributed learning techniques in Bhutan and Nepal. The International Review of Research in Open and Distributed Learning. 2007;8(1).

DOI: 10.19173/irrodl.v8i1.339
8. Royal university of Bhutan. Annual report 2016. Kuensel; 2016.
Accessed February 2, 2021.
Available:https://www.rub.edu.bt/index.php/en/annual-reports/275-annual-report-2016.html
9. Johnson DW, Johnson RT. Using technology to revolutionize cooperative learning: An opinion. Frontiers in Psychology. 2014;5.
DOI: 10.3389/fpsyg.2014.01156
10. Awan RN. Students Opinions on the Use of a Virtual Learning Environment at a Higher Education Institution in Dubai. undefined. Published; 2013.
Accessed February 2, 2021.
Available:https://www.semanticscholar.org/paper/Students-Opinions-on-the-Use-of-a-Virtual-Learning-Awan/9a24c4892a243188073aef39ce855986a872b070
11. Henderson M, Selwyn N, Aston R. What works and why? Student perceptions of "useful" digital technology in university teaching and learning. Studies in Higher Education. 2015;42(8):1567-1579.
DOI:10.1080/03075079.2015.1007946
12. Fabian K, Topping KJ, Barron IG. Using mobile technologies for mathematics: Effects on student attitudes and achievement. Educational Technology Research and Development. 2018;66(5): 1119-1139.
DOI:10.1007/s11423-018-9580-3
13. Tarhini A, Hone K, Liu X, Tarhini T. Examining the moderating effect of individual-level cultural values on users' acceptance of E-learning in developing countries: A structural equation modeling of an extended technology acceptance model. Interactive Learning Environments. 2016;25(3):306-328.
DOI:10.1080/10494820.2015.1122635
14. van Raaij EM, Schepers JJL. The acceptance and use of a virtual learning environment in China. Computers and Education. 2008;50(3):838-852.
DOI:10.1016/j.compedu.2006.09.001
15. Pierre Dillenbourg. Eun Conference 2000: "Learning in the new millennium: Building new Education Strategies for Schools". Workshop on Virtual Learning Environments; 2000.
Accessed October 14, 2019.
Available:http://tecfa.unige.ch/tecfa/publicat/dil-papers-2/Dil.7.5.18.pdf
16. Park N, Lee KM, Cheong PH. University instructors' acceptance of electronic courseware: An application of the technology acceptance model. Journal of Computer-mediated Communication. 2007; 13(1):163-186.
DOI:10.1111/j.1083-6101.2007.00391.x
17. Sumak B, Polancic G, Hericko M. An empirical study of virtual learning environment adoption using UTAUT. Second International Conference on Mobile, Hybrid, and On-Line Learning; 2010.
Published online February 2010.
DOI: 10.1109/elml.2010.11
18. Hendrick HW, Organizational I. Human factors in organizational design and management. Proceedings of the First Symposium Held in Honolulu, Hawaii, 21-24 August, 1984. - 1984. - XVII, 628 S. North-Holland; 1984.
19. Davis FD. Perceived usefulness, Perceived ease of use and user acceptance of information technology. MIS Quarterly. 1989;13(3):319-340.
DOI: 10.2307/249008
20. Davis FD. A technology acceptance model for empirically testing new end-user information systems: Theory and results. Dspace. Mit. Edu. Published 1985.
Accessed April 24, 2020.
Available:https://dspace.mit.edu/handle/1721.1/15192
21. Ratna PA, Mehra S. Exploring the acceptance for e-learning using technology acceptance model among university students in India. International Journal of Process Management and Benchmarking. 2015;5(2):194.
DOI: 10.1504/ijpmb.2015.068667
22. Venkatesh V, Davis FD. A model of the antecedents of perceived ease of use: Development and test. Decision Sciences. 1996;27(3):451-481.
DOI:10.1111/j.1540-5915.1996.tb01822.x
23. Ramirez-Anormaliza R, Sabaté F, Guevara-Viejo F. Evaluating Student Acceptance Level of E-learning Systems. In: Proceedings of ICERI2015 Conference.; 2015.
Accessed January 21, 2021.
Available:https://www.semanticscholar.org/paper/EVALUATING-STUDENT-ACCEPTANCE-LEVEL-OF-E-LEARNING-Ramirez-Anormaliza-Sabat%C3%A9/6422bf59e50e0dfd7faf4320959120ab49070e83

24. Venkatesh V, Morris MG, Davis GB, Davis FD. User Acceptance of information technology: Toward a Unified View. MIS Quarterly. 2003;27(3):425-478. DOI:10.2307/30036540
25. Venkatesh V. Creation of favorable user perceptions: Exploring the role of intrinsic motivation. MIS Quarterly. 1999;23(2):239. DOI:10.2307/249753
26. Teo T, Van Schalk P. Understanding technology acceptance in pre-service teachers: A structural-equation modeling approach. The Asia-Pacific Education Researcher. 2009;18(1). DOI: 10.3860/taper.v18i1.1035
27. Abdullah F, Ward R, Ahmed E. Investigating the influence of the most commonly used external variables of TAM on students' Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) of e-portfolios. Computers in Human Behavior. 2016;63:75-90. DOI: 10.1016/j.chb.2016.05.014
28. Abdullah F, Ward R, Ahmed E. Investigating the influence of the most commonly used external variables of TAM on students' Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) of e-portfolios. Computers in Human Behavior. 2016;63:75-90. DOI: 10.1016/j.chb.2016.05.014
29. Olsson T, Lagerstam E, Kärkkäinen T, Väänänen-Vainio-Mattila K. Expected user experience of mobile augmented reality services: A user study in the context of shopping centres. Personal and Ubiquitous Computing. 2011;17(2):287-304. DOI: 10.1007/s00779-011-0494-x
30. Lee Y-H, Hsiao C, Hadi S. Enhancing e-learning acceptance: An empirical examination on individual and system characteristics. Academy of Management Proceedings. 2012;2012(1):15828. DOI:10.5465/ambpp.2012.15828abstract
31. Purnomo SH, Lee Y-H. E-learning adoption in the banking workplace in Indonesia. Information Development. 2012; 29(2):138-153. DOI: 10.1177/0266666912448258
32. Motaghian H, Hassanzadeh A, Moghadam DK. Factors affecting university instructors' adoption of web-based learning systems: Case study of Iran. Computers and Education. 2013;61:158-167. DOI:10.1016/j.compedu.2012.09.016
33. Abbasi MS, Tarhini A, Elyas T, Shah F. Impact of individualism and collectivism over the individual's technology acceptance behaviour. Journal of Enterprise Information Management. 2015;28(6):747-768. DOI: 10.1108/jeim-12-2014-0124
34. Tarcan E, Varol ES, Toker B. A study on the acceptance of information technologies from the perspectives of the academicians in Turkey. Ege Akademik Bakis (Ege Academic Review). 2010;10(3):791-791. DOI: 10.21121/eab.2010319615
35. Ma Q, Liu L. The Technology Acceptance Model. Journal of Organizational and End User Computing. 2004;16(1):59-72. DOI:10.4018/joeuc.2004010104
36. Angela, Chatrine Sylvia, Handoko, Edi Abdurachman. E-learning acceptance analysis using Technology Acceptance Model (TAM) (Case study: Stmik Mikroskil). Journal of Theoretical and Applied Information Technology. 2018;96(19). DOI: 10.5281/zenodo.3256381
37. Ramirez-Anormaliza R, Tolozano-Benites R, Astudillo-Quionez M, Suarez-Matamoros V. Evaluation of acceptance and use of the e-learning system among the university students in Ecuador. EDULEARN17 Proceedings. Published online March 2017; 2017. DOI: 10.21125/edulearn.2017.2467
38. Royal University of Bhutan. Annual report 2016. Kuensel; 2016. Accessed August 6, 2020. Available:https://www.rub.edu.bt/index.php/en/key-documents/annual-reports/684-annual-report-2018-2019
39. Ji Z, Yang Z, Liu J, Yu C. Investigating users' continued usage intentions of online learning applications. Information. 2019; 10(6):198. DOI: 10.3390/info10060198
40. Kim M-R. Factors influencing the acceptance of e-learning courses for mainstream faculty in higher institutions. International Journal of Instructional Technology and Distance Learning. 2008;5(2). Accessed May 6, 2020. Available:http://www.itdl.org/Journal/Feb_08/article03.htm
41. Ismail S. International students' Acceptance on using social networking site to support learning activities. Published; 2011. Accessed February 1, 2021. Available:www.semanticscholar.org.

Available:https://www.semanticscholar.org/paper/International-Students-%E2%80%99-Acceptance-on-using-Social-Ismail/596a2a731f4f7f16119350a3e660f0bbbd041d19?p2df

42. Chang C-T, Hajiyev J, Su C-R. Examining the students' behavioral intention to use e-learning in Azerbaijan? The General Extended Technology Acceptance Model for E-learning approach. Computers and Education. 2017;111:128-143.
DOI:10.1016/j.compedu.2017.04.010
43. Altanopoulou P, Tselios N. Assessing acceptance toward wiki technology in the context of higher education. The International Review of Research in Open and Distributed Learning. 2017;18(6).
DOI: 10.19173/irrodl.v18i6.2995
44. Lee Y-H, Hsieh Y-C, Ma C-Y. A model of organizational employees' e-learning systems acceptance. Knowledge-Based Systems. 2011;24(3):355-366.
DOI: 10.1016/j.knosys.2010.09.005
45. Chacko Punnoose A. Determinants of intention to use elearning based on the technology acceptance model. Journal of Information Technology Education: Research. 2012;11:301-337.
DOI: 10.28945/1744
46. Alharbi S, Drew S. Using the technology acceptance model in understanding academics' behavioural intention to use learning management systems. International Journal of Advanced Computer Science and Applications. 2014;5(1).
DOI: 10.14569/ijacsa.2014.050120
47. Budu KWA, Yinping M, Mireku KK. Investigating The Effect of Behavioral Intention on E-learning Systems Usage: Empirical Study on Tertiary Education Institutions in Ghana. Mediterranean Journal of Social Sciences. 2018;9(3):201-216.
DOI: 10.2478/mjss-2018-0062
48. Li Y, Duan Y, Fu Z, Alford P. An empirical study on behavioural intention to reuse e-learning systems in rural China. British Journal of Educational Technology. 2011;43(6):933-948.
DOI: 10.1111/j.1467-8535.2011.01261.x

APPENDIX

Table 17. Term variables and items used in the study

Term variables	Items
1. Facilitating conditions	a. When I need help to use VLE, guidance is available to me. b. When I need help to use VLE, specialized instruction is available to help me. c. My institution has all facilities in place so that I can use VLE without any problem.
2. Self-efficacy	a. I believe I can use VLE now even when no one else is there to show me how to use it. b. I believe I can use the VLE system even though I only have online. instructions as a reference. c. I believe I will be able to use the VLE system as long as I have enough time.
3. Subjective norms	a. My lecturers think and expect me to use the VLE system. b. My classmates think I should participate in activities based on VLE systems. c. My college management think and expect me to use the VLE system.
4. Experience	a. I am often pleased to use the VLE system as a learning tool. b. I feel good to use VLE as it meets my learning expectations. c. I rarely encounter technical problems while using VLE.
5. Perceived usefulness	a. I find the VLE useful in my studies. b. Using VLE enables me to accomplish task quickly. c. VLE improves my self-confidence in expressing ideas and opinions. d. The VLE improves my interactions with friends and the teacher .
6. Perceived ease of use	a. I find VLE system easy to use. b. Learning to use VLE is easy to me. c. I know how to access the materials provided online by the teacher.
7. Behavioural intention	a. I think using VLE is a good idea. b. I intend to use the VLE system without somebody having to force me to do so. c. If given a choice I would use VLE in all the modules in the future.
8. System use	a. I frequently use VLE system. b. I spend a lot of time exploring the VLE system. c. I often get involved a lot with VLE system.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/65800