EXPLORING UNIVERSITY STUDENTS' ACCEPTANCE OF E-LEARNING USING E-LEARNING ACCEPTANCE MEASURE (ELAM) IN BHUTAN: A VALIDATION STUDY

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ABSTRACT

This study is presented in two sections. A total of 436 students from five different colleges under the Royal University of Bhutan participated in this study. The first part involved validating the E-Learning Acceptance Measure (ELAM) proposed by Teo (2010) for its applicability in the context of the study by using Confirmatory Factor Analysis (CFA), which involved 230 students. This was followed by an investigation of Bhutanese HEI students' acceptance level of the e-learning system, which involved 206 students. In the first section, the findings of the CFA revealed that the ELAM model was a bad fit for the participants and modification indices disclosed that a better fit would be obtained if some items were correlated and removed. After doing this, the findings supported only 17 of 21 items from the ELAM model. As for the second section of the study, the findings showed that the participants held an above-average acceptance level of the e-learning system used in the context. This study concludes with theoretical and practical implications of the findings, together with directions for future research.

Keywords: *ELAM model, model validation, e-learning acceptance, CFA, HEIs, Bhutan.*

INTRODUCTION

In recent years, e-learning systems have received considerable attention from researchers and practitioners for their benefits on the teaching and learning process (Daultani et al., 2021; Maatuk et al., 2021; Olutola et al., 2018; Soni, 2020; Sufyan et al., 2020), especially Moodle (Luk at al., 2018; Simanullang & Rajagukguk, 2020; Teo et al., 2019). Moodle, or modular object-oriented dynamic learning environment, is a free Learning Management System with more than 231 countries currently using it for educational purposes, particularly in Higher Education Institutions (HEIs) (Teo et al., 2019), including Bhutan. With the introduction of Moodle version 3+ in the Royal University of Bhutan (RUB) in 2011, the HEIs or colleges under RUB in Bhutan have been using it to disseminate curricular content to students for the past few years. Moodle supports both teachers and students in sharing videos as a discussion forum, chatting with teachers/classmates, and sharing learning materials and quizzes (Simanullang & Rajagukguk, 2020). The benefits of using Moodle are several including helping teachers to track their learning progress through the system (Salhab, 2019), reducing the cost of time in delivering instruction (Kaizer et al., 2020), facilitating teachers-students and student-student communication (Liu et al., 2020), promoting collaboration and group work (Alokluk, 2018), improving students participation (Ghosh et al., 2019), amongst others.

Despite its immense advantage for students, not many lecturers and students use e-learning or Moodle extensively in Bhutan for several reasons such as poor internet facilities, poor infrastructure to support e-learning, a lack of access to

educational ICT tools, etc. (Wangdi et al., 2023; Wangdi & Rai, 2022; World Bank. 2019). In this context, Penjor and Zander (2016) postulated that e-learning platforms are not being used efficiently in the HEIs of Bhutan. Further, they divulged that lecturers and students in HEIs of Bhutan use Moodle only for basic purposes, such as posting assignments, lecture notes, and homework. They underscored that not many lecturers use Moodle as an interactive teaching and learning platform. That said, it cannot be denied that the advent of Moodle in the HEIs of Bhutan has helped both lecturers and students to some degree, especially the students. Moodle has provided the Bhutanese HEIs students with a new platform and opportunities to increase autonomous and self-directed learning skills with minimal engagement in the formal classroom (Penjor & Zander, 2016).

Although the reliance on and the use of e-learning services in Bhutanese schools and HEIs have been increasing compared to the previous years, especially after the COVID-19 pandemic (Wangdi & Rai, 2022), little is known about how successful and effective e-learning has been in teaching and learning. Tarhini et al. (2016) noted that the effectiveness and success rate of e-learning primarily depend on students' acceptance levels of the system. Likewise, past studies suggest that the practice and effectiveness of e-learning cannot be fully realized unless the students' acceptance of it is known (Chai et al., 2011; Higgins, 2003; Teo et al., 2019; Venkatesh et al., 2003). Thus, there is a need for research to explore the Bhutanese HEIs students' acceptance of the e-learning services provided in Bhutan, especially Moodle, to ensure the success of the practice. Additionally, a thorough review of the literature on e-learning and subsequent research studies conducted in Bhutan revealed that none of the previous studies examined students' acceptance of e-learning services in the context of Teo's (2010) E-Learning Acceptance Measure (ELAM) model. This was an added reason to carry out our current study. For this reason, and to provide theoretical and practical implications for future research on the topic, we used the validated ELAM model to explore the Bhutanese HEIs students' acceptance level of Moodle e-learning.

The ELAM Model

Timothy Teo extended the Technology Acceptance Model (TAM; Davis, 1989) and developed an E-Learning Acceptance Model (ELAM; Teo 2010) to gauge students' acceptance of e-learning systems in practice at higher education institutions. The ELAM framework has three constructs, namely: Tutor Quality (TQ), Perceived Usefulness (PU), and Facilitating Conditions (FC). These three constructs can be summarised as follows: TQ is the quality of teachers often determined by the way they provide services to the students and their ability to maintain good interactions with their students, while PU is the degree to which a person believes that using a particular system would enhance his or her job performance, FC is the degree of technological and technical support from the government, organizations, and institutions to the users in integrating technology (Teo, 2010). Although the literature reveals that the ELAM model is cited by many previous studies conducted across different disciplines, only a few (see Tarhini et al., 2016, Teo, 2010) have validated and tested its applicability, particularly in an Asian context, and none in the Bhutanese context. Teo himself validated the model using a confirmatory factor analysis (CFA) with 189 postgraduate diploma students in an education program from an Asian country (2010). The findings of his study revealed that the three constructs of the ELAM model, along with a 21-item questionnaire, were a good fit to estimate the students' acceptance of e-learning. Of the three constructs, PU was the highest predictor of students' acceptance of e-learning, followed by TQ and FC. Although the combined three factors explained a little more than 27% of students' e-learning acceptance variance, 73% of the variance was unexplained. Still, he concluded that these three factors adequately predict students' acceptance of e-learning.

Later, the ELAM model was tested and validated by Tarhini et al. (2016) using a CFA across two cultural contexts (Lebanese and English). The participants were 461 students from two private universities in Lebanon (Asian) and one in England (Western), each comprising 209 and 252 students, respectively. The findings of their study suggest that, while the ELAM model was a good fit for the British sample, it was a bad fit for the Lebanese sample. Although the ELAM model has gained considerable attention from researchers in the field of technology and education, as mentioned

earlier, not many studies have assessed its applicability. Considering that different contexts may yield different findings because of differences in accessibility to the facilities and in teachers' and students' competency to use e-learning, as well as support from the institutions among other things, there was a need for model validation before applying it in the context of our study. Further, the ELAM model's applicability was found to be inconclusive as it was a good fit for Western and a bad fit for Asian students (Tarhini et al., 2016). This gave us further reasons to evaluate the model. For this reason, CFA was run to confirm its applicability in the Bhutanese context before proceeding to the second research objective, which was to investigate the students' acceptance level of e-learning services provided in the context.

LITERATURE REVIEW

Many studies have been conducted on the students' acceptance of technology or e-learning systems in different contexts of HEI settings (e.g., Al-Hajri et al., 2018; Khadam et al., 2018; Park, 2009) using different theoretical models. For instance, Al-Hajri et al. (2018) conducted a study that investigated university students' acceptance of e-learning and the subsequent factors that influence the use of e-learning in the context of Oman. They used four theoretical models: the Theory of Reasoned Action (Fishbein & Ajzen, 1975), the Theory of Planned Behavior (Ajzen, 1991), the Technology Acceptance Model (Davis, 1989), and the Diffusion of Innovations Theory (Rogers, 2010). The overall finding of their study showed that Omani university students held a positive perception of the use of e-learning, meaning they were ready to accept/adopt the e-learning services provided in their context. They also underscored that the students' acceptance of e-learning is strongly correlated with perceived ease of use (PEOU) and perceived usefulness (PU).

In another study, Pham and Tran (2020) investigated the factors that influence Vietnamese students' acceptance level of the e-learning system. They used the Unified Theory of Acceptance and Use of Technology proposed by Venkatesh et al. (2003). A total of 357 university students in Vietnam participated in their survey. They reported that factors such as support from the university, students' computer knowledge, the infrastructure of the university, the content and design of courses, and student's level of collaboration influence the students' acceptance level of the e-learning system. Their findings were consistent with Venkatesh et al.'s (2003) study that students' learning programs and course majors influence students' acceptance of e-learning services.

Likewise, Khadam et al. (2018), with 280 Saudi university students, used an extended TAM model and observed the students' attitudes and intentions to use the e-learning system in their context. The variables in their study included demographic information (e.g., age, gender, educational background), experiences (e.g., computer, internet, e-learning), and perceived skills (e.g., computer, internet, e-learning). They reported that Saudi students had a positive attitude towards the e-learning system, with females slightly more inclined towards e-learning than males. However, they noted that age and educational background did not contribute to students' acceptance of the e-learning system. Similarly, the computer, internet, and e-learning experiences of students did not increase or decrease students' acceptance of e-learning systems.

Ibrahim et al. (2017) carried out a similar study in the Malaysian context using the extended TAM model on students' acceptance of e-learning with 95 undergraduate university students. Their model consisted of and tested six constructs: characteristics of the instructor, students' computer self-efficacy, course and materials design, PU, PEOU and intention to use e-learning. The overall findings of their study indicated that PEOU was significantly influenced by students' computer self-efficacy belief and strongly influenced students' intention to adopt e-learning services.

Further, with 377 Thai HEI students, Teo et al. (2011) investigated the students' acceptance level of e-learning using the ELAM model. While the general findings of the study concluded that Thai students held an above-average acceptance level of e-learning systems, the discussion of the study implied that the e-learning acceptance level of Thai students was slightly lower than neighboring countries, such as Singapore. By comparing findings from Teo (2010), they highlighted that the average mean scores (based on Teo's (2010) proposed calculation) of Thai and Singaporean HEI students were 111.36 and 130.05, respectively, out of 147 (with high scores indicating a higher level of e-learning acceptance).

Finally, the literature discussed thus far indicates two valuable gaps that need to be addressed. First, the ELAM model was found to be a good fit for some contexts and a bad fit for others. Second, there is a dearth of studies that have addressed HEI students' acceptance level of e-learning given that the research culture in the Bhutanese context is not as vibrant as in other contexts (Wangdi & Tharchen, 2021). In response to these two gaps, the present study: (1) assessed the applicability of the e-learning acceptance model (Teo, 2010) in the Bhutanese context and (2) investigated the Bhutanese HEI students' acceptance level of the Moodle e-learning system.

METHOD

Participants and Procedure

The present study adopted a cross-sectional quantitative approach to examine the Bhutanese university students' acceptance of e-learning using the ELAM model and its 21-item questionnaire. A convenience sampling technique was used to recruit college students under RUB. After obtaining consent from the colleges, we used the snowballing sampling technique to collect the data since targeted participants were not easily reachable (Naderifar et al., 2017) because of the Covid-19 pandemic. Following this, the electronic questionnaire (as a Google Form) was distributed to the students with the help of the lecturers in charge of classes and the students themselves. While a total of 230 (male = 146, female = 84) university students participated in the first section, 206 (male = 116, female = 90) participated in the second section. The participants were given an option not to participate in this study by responding "NO" to the YES/NO to Participate confirmation attached to the original electronic questionnaire. We collected data from five different colleges under RUB, namely, the Colleges of Education, College of Sciences, College of Business Studies, College of Arts and Humanities, and College of Information and Technology. The RUB is a decentralized university of Bhutan founded in 2003 with ten constituent colleges spread throughout the country. In other words, it is the center of HEIs in Bhutan (Wangdi & Tharchen, 2021).

Instrumentation

We adopted for this study Teo's (2010) instrument developed to measure HEIs students' acceptance level of the e-learning systems. The questionnaire consisted of 21 questions on a 7-point Likert scale, ranging from 1 - *strongly disagree* to 7- *strongly agree*, covering three original factors of the ELAM model: Tutor Quality (TQ), Perceived Usefulness (PU), and Facilitating Conditions (FC). Each factor consisted of eight, nine, and four items, respectively. Although the instrument used in this study looked reliable (e.g., Tarhini et al., 2016; Teo, 2010), to ensure it was for the present study we further tested its reliability by taking data from 15 random participants. In doing this, the Cronbach Alpha Coefficient value for the questionnaire was 0.902, which is acceptable (Taber, 2018).

Data Analysis

To answer the first objective of this research, we tested the assumption of normality. Tabachnick and Fidell (2019) state that data should be normally distributed and outliers should be removed before conducting CFA when the analysis involves multivariate data, which we did using Amos 26. This was performed to evaluate the original three constructs of the ELAM model proposed by Teo (2010) and to examine whether these three constructs (which consisted of 21 questionnaire items in total) best fit with the sample of the context.

For the second objective, which aimed at investigating the Bhutanese university students' acceptance level of Moodle e-learning service, we used IBM SPSS version 23 for descriptive analysis such as mean and standard deviation.

RESULTS

Measurement Analysis

First, we tested the assumption of normality of the data using skewness and kurtosis coefficients. The descriptive analysis of skewness and kurtosis coefficients revealed that the value of the data set was normally distributed with skewness values ranging from −1.49 to 0.19 and kurtosis values ranging from −0.10 to 2.47. The skewness and kurtosis values of all the items were within the recommended value of ±3 (Kim, 2013).

Following this, we performed CFA using Amos 26. CFA is a statistical technique that evaluates how the indicator variables measure the unobserved constructs within the model (Collier, 2020; Tarhini et al., 2016). In CFA, the concept of unidimensionality is vital for researchers to consider, and therefore, each measured variable is hypothesized to relate to only a single construct.

Table 1. The Measurement Model

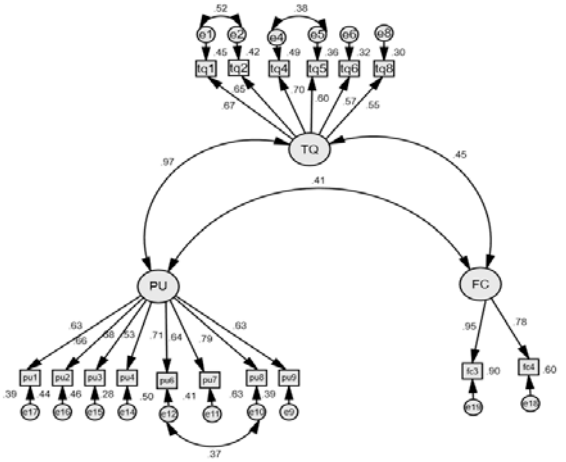
Fit Index	Recommended value	Without Modification	With Modification	References
χ^2	NS at p<0.05	890.315 (p=.001)	334.747 (p=.001)	
χ^2/df	<5	4.787	3.416	
CFI	>0.90	0.81	0.926	Hu & Bentler (1999)
SRMR	<0.10	0.0982	0.0495	Hair et al. (2010)
RMSEA	<0.08	0.093	0.075	Hair et al. (2010)
TLI	>0.90	0.786	0.91	Hu & Bentler (1999)

Note. NS=not significant, df=degrees of freedom, CFI=Comparative Fit Index, RMSR=Root Mean Square Residuals, RMSEA=Root Mean Square Error of Approximation, TLI=Tucker-Lewis Index

CFA allows for the explicit constraint of specific loadings to be zero (Tarhini et al., 2016), which contrasts with Exploratory Factor Analysis (EFA) all loadings are free to vary. In an EFA, "the analysis simply tries to let every indicator load on every construct" (Collier, 2020, p. 63).

In our study, the highest standardized estimate was for PU (β = 0.65), followed by TQ (β = 0.61), and the lowest was for FC (β = 0.43). The variables were significant at $p < 0.05$ in explaining the e-learning acceptance level of the university students of Bhutan. The combined variances explained by the three variables were close to 15%, comparatively lower than Teo's (2010) study. Table 1 includes selected fit statistics from the CFA output. For the sample, the first run of the model revealed a bad fit of the data [$\chi^2 = 890.315$; df = 186; χ^2/df = 4.7; TLI = 0.78; CFI = 0. 810; SRMR = 0.082; RMSEA = 0.093]. The modification indices revealed possible information where model fit improvement could be done if some parameters were correlated. Therefore, to acquire a better-fit model, three pairs of measurement error terms were correlated (e1 ↔ e2), (e4 ↔ e5), and (e10 ↔ e12) because there were a high covariance measurement error and high regression weights between these error constructs (see Figure 1). In addition, two indicators (TQ3 and TQ7) from tutor quality, one indicator from perceived use (PU5), and one other indicator (FC1) had to be removed from the initial measurement model to achieve a good model fit. The factor loading below |0.50| was identified as a candidate for deletion and loading greater than |0.50| was retained as their average variance extraction (AVE) value exceeded |0.50| (Collier, 2020). According to Mahembe et al. (2015), the standardised loading estimates should be |0.50| or higher, ideally |0.70|. As indicated in Table 1, the standardised loading estimate of the internal consistency of the present factors was within the recommended range. The Tucker-Lewis Index (TLI) |0.91| has values close to |> 0.90| or, in other words, is somewhat close to the thresh hold value of |0.95| (Hu & Bentler, 1999).

Figure 1. CFA for E-Learning Acceptance Measure (ELAM) with Error Terms



Note. Items are numbered in the order presented in the text. All model and path coefficients are significant (p<0.05).

Construct Reliability, Convergent Validity and Discriminant Validity

Further, the CFA allowed us to assess the construct validity of a proposed measurement theory. The purpose measurement theory is considered valid because the internal validity of the three constructs (TQ, PU, and FC) after deleting outliers variables met the required internal consistency reliability cut-off value of 0.70 (Table 2). This implies that the indicator variables of each

construct loaded significantly to their respective constructs. The composite values were more significant than the average variance extracted (AVE) values for TQ, PU, and FC. Also, Cronbach's alpha minimum cut-off requirement value of 0.70 was met. This suggests that the three constructs of the proposed measurement of the ELAM model had adequate reliability. Similarly, convergent validity was established for TQ, PU, and FC, as their respective AVE value was > 0.50. However, the data presented had discriminant validity issues. The square root of the AVE for TQ was less than the absolute value of the correlations with another factor (PU). The AVE for TQ and PU was less than the maximum shared variance (MSV). It can be seen, for instance, from Table 2 that the AVE value for FC was greater than the MSV, while for PU and FC, their discriminant value was established as the square root of the AVE and greater than the correlation value. The MSV value for TQ and PU were greater than their average shared squared variance (ASV) value. It can also be seen that the ASV value for TQ and PU were lower than the AVE value, thus posing discriminant validity issues.

After testing the ELAM model and its instrument for its applicability in the context, a descriptive analysis such as mean and standard deviation was performed with the data obtained from the final 17 acceptable questionnaire items for this context. This was done to validate the instrument and to examine students' acceptance level of the e-learning system provided in the context. The findings revealed that the mean values of all items were above the midpoint of 4.00 (total 77.88, above average) except for item numbers FC2, FC3, and FC4. For TQ, the mean value ranged from 4.25 to 4.96 (SD = 0.88 to 1.27), and while the mean value for PU ranged from 4.08 to 5.26 (SD = 0.89 to 1.45), the mean for FC ranged from 3.76 to 4.79 (SD = 0.97 to 1.39). The mean and standard deviation statistics indicated that the respondents responded positively to TQ, PU, and FC measurement items. However, the mean value of FC was slightly low compared to TQ and PU.

Table 3. Descriptive Statistics of the 17-item (adopted from Teo, 2010)

Items	SD
TQ1	1.24
TQ2	1.14
TQ4	0.88
TQ5	1.22
TQ6	1.11
TQ8	1.27
PU1	1.37
PU2	1.40
PU3	1.45
PU4	1.00
PU6	1.15
PU7	1.21
PU8	1.14
PU9	0.89
FC2	0.97
FC3	1.06
FC4	0.97

DISCUSSION AND CONCLUSION

The main objectives of the study were to test the ELAM model for its applicability in the context, particularly the model's three constructs and its corresponding questionnaire items, and to assess the Bhutanese HEI students' acceptance level of the e-learning system. As for the first objective of this study, the first run of CFA revealed that the ELAM model was a bad fit for the context. There

Table 2. Construct Reliability, Convergent and Discriminant Validity

	Variance and reliability					A factor correlation matrix with √AVE on the diagonal		
Construct	**CR**	**AVE**	**MSV**	**ASV**	α	**TQ**	**PU**	**FC**
TQ	0.788	0.55	0.776	0.497	0.820	0.742		
PU	0.865	0.64	0.776	0.493	0.865	0.881	0.8	
FC	0.949	0.63	0.218	0.213	0.712	0.467	0.457	0.794

Note. ASV=average shared squared variance, AVE=average variance extracted, CR=compostite reliability, MSV= maximum

was a high covariance measurement error and high regression weights between these error constructs. Tarhini et al. (2016) also stated that the model was a bad fit for Lebanese and Asian students. The bad fit of the model in the Bhutanese context, to some extent, indicated that the students in the context may not be using the e-learning system extensively. This could be ascribed to the lack of competent teachers, lack of access to educational ICT tools, lack of infrastructure (such as lack of internet facilities, access to educational technological tools, etc.), and lack of resources to support e-learning (Wangdi et al., 2023; Wangdi & Rai, 2022; World Bank. 2019). This might have added to students' negative responses to the e-learning systems. On the contrary, we cannot deny that the observed positive responses to the e-learning acceptance in the present study could be attributed to the mandatory online classes program necessitated by the Covid-19 pandemic (Wangdi & Rai, 2022).

Although the ELAM model was used by many researchers in different contexts, confounding findings concerning its applicability between Tarhini et al. (2016) and Teo et al. (2011), who claimed a model was a bad fit for Labonese and a good fit for Thai participants respectively, indicated that there is a need for further validation of the model before using it in the context of Bhutan. For this reason, the model was tested and refined using CFA. In doing so, the modification indices in CFA disclosed that indicators (e.g., TQ3, TQ7, PU5, and FC1) had to be deleted from the measurement model because they affected the overall measurement of the constructs. The final acceptable model that was found fit for the context after CFA included 17 items (see Appendix A). When considering the entirety of the combined factors of the currently validated model, they were able to account for 15% of the variance in students' acceptance of e-learning. This percentage was however relatively lower in comparison to Teo's (2010) earlier findings, which accounted for 27%. However, researchers in both the present and future contexts may find value in employing the suggested measurement model from this study to evaluate students' acceptance of e-learning services. This model proved sufficient in gauging students' acceptance of the e-learning system within the given context. On the whole, the present findings supported Tarhini et al.'s (2016) study that reported the ELAM model as a bad fit for Asian students and rejected the assumption made by Teo et al. (2011), who posited that the ELAM model was a good fit for Thailand, another Asian country. Thus, we argue that the ELAM model needs further validation and testing to improve its applicability in different contexts. Further, we recommend future researchers validate the ELAM model before using it in their context as we did in the present study.

As for the constructs of the ELAM model, in general, the present participants had positive responses to all three constructs. Most of the items measuring the three constructs had an average mean value greater than 4.00 (the midpoint value). Of three constructs, in line with previous studies (e.g., Reddy et al., 2021; Tarhini et al., 2016; Teo, 2010; Teo et al., 2019), the Perceived Usefulness (PU) appeared to be the highest predictor of the student's acceptance of e-learning in the context, followed by Tutor Quality (TQ) and Facilitating Conditions (FC). While our finding on the influence of TQ on students' e-learning acceptance rejects Pham and Tran's (2020) assumption that Tutor Quality (TQ) does not have an impact on e-learning acceptance, on the one hand, the finding was in line with Umrani-Khan and Iyer (2009), who reported TQ having a positive influence on students' e-learning acceptance levels. However, for a few items of FC, the mean values were found below the midpoint, indicating that participants had given slightly negative responses to the items measuring the FC construct. This implies that either the Bhutanese students were not oriented well about the e-learning system used in the institutions (FC2, FC4), or they lacked assistance from the lecturers (FC3). Taken together, the findings of this study indicate that policymakers, institutions, and teachers need to focus on how to improve students' attitudes toward the perceived usefulness of the e-learning system as it greatly influences students' willingness to embrace the e-learning system. Conducting frequent workshops or training on the benefits e-learning has on learning may help students perceive e-learning as useful to a greater extent. That said, TQ and FC should be equally given importance as these constructs also had a positive influence on students' acceptance level of the e-learning system.

Chai et al. (2011), Higgins (2003), Teo et al. (2019), and Venkatesh et al. (2003) suggested

that the effectiveness of e-learning services cannot be realized if users' acceptance is not known. Therefore, the second part of our study assessed the Bhutanese HEI students' acceptance of Moodle e-learning services using the validated ELAM model. The findings revealed that the participants had an above-average acceptance level of e-learning services with an average mean score of 77.88 (summed up the mean scores of 17 items; see Table 3) following Teo's (2010) proposed calculation of a range of the mean scores, with high scores indicating a higher level of e-learning acceptance. This indicates that the Bhutanese HEI students were willing to embrace the Moodle e-learning system. The overall finding of this study are consistent with previous studies such as Al-Hajri et al. (2018), Khadam et al. (2018), and Ibrahim et al. (2021) of different contexts. Further, the finding is also in line with Teo et al. (2011) and Teo (2010), who used the same ELAM model to explore Thai and Singaporean university students' acceptance of e-learning, respectively.

Implications of the Study

Even though the current study was limited to the Bhutanese context, the findings of the study have potential theoretical and practical implications that can be extended to the Asian region and beyond in the field of education and technology. First, the findings of this study suggest that the ELAM model proposed by Teo (2010), comprising three original constructs, namely TQ, PU, and FC, of user's acceptance of e-learning systems needs to be further evaluated in different contexts to improve its applicability. As noted earlier, the ELAM model was found to be a good fit for Thai (Teo et al., 2011) and British contexts (Tarhini et al., 2016), but a bad fit for Lebanese (Tarhini et al., 2016) and Bhutanese contexts, as indicated by the present study. A possible explanation could be that the ELAM model is applicable only in the places where technological infrastructure is relatively better, such as England and Thailand, and not for those contexts where the arrival of technology happened later and infrastructure and resources are not adequate to support e-learning systems, such as in Bhutan (Wangdi & Rai, 2022). Second, this study contributes to the existing ELAM model by removing some outlier variables to fit the model in the Bhutanese context. Future researchers of the context and similar contexts may consider using the final 17 items to examine the acceptance level of the e-learning system as it was found adequate to measure students' acceptance level of e-learning in the present study.

Although the overall findings reveal that the Bhutanese higher education students have an above-average acceptance level of the e-learning system, based on their responses to the questionnaire items there seems to be a lack of facilities and support from teachers and institutions concerning the use of e-learning (Wangdi et al., 2023). Thus, we suggest that authorities work on helping institutions equipped with the required facilities and tools for e-learning and on offering regular workshops and training sessions to both students and teachers, focusing on the effective utilization of educational ICTs and e-learning systems. A similar concern was expressed by Wangdi and Rai (2022), who explored the challenges faced by Bhutanese teachers in teaching online using ICT tools during the Covid pandemic. Most importantly, there is a necessity to emphasize strategies for enhancing students' acceptance of e-learning within the given context as it was comparatively found to be lower than in some other Asian higher education institutions' students, such as Thailand and Singapore. While the average mean score of e-learning acceptance for the present participants was 77.88, Thai students and Singaporean students had 111.36 and 130.05 respectively (higher scores indicating a higher level of e-learning acceptance; Teo et al., 2011).

Limitations and Future Research

Finally, we acknowledge that the present study has some limitations. Framed by a quantitative approach, the data were collected using an online survey; hence, some respondents might have just completed it for the sake of completion without giving it proper consideration. Thus, we suggest readers approach the findings of this study with caution. Nevertheless, the present study built on the existing knowledge of acceptance of e-learning systems, which would be useful, particularly for the Bhutanese policymakers and practitioners. That said, the findings of such research need to be evaluated qualitatively for a deeper understanding. We suggest future researchers consider exploring students' acceptance of e-learning systems using qualitative or mixed-method designs to corroborate the present findings. Further, considering factors

other than TQ, PU, and FC, such as perceived ease of use (PEOU) to determine students' acceptance of e-learning systems may shed light on the Bhutanese students' acceptance level of e-learning systems. Furthermore, factors such as gender, technology exposure, administrative support, computer self-efficacy, and different groups of students (e.g., rural and urban students) and their influence on students' acceptance of e-learning systems may prove a valuable contribution in the field of technology and education.

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APPENDIX A

Proposed instrument of the ELAM model for the context (adopted from Teo, 2010)

TUTOR QUALITY (TQ)

TQ1 My tutor could explain the concepts clearly
TQ2 My tutor was knowledgeable in ICT
TQ3—delete
TQ4 My tutor was focused on helping me to learn
TQ5 The tutorial activities were well-manage
TQ6 My tutor was accessible when I needed to consult them
TQ7—delete
TQ8 The group sessions were well facilitated

PERCEIVED USEFULNESS (PU)

Because of what I have learnt from the course,
PU1 I am able to apply the course contents in my work
PU2 What I had learned from the course is useful to my work
PU3 I am able to use the knowledge from the course to help my colleagues
PU4 I can contribute to my work place more
PU5—delete
PU6 I can integrate ICT in my work with minimal help
PU7 I know how to search, evaluate and select appropriate IT resources to
PU8 I am able to adopt and adapt ICT resources in my work
PU9 I can manage ICT resources more effectively at my work place

FACILITATING CONDITIONS (FC)

FC1—delete
FC2 When I need help to use the e-learning system, specialised instruction is available to help me
FC3 When I need help to use the e-learning system, a specific person is available to provide assistance
FC4 When I need help to use the e-learning system, I know where to find it