Lecturer Attitudes and Behavioural Intentions to Use Learning Management Systems in Vietnam

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Abstract

This study aims to explore lecturer attitudes to, and intentions for, using a learning management system (LMS) in a Vietnamese university. Its two main purposes are to (a) identify the factors that influence lecturer attitudes and intentions to use an LMS, and (b) examine the causal relationships among the factors. To achieve this aim, the study used Davis' (1985) technology acceptance model (TAM) as a baseline. The study expands the original model to include two constructs: perceived internet self-efficacy (PIS), and support to use (SU). The results of the study revealed that PIS was a significant direct predictor of lecturers' perceived ease of use and behavioural intention to use an LMS. However, the *support to use* construct did not predict perceived ease of use. The study suggests that institutions should conduct an in-depth survey of teacher needs to assist with making well-informed decisions about developing an LMS for future emergencies.

Keywords: learning management system (LMS); technology acceptance model (TAM); attitude; intention; structural equation modelling (SEM); Vietnam

Introduction

The novel coronavirus disease 2019 (COVID-19) that emerged at the end of December 2019 caused an unprecedented phenomenon during which students at all levels were forced to study online. Online learning had never been so vital for the education sector. During this period, most higher education institutions (HEIs) used live video-conferencing tools such as Google Workspace (formerly G Suite) to conduct classes. These makeshift online lessons could hardly satisfy students and teachers, many of whom had never been online for learning and teaching before. The migration from offline to online course delivery met government policies that stated, "school is out, but class is on" (Bich, 2020). However, many issues emerged, including the technological and academic readiness of both teachers and students, and quality assurance of online lessons.

Public universities in many developing nations lack technological platforms and formal online learning management systems (LMSs) for communicating with students or their teaching staff (Talidong & Toquero, 2020). Hence, they cannot fully support the online learning process. Students, forced to communicate synchronously with their instructors and peers through free applications such as Zoom and Google Workspace, suffered from significant anxiety and concern, which affected their behaviour (Baloran, 2020; Thúy & Trường, 2020). Thus, institutions needed to develop fully functional LMSs to counteract the anxiety and concern so students could study whenever they want—not only during the online in-class hours through synchronous lessons with the instructors, but also after class hours.

Vietnamese HEIs include national and regional universities, junior 3-year colleges, and academies that award undergraduate and post-graduate degrees (Quốc hội, 2018). Before the 1990s, all of Vietnam's universities and colleges were public institutions, and it was not until 1998 that the first private university was established (Pham & Fry, 2002). As of 2019, the country has about 65 private universities, most of which operate as for-profit businesses and depend almost entirely on student tuition revenues (MOET, 2020a, Chau et al., 2020). Recently, however, a few economic groups and companies have invested in upgrading operational universities or setting up new ones and running them according to business models. Examples are Phenikaa University of A&A – PHENIKAA Group, Hoa Sen University of Nguyen Hoang Group, and VinUniversity of Vingroup Joint Stock Company (Pham, 2020).

During the COVID-19 outbreak, most Vietnamese HEIs had to switch to online teaching and learning. Although a few universities had used this mode of lesson delivery and had a certain level of readiness, most had no option but to start training their teachers and students on pedagogical and technical skills for this new way of learning. Online lessons were delivered from the end of February to the end of May 2020, but online teaching and learning continued after social distancing restrictions were lifted. Teachers and students either went to their offices or stayed at home and continued to deliver and access online lessons via Zoom or Google Workspace. They also used online chat tools, such as Zalo and Facebook, for communication. Although some educators and teachers consider this emergency delivery of lessons to be online learning, specialists in the field believe video-conferencing applications cannot replace a fully functional LMS. The video-conferencing applications were preferred by most universities because not all teachers and students were well-prepared to use LMSs in their institutions. Zoom or Google Workspace were more economical and user-friendly, and provided many educational tools in one application (Spathis & Day, 2020; Thanh et al., 2020).

Before COVID-19, the government of Vietnam and MOET had issued many policies and directions to encourage schools and HEIs to deliver online courses and services to students and the public. A national television channel is also designated for teaching languages, general knowledge, life skills, and school subjects such as mathematics, physics, and chemistry, especially before the entrance examination to university in Vietnam (normally in July). Because of the need for long-term online learning in response to COVID-19, MOET has also provided guidance on quality assurance of online learning, especially the official dispatch No. 988/BGDĐT-GDĐH on quality assurance of online distance teaching (MOET, 2020b). Nevertheless, few studies have been conducted in Vietnam on aspects of online learning such as online learning styles, study outcomes, instructor perceptions, and experiences in online teaching.

Review of related literature

Over recent decades, LMSs such as Blackboard, Moodle, and WebCT have provided tools and functions for course management, online group chat, discussion, and course evaluation to support teaching, learning, and assessment (Fathema et al., 2015; Walker et al., 2016). Learning management system tools and functions allow students to interact with course content and peers and instructors synchronously and asynchronously (Moore, 1989). An LMS gives learners and teachers access to data. Such data is also valuable for administration, quality assurance, and research (Walker et al., 2016). In this context, it is necessary to understand both teacher and learner perceptions of, and readiness to use, an LMS. Although some teachers perceive that teaching with an LMS is the same as teaching face to face, others disagree and maintain that they need different competencies and tools to prepare content, and to communicate with and assess online learners (Martin et al., 2019).

A typical LMS has key tools such as grade books, course materials, forums, and assessment matrices. Whether these tools are effective for the instructors (e.g., lecturers) and learners (university students) depends very much on the users themselves. Earlier research has concluded that one-size LMS does not fit all (Walker et al., 2016) and that the effectiveness of an LMS depends on the attitudes and competencies of the instructors (Alharbi & Drew, 2014; Walker et al., 2016). However, as learners become the centre of an online learning environment, their digital engagement—or lack of it—in online learning activities also has an important effect on the quality of learning (Doe et al., 2017). Indeed, student and faculty satisfaction are the two critical components of quality in online teaching and learning, and are closely related (Bolliger & Wasilik, 2009).

Institutions have a crucial role to play in the creation and implementation of an LMS. First, institutional administrators are often responsible for decisions to invest and maintain online courses and programmes, which include training for technical and academic staff. It has been claimed in past research that having a good understanding of factors affecting the adoption and use of an LMS can help education managers to make decisions about training teachers in the design, development, and implementation of online courses and encouraging learners to study online more effectively (Kultur & Yazici, 2014). In other words, understanding teacher and student perceptions and attitudes towards adopting an LMS are some of the critical criteria university leaders use to make decisions about investment in online learning. Unfortunately, in the case of LMS adoption, decisions are sometimes driven by authorities, not research (Walker et al., 2016).

Past studies have used a range of frameworks and methods to understand instructor attitudes and experiences about teaching online and using an LMS. Earlier studies relied on the technology, pedagogy, and content knowledge (TPACK) framework "to describe how teachers' understanding of educational technologies and PCK interact with one another to produce effective teaching with technology" (Koehler & Mishra, 2009, p. 62). More recently, the faculty readiness to teach online (FRTO) framework was used to measure teachers' attitudes, knowledge, readiness, and ability for online teaching (Martin et al., 2019). The core issue in these frameworks was the teachers' integration of knowledge about technology, pedagogy, and subject content so that they can be ready for a virtual environment. However, the results of past studies have been inconclusive about how good and how satisfied instructors were in the integration or use of technology in teaching (Bolliger & Wasilik, 2009; Walker et al., 2016). Previous studies on the adoption of an LMS have also been based on the technology acceptance model (TAM) and later versions (TAM2 and TAM3) (Davis, 1985; Venkatesh & Bala, 2008). The baseline TAM model is shown in Figure 1.

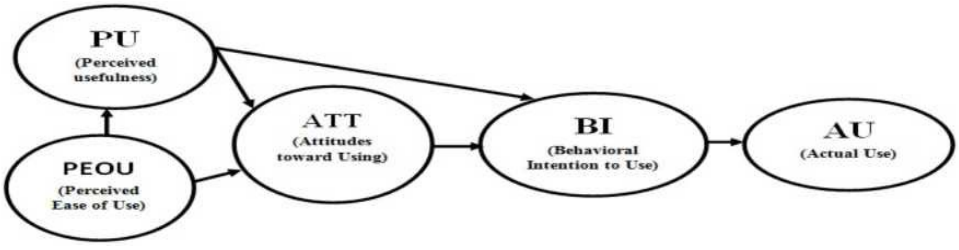

Figure 1 Technology acceptance model (TAM; Davis, 1985)

In this study, two modifications were made to the baseline model: (a) adding two external constructs (*perceived internet self-efficacy* and *support to use*) and (b) omitting one baseline variable (*actual use*). This omission was based on survey results that indicated less than 30% of the teachers had some experience in online teaching, suggesting that many of them were not

familiar with an LMS. One of the main foci of this study was to seek their attitudes and behavioural intentions to use an LMS. The next part of this paper presents brief definitions and the inferences of the two additional constructs.

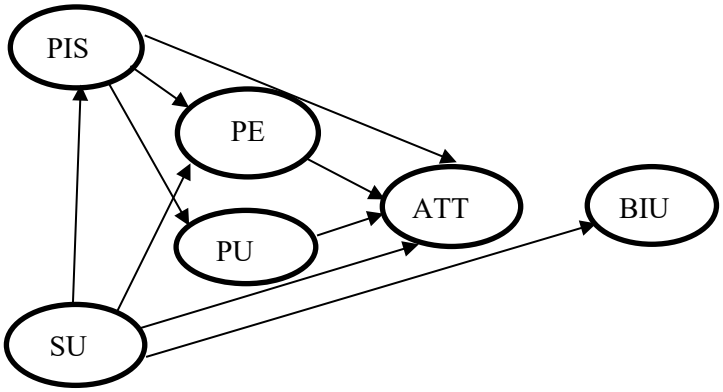

Figure 2 Proposed research model

Note: PIS = perceived internet self-efficacy, SU = support to use, PEOU = perceived ease of use, PU = perceived usefulness, ATT = attitude towards using, and BIU = behavioural intention to use.

Perceived internet self-efficacy (PIS)

In the literature, internet self-efficacy is considered to be the confidence of individuals in their capabilities to use the internet for different purposes (Kao et al., 2014). In online learning and teaching, internet self-efficacy correlates with student and teacher performance and satisfaction (Chang et al., 2013; Tabata & Johnsrud, 2008). In studies about using an LMS, it was revealed that users with higher internet capabilities have more positive attitudes about the ease and usefulness of an LMS, and vice versa (Fathema & Sutton, 2013). Researchers have used scales to measure student and teacher internet self-efficacy (Jansen et al., 2017; Kim & Glassman, 2013). In this study, teachers' internet self-efficacy was measured through their technical competencies, which included their knowledge and skills in using applications, communication tools, and learning systems, as well as their readiness to teach online (Martin et al., 2019). This construct included items that measured the participants' perceived beliefs about their confidence in using online tools (such as being familiar with the platforms, conducting online surveys, and using social networks for online interaction), as well as their overall satisfaction with the outcomes of past online teaching (such as their own knowledge and skills in online teaching, online interaction with students, and support from relevant stakeholders such as faculty and university leaders).

Based on prior literature, three hypotheses were formulated about the relationships between PIS and perceived usefulness (PU), perceived ease of use (PEOU), and attitude towards using (ATT). The justification for these hypotheses is that if lecturers are confident in using the internet for online teaching, they will find an LMS easy to use, recognise the effectiveness of using technology for teaching, and have positive attitudes to adoption.

H_1: PIS has a significant positive effect on lecturer PEOU of an LMS.

H_2: PIS has a significant positive effect on lecturer PU of an LMS.

H_3: PIS has a significant positive effect on lecturer ATT of an LMS.

Support to use (SU)

Earlier studies have concluded that institutional support for lecturers' teaching online in general, and adopting an LMS in particular, is one of the facilitating conditions (Fathema et al., 2015; Ngai et al., 2007). This comprises favourable support that teachers receive to perform their tasks (Teo, 2010). It can be in the form of technical, financial, and academic resources that institutions provide for online teaching (Venkatesh & Bala, 2008). This support is an important factor that affects teachers' perception about the ease and usefulness of using an LMS (Fathema et al., 2015; Ngai et al., 2007; Teo, 2010). During the COVID-19 crisis, technical problems (such as poor internet connectivity, teachers' lack of pedagogical knowledge and skills in course design and online learning control, etc.), meant that the need for institutional support became even more pressing (Moralista & Oducado, 2020; Rapanta et al., 2020).

The current study proposed three hypotheses to examine the effect of SU on the PEOU, ATT, and BIU in an LMS.

H_4: SU has a significant positive effect on lecturer PEOU of an LMS.

H_5: SU has a significant positive effect on lecturer ATT of an LMS.

H_6: SU has a significant positive effect on lecturer BIU of an LMS.

Method

Participants and online courses

The participants were 206 teachers at a Vietnamese university. They were teachers of foreign languages (such as English, Chinese, and Japanese) and those who taught other subjects (such as business administration, information technology, banking, and finance) in English and French. They started teaching online from the end of February 2020, when Vietnam banned large gatherings and required social distancing. As mentioned earlier, due to the emergency, lecturers were trained to use applications such as Zoom or Google Workspace to deliver online lessons. Technical support was also provided during the teaching periods, but the content was designed to be taught online without any pedagogical assistance. Table 1 presents information about the participants.

Table 1 Participant profile

		Frequency	Percentage
Gender	Female Male Total	176 30 206	85.4 14.6 100
Online teaching experience	No Yes Total	147 59 206	71.4 28.6 100
Types of courses	Practice-based Theory-based Total	129 77 206	62.6 37.4 100
Academic rank	Bachelor Masters PhD Associate Professor Total	12 153 40 1 206	62.6 74.3 19.4 0.5 100
Tenure	Under 5 years 6–10 years 11–15 years 16–20 years Over 20 years Total	42 61 65 32 6 206	20.4 29.6 31.6 15.5 2.9 100

Nationwide school closures and social distancing resulted in online teaching being implemented from the end of February to the end of May 2020. Teachers stayed at home in the capital city of Hanoi or their hometowns to deliver online lessons via Zoom or Google Workspace. They taught online for all courses of language practice, interpreting, and translation (for language majors), and specialised courses (for non-language majors) with the exception of physical education. Some teachers used the university's Moodle as part of their LMS to store lessons, but most developed their own teaching materials (e.g., slides and assignments) to deliver via Zoom or Google Workspace.

Instrument development

As mentioned earlier, this study added two constructs to Davis' (1985) TAM model; that is, teacher PIS and SU (institutional support for teachers who are teaching online). The former construct included items such as teacher capabilities in managing online classes, designing lesson content, using an LMS, and using online materials. The latter comprised the support that teachers needed to conduct online surveys, to use tools to monitor student progress, to teach online better (online teaching pedagogy), and to enhance communication with students. These are the key competencies of teachers as specified in the TPACK model, in which technology knowledge "requires a deeper, more essential understanding and mastery of information technology for information processing, communication, and problem solving than does the traditional definition of computer literacy" (Koehler & Mishra, 2009, p. 64). However, one construct—actual use—was deleted from the baseline model because most participants (over 71%) had not previously used an LMS for online teaching (see Table 1).

There were two stages in the process for the instrument development and translation. In Stage 1, all constructs were adapted from prior studies, translated into Vietnamese, and re-worded to make them relevant to the specific context of the study. To ensure the content validity of the instrument, an expert judgement session was organised. Eight teachers who were involved in online teaching during the COVID-19 pandemic were invited to read the questions. They were asked to comment on whether the questions were clear and appropriate for this study. Slight modifications (such as item deletion and addition and wording changes) were made to ensure the

suitability of questions for this study. In Stage 2, the questionnaire was piloted with ten teachers who were teaching online at the time. These teachers were not among the participants in this study. The Cronbach's alpha values for six constructs of the pilot questionnaire were considered good, ranging from 0.83 to 0.94, indicating that the developed instruments were reliable. The final survey questionnaire comprised 32 Likert scale items on six constructs (PIS, SU, PEOU, PU, ATT, and BIU). All internal consistency reliabilities (based on Cronbach' alphas) for all six constructs ranged from 0.862 to 0.938 (Table 2), and were considered good (Hair et al., 1998).

Data collection and analysis

All teachers who taught online at the participating university (about 400) were contacted via email during their online teaching period. The email had information about the study and a link to the online survey. They were also informed that participation in the survey was voluntary. Follow-up reminder emails were sent to increase the response rate. After 10 days, 217 teachers (54%) responded. However, after cleaning the data (deleting carelessly invalid responses), 206 responses were retained for analysis.

Table 2 Measurement scales

No.	Factor	No. of items	Reliability	Adapted from
1	PIS	10	0.869	Martin, Budhrani, and Wang (2019)
2	SU	8	0.882	Adapted from TPACK framework (2009)
3	PEOU	4	0.871	Venkatesh and Davis (2000)
4	PU	3	0.834	Venkatesh and Davis (2000)
5	ATT	3	0.938	Venkatesh and Davis (2000)
6	BIU	4	0.862	Venkatesh and Davis (2000)

Note: All items were measured on a five-point Likert scale, with 1 representing "strongly disagree" and 5 representing "strongly agree".

A two-stage approach for structural equation modelling (SEM) was used for data analysis. First, a confirmatory factor analysis (CFA) was conducted to develop the measurement model. Second, the proposed structural model was tested to examine the causal relationships among all constructs. The software program, Analysis of Moment Structures (AMOS), and part of the Statistical Package for the Social Sciences (SPSS) software (Arbuckle, 2007), were used to conduct the CFA and SEM. Confirmatory factor analysis was used to measure the construct validity of the instrument, and SEM was employed to evaluate the fit of both the measurement and structural components of the proposed model. Structural equation modelling was used because it could analyse both of the paths in the model, and test its goodness of fit.

The two-stage approach employed in this study is fully supported by Anderson and Gerbing (1988) and Hair et al. (2010), who recommended using CFA and then SEM to investigate the relationships between factors. This paper also uses exploratory factor analysis (EFA) on the basis that all items in the questionnaire were partially adapted from previous studies (Mulaik & Millsap, 2000). The approach employed to analyse the data would also give answers to the six hypotheses of this study.

Empirical results

From EFA, five latent variables were initially identified with KMO of 0.819 (> 0.5) and significant Bartlett's test of sphericity. The measure of sampling adequacy (MSA) suggested sufficient samples for all items as all MSA figures are larger than 0.50. Furthermore, a few correlation indices are in the range of 0.8, and the determinant of the correlation matrix was 5.339E-7, greater than 0.00001, suggesting a potential problem of collinearity (Tabachnick & Fidell, 2013). Besides, cumulative extraction sums of squared loadings were 56.048%, which is

higher than the cutoff level of 50%. The study did not rely on the eigenvalue cutoff rule but used a parallel analysis and scree plot to determine how many factors were needed for analysis. As is revealed, only three factors were sufficient where perceived ease of use is now measured by seven items (PEOU1-4 and PU1-3). Factor loadings of each item were all larger than 0.4, which is considered acceptable (Hair et al., 2010). Principal component analysis also shows that the use of behavioural intention to use (BIU) as a factor was satisfactory because cumulative extraction sums of squared loadings were 71.53% (> 50%), KMO was 0.801 (> 0.5), and Bartlett's test was significant (p-value = 0.000 < 0.05).

The influence of these three factors on BIU was then analysed. Attitude towards using (ATT) is examined as a moderating factor in the model. From the analysis provided by EFA, five constructs were used in the research model as shown in Table 3.

Table 3 Number of items in each factor

No.	Factor	No. of items	Measured by
1	BIU	4	BIU1-4
2	SU	8	SU1-8
3	PIS	10	PIS1-10
4	ATT	3	ATT1-3
5	PEOU	7	PEOU1-4, PU1-3

Reliability of constructs

Reliability of factors are to be measured internally with the use of Cronbach's alpha as well as overall with composite reliability (CR) and average variance extracted (AVE). Cronbach's alpha should be at least 0.6 (Nunnally & Bernstein, 1994), CR should be at least 0.70, and the AVE at least 0.50 (Hair et al., 2010).

Table 4 suggests that all constructs have acceptable Cronbach's alpha and CR. Furthermore, all constructs, except for SU and PIS, reported AVE values of above 0.5.

Table 4 Reliability validation

			Convergence		
Construct	**Item**	**Cronbach's alpha**	**Factor loading**	**Composite reliability**	**Average variance extracted**
Behavioural intention to use	BIU1 BIU2 BiU3 BiU4	0.862	0.750 0.817 0.733 0.850	0.868	0.622
Support to use	SU1 SU2 SU3 SU4 SU5 SU6 SU7 SU8	0.882	0.534 0.570 0.605 0.678 0.639 0.775 0.856 0.829	0.879	0.483
Perceived internet self-efficacy	PIS1 PIS2 PIS3 PIS4 PIS5 PIS6 PIS7 PIS8 PIS9 PIS10	0.869	0.541 0.615 0.623 0.588 0.656 0.605 0.720 0.676 0.764 0.660	0.877	0.420
Attitude towards using	ATT1 ATT2 ATT3	0.938	0.897 0.929 0.920	0.939	0.838
Perceived ease of use	PEOU1 PEOU2 PEOU3 PEOU4 PU1 PU2 PU3	0.894	0.633 0.755 0.734 0.736 0.687 0.774 0.823	0.892	0.543

Convergent validity is achieved when all standardised estimates are greater than 0.5 and unstandardised estimates are significant (Anderson & Gerbring, 1988). Discriminant analysis was run to examine whether correlations among constructs were sufficiently low. Because most correlations of all pairs of constructs were lower than 1, discriminant validity had been reached. Another approach is to check whether correlations with other items are smaller than the square root of the AVE (Fornell & Larcker, 1981). The square root of the AVE was presented diagonally, while the remaining values were squared correlations between constructs (Table 5).

Discriminant validity

Table 5 Discriminant validity

	SU	PEOU	PIS	ATT	BIU
SU	**0.695**				
PEOU	0.222	**0.737**			
PIS	-0.044	0.276	**0.648**		
ATT	-0.029	0.863	0.176	**0.915**	
BIU	-0.027	0.858	0.313	0.860	**0.789**

Starting with the five constructs, the path analysis model with the use of the maximum likelihood method (MLE) was analysed. The hypothesised relationships are summarised in Table 6 and illustrated in Figure 3. The sampled data supports five of the six paths specified in the model. The paths from PIS to PEOU, PEOU to ATT, and PEOU to BIU were statistically significant at a 1% level of significance. Meanwhile, the paths from ATT to BIU and PIS to BIU were significant at 5%. The path from SU to BIU was confirmed to be insignificant. Standardised regression weights were all positive, so all paths were positively correlated. For example, the beta coefficient of PIS to PEOU is positively significant, indicating that a higher level of PIS is associated with a higher level of perceived ease of use. Notably, PEOU reports the biggest effect on ATT (1.28), followed by the effects of PEOU on BIU (0.75) and ATT on BIU (0.32) (See Table 6).

Table 6 Model coefficients

	Estimate	S.E.	C.R.	P-value
PEOU <--- PIS	0.162	0.057	2.823	0.005
PEOU <--- SU	0.068	0.082	0.829	0.407
ATT <--- PEOU	1.282	0.139	9.242	***
BIU <--- ATT	0.323	0.141	2.290	0.022
BIU <--- PEOU	0.751	0.218	3.449	***
BIU <--- PIS	0.11	0.046	2.418	0.016

The bootstrap method was employed to test the reliability of estimates in the model (Lunneborg, 1987). Bias-corrected confidence intervals suggested that the standardised estimates for the paths from ATT to BIU might not be reliable (see Table 7).

Table 7 Bootstrap analysis

	Estimate	Lower	Upper	P-value
PEOU <--- PIS	0.236	0.099	0.363	0.008
PEOU <--- SU	0.061	-0.064	0.169	0.450
ATT <--- PEOU	0.909	0.806	0.978	0.001
BIU <--- ATT	0.336	-0.453	0.725	0.342
BIU <--- PEOU	0.553	0.146	1.348	0.032
BIU <--- PIS	0.119	0.033	0.218	0.026

Fit indices of the proposed model

All indicators, except for chi-squared/df, are outside the acceptable range of values, showing that this might not fit the sampled data (see Table 8). However, the values for comparative fit index (CFI), root mean square errors of approximation (RMSEA), and Tucker–Lewis index (TLI) are quite close to the suggested values. A model is acceptable if most fit measures are in acceptable values (Schumacker & Lomax, 2010).

Table 8 Fit measures of the structural model

Absolute fit indices	**Path model**	**Recommended level of fit**
Relative chi-square (CMIN/DF)	2.398	< 3
Root mean square of error approximation (RMSEA)	0.083	< 0.08
Standardised root mean residual (SRMR)	0.072	< 0.8
Goodness of fit index (GFI)	0.748	> 0.9
Incremental fit indices		
CFI (Comparative fit index)	0.850	> 0.9
IFI (Incremental fit index)	0.852	> 0.9
NFI (Normed fit index)	0.770	> 0.9
TLI (Tucker Lewis index)	0.836	> 0.9

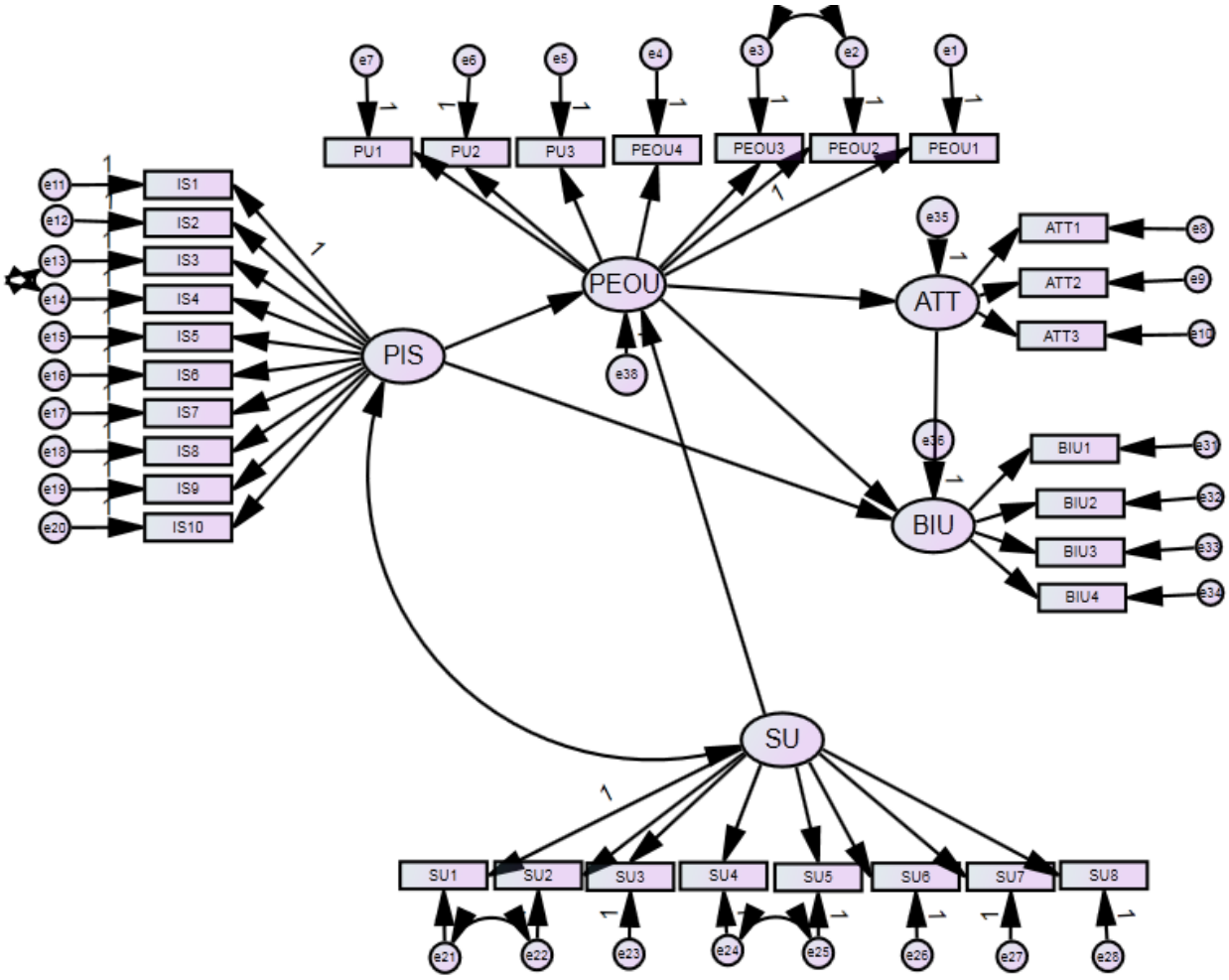

Figure 3 Path analysis

The revised model is presented in Figure 3. The fit indices considered to test the models are shown in Table 8. Overall, the model fitted the data well and showed a predictive power in determining paths from teachers' PIS to PEOU and then from their attitudes (ATT) to behavioural intention (BIU) to use an LMS.

Hypotheses testing results

Table 9 Hypothesis testing

Hypothesis	Critical ratios	p-value	Decision
H1: Perceived internet self-efficacy has positive effects on perceived ease of use	2.823	0.005	Supported
H2: Perceived internet self-efficacy has positive effects on behavioural intention to use	2.418	0.016	Supported
H3: Perceived ease of use has positive effects on attitude towards using	9.242	<0.01	Supported
H4: Attitude towards using has positive effects on behavioural intention to use	2.290	0.022	Supported
H5: Perceived ease of use has positive effects on behavioural intention to use	3.449	<0.01	Supported
H6: Support to use has positive effects on perceived ease of use	0.829	0.407	Not supported

Note: PIS = perceived internet self-efficacy, SU = support to use, PEOU = perceived ease of use, PU = perceived usefulness, ATT = attitude toward using, and BIU = behavioural intention to use.

The SEM results (summarised in Table 9) revealed that only one external variable (PIS) has a significant effect on teacher PEOU, ATT, and BIU. Five of the six proposed hypotheses were supported. The results indicated that the first external construct, PIS, significantly affects PEOU, ATT, and BIU. Therefore, hypotheses H1, H2, and H3 were supported. However, no significant effect of SU on PEOU was found, so hypothesis H6 was not supported. The results also indicated significant relationships among the original TAM constructs (ATT and BIU; PEOU and BIU). Figure 4 shows the results of the model.

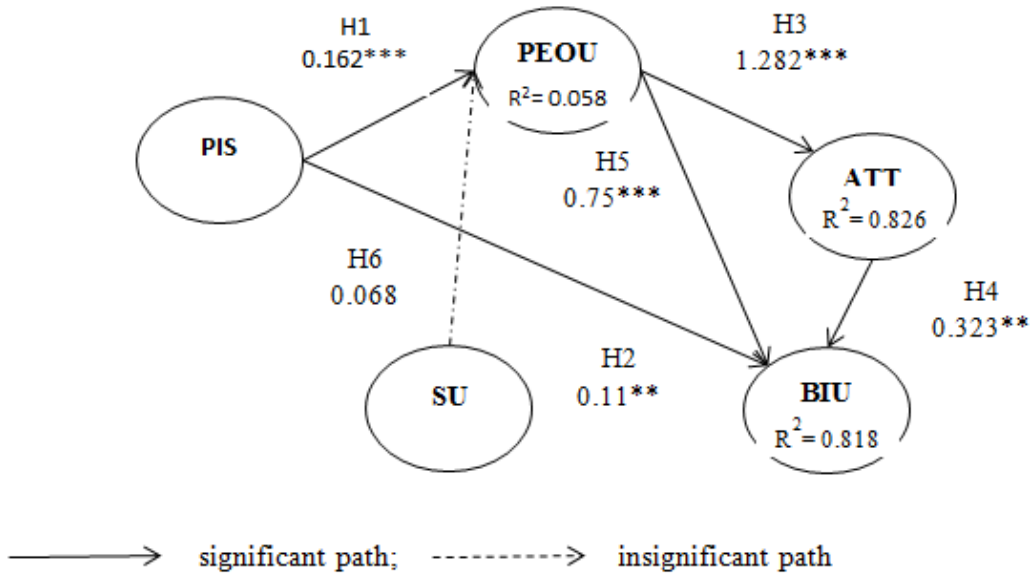

Figure 4 Results of the model

PIS is the only exogenous variable that is proved to be a significant determinant of other endogenous variables, namely PEOU and BIU (Figure 4). Moreover, there is sufficient evidence that the endogenous variable BIU is determined by three other factors of PEOU ($\beta = 0.751$, $p < 0.001$), ATT ($\beta = 0.323$, $p < 0.05$) and PIS ($\beta = 0.11$, $p < 0.05$), with an R^2 of 81.8%. This means that 81.8% of the variation of BIU is explained by these three factors. Similarly, PEOU is statistically evidenced to be determined by PIS ($\beta = 0.162$, $p < 0.001$) with an R^2 of merely 0.058, indicating that PIS explains only 5.8% of the variation in PEOU. Finally, ATT is statistically involved with PEOU ($\beta = 1.282$, $p < 0.001$), which accounts for 82.6% of its variation. All paths suggest that this model had predictive power in determining the use of an LMS by faculty members.

Total effects

Table 10 Total effects

	SU	PIS	PEOU	ATT	BIU
PEOU	0.061	0.236	0.000	0.000	0.000
ATT	0.056	0.215	0.909	0.000	0.000
BIU	0.053	0.322	0.858	0.336	0.000

Table 11 Indirect effects

	SU	PIS	PEOU	ATT	BIU
PEOU	0.000	0.000	0.000	0.000	0.000
ATT	0.056	0.215	0.000	0.000	0.000
BIU	0.053	0.203	0.305	0.000	0.000

The standardised indirect effect, or index of mediation (Preacher & Hayes, 2008), is shown in Table 11. For our given data, PEOU's indirect effect on BIU is the largest at 0.305, which indicates an increase of BIU of 0.305 of a standard deviation for every standard deviation rise in BIU. Bootstrapped bias-corrected confidence intervals are then used to check whether these indirect effects are statistically significant. As is revealed, the indirect paths from PIS to ATT and PIS to BIU are proved to be statistically significant with standardised indirect effects of 0.215 and 0.203 respectively.

Discussion and conclusion

The current study investigated the factors that influence teacher attitudes and behavioural intentions to use an LMS, and to identify the underlying causal relationships among the factors using a proposed extension of the original TAM framework (Davis, 1985). Data from 206 teachers who were teaching online during COVID-19 in Vietnam was collected and analysed. The study results generally supported the proposed model (with minor revisions) and confirmed the significant influence of perceived internet self-efficacy on teachers' attitudes and behavioural intentions to use an LMS. However, support from the institution did not seem to influence their attitude and intentions. The results of this study will be compared with the findings of other works.

Firstly, the results of this study revealed that perceived internet self-efficacy (PIS) had a significant positive effect on perceived ease of use (PEOU) and behavioural intention to use (BIU) of LMS. This indicates the critical importance of teachers' technological capabilities and means that teachers with higher self-efficacy find an LMS easier to use than do those teachers who have lower self-efficacy. This result agrees with the findings of previous studies, which reveal that teacher PIS is a significant factor in determining their use of technology (Holden &

Rada, 2011; Yuen & Ma, 2008). The result of this study also seems to be in accordance with the literature—teachers tend to be more confident in online teaching if their technical skills are good, and vice versa (DeGagne & Walters 2010; Green et al., 2009). Altogether, past research on the TAM model revealed that teachers' confidence in their ability to use computers and the internet play a critical part in their intention to use LMSs and to teach online in general (Wingo et al., 2017).

Contrary to expectations, this study did not find a significant correlation between support from institutions and teachers' POEU ($p > 0.05$). One of the possible explanations of this insignificant path was that these teachers had high internet self-efficacy already, so they did not care as much about, or need, support from the institution (e.g., training in online pedagogy and online communication with students). In addition, as mentioned earlier, over two-thirds of the teachers had not taught online before, so they might not have imagined how easy or difficult it was to operate an LMS. These findings contradicted the results of Teo's (2010) study, which reported that support from the institution (or facilitating organisation) had significant positive effects on PEOU. The results of past studies about teacher perceptions about online teaching indicated that institutional support played a critical role—not only in teacher satisfaction but also in the success of an online course (Chapman et al., 2004; Lackey, 2011). Nevertheless, teacher intention to use an LMS and teach online generally also depends on other factors, including stipends, how their online teaching will be assessed, and the flexibility they could have (Bolliger & Wasilik, 2009).

Regarding the relationships among the constructs of the baseline TAM model, the results of this study support prior research that indicates strong relationships among PEOU, attitude towards use (ATT), and BIU. In line with past findings (Lee et al., 2013), teacher ATT and BIU was significantly determined by the PEOU. The positive effect of ATT on BIU (Farahat, 2012) was also supported in this study. These findings further validated Davis' (1985) claim that teacher attitudes and intentions to use an LMS depend on their perceptions about its use and usefulness.

Implications

This study used baseline TAM as a framework to investigate teacher attitudes and behavioural intentions to use an LMS in the context of emergency online teaching because of COVID-19 in a developing country. It highlighted a few issues that institutions need to consider if they want to prepare well for a new normal; that is, building an LMS for online teaching and learning. On the one hand, the study results revealed that teachers' internet self-efficacy plays a very important role in having favourable perceptions about ease of use, which leads to positive attitudes towards use and intention to use an LMS. On the other hand, the study findings seem to indicate that the business-as-usual support for teachers (e.g., for subject content, pedagogy, and knowledge) did not lead to better perceptions about ease of use of an LMS. Teachers could need other kinds of institutional help to ensure the quality of online teaching and learning, to protect their image when online, and to promote student engagement (Wingo et al., 2017) and their perceptions about the benefits of teaching online in the context of (during and after) COVID-19 pandemic ("the new normal") (Shenoy et al., 2020).

With the significant and salient effect of teacher PIS on their PEOU, ATT, and BIU, it is suggested that when a new LMS is adopted, institutions should inform teachers about features, usefulness, and technical issues that might be different from those in applications such as Zoom and Google Workspace, which were used during the COVID-19 pandemic. In addition, other relevant and practical issues such as online teaching remuneration, incentives, and even online teaching and learning regulations should be made clear before implementation (Wingo et al., 2017). Over two-thirds of participants in this study were not familiar with online teaching; hence, attention should be paid to exploring the technical and academic support that teachers require, with the goal of organising tailor-made training courses. Creating a reliable network or support

group to ensure the smooth running of an LMS could help weaker teachers to develop positive attitudes toward an LMS, which will, in turn, ensure they use it more. (Hustad & Arntzen, 2013).

As mentioned earlier in this paper, the TAM model has been used extensively in past research about teacher intentions and behaviour in the adoption of technology for online teaching. However, during the COVID-19 pandemic, most teachers had to use available live video-conferencing tools for their online work, and had to change their mindset about online learning (Shenoy et al., 2020). Left with fewer options, they adapted to the new normal of education (Moralista & Oducado, 2020). This does not mean that institutions can expend less effort on training and technical support for teachers. Past studies have revealed that, in addition to technical skills, emotions (e.g., anxiety) can hinder the effectiveness of online teaching (Moralista & Oducado, 2020; Talidong & Toquero, 2020). Teachers do need strong institutional support to deliver online lessons in different forms and to keep up with effective pedagogical methods (Rapanta et al., 2020).

In summary, the study's findings provide guidance for educational institutions to focus on the kind of training that will be needed to deploy both emergency online teaching due to similar catastrophic situations, and to provide long-term investment in an LMS. The present study provides additional evidence of the strong relationship between teachers' internet capabilities and their willingness to use an LMS for teaching. Although this study did not confirm the connection between institutional support and teachers' perceived ease of use, it did partially substantiate the notion that teachers appreciated online teaching in general, and using an LMS in particular. Their special effort during the COVID-19 pandemic can be considered to be a good foundation for institutions to build on and organise better online teaching modes for similar emergency situations.

Limitations

A few limitations to this study need to be acknowledged. First, the data used in this study was from the teachers only; future research should include a more in-depth investigation of learners' and education administrators' perceptions on the use of an LMS. Second, the participants of this study were from a social science university, in which teachers could have lower technological competencies than those in technical institutions. The findings might not be transferable to other contexts without further research. Third, more qualitative data should be collected to confirm the findings of quantitative analyses and to explore teachers' in-depth perceptions about using an LMS and implementing a blended teaching and learning mode.

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