



# The Impact of Student's Anxiety on using Learning Management Systems in Covid-19 Pandemic

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**Abstract:** The COVID-19 pandemic has compelled many educational institutions worldwide to use learning management systems (LMS) to deliver their courses. This study aims to determine the constituents that affect scholars when using LMS for graduation during the pandemic. This research also examines the impact of the students' anxiety level when using the LMS by conducting multiple group analyses with the partial least square's method. The results show a significant influence on the students' anxiety level when using the LMS. Students who have a low level of anxiety exhibited insignificant communication quality regarding the perceived ease of use and perceived usefulness. Meanwhile, students with a high level of anxiety highlight a consequential effect of communication quality in the perceived ease of use and usefulness. Moreover, students with a low level of anxiety displayed significantly high-perceived usefulness, satisfaction, and subject norm when using the LMS. In contrast, students with a high level of anxiety did not display perceived usefulness, satisfaction, or subject norm when using the LMS. As a result of the findings from this research, concrete effects can be provided for educationalists, policymakers, and practitioners, who want to advance functional procedures to enhance the design of the LMS during COVID-19.

**Keywords:** Acceptance, Learning Management System, Higher Education, Students' Anxiety

## I. INTRODUCTION

The world is undergoing many changes caused by the Coronavirus (COVID-19) pandemic, which sprung up in China in December 2019. The deadly virus spreads through close contact with an infected person or contaminated surfaces. Consequently, strict restrictions were adopted in China and several countries of the world [1] [2] [3] [4]. These restrictions include limiting movements, delays in opening schools, and stringent isolation measures [5, 6]. These strategies significantly affected physical learning because experts hypothesised that they would accelerate the infection rate among students. Most educational institutions have adopted online learning methods to facilitate the continuity of education [7]. The growth of technology, the Internet, and communication tools have significantly improved the education sector, which has led to the

emergence of e-learning. According to Findik-Coşkunçay et al. [8], e-learning is leading-edge education, in which educational resources are taught remotely to the students using computer. Therefore, the increased use of computers and smartphones for students and instructors has supported the seamless integration of e-learning into institutions. Currently, there is a COVID-19 epidemic. Thus, students have continued to learn using a wide array of online applications and computer resources despite the strict measures adopted in various countries in response to COVID-19 [9] [10]. Despite the importance of effective learning for students and teachers, some barriers affect the influence of successful e-learning. Naveed et al. [11] stated that the technical barriers include unsuitable groundwork and a lack of technical support. Meanwhile, instructors face impediments such as inadequate information and communication technology (ICT) skills, their resistance to changing their teaching styles, and a lack of time to develop e-courses [12] [13]. Additionally, the barriers focused on institutional management include a lack of technical support, financial support, training for e-learning systems, and instructional design. Naveed et al. [11] identified some of the barriers related to students, for instance, the lack of e-learning knowledge and motivation. However, there is a gap in the literature in terms of the factors related to the students' characteristics, such as the students' anxiety level during a pandemic. The study aims to determine and analyse the elements that affect students when using LMS. This investigation also examines how the students' anxiety level affects their performance when using the LMS. The structure of this paper goes thus: Section 2 presents an outline of the literature. Section 3 reports the hypothesis for study and a conceptual framework. In Section 4, the research approach used to attain the study's goal is described, followed by Section 5, which contains the results of the data analysis. Section 6 explains the findings of this study and section 7 enlightens the contributions of this study.

## II. LITERATURE REVIEW

### A. Learning Management Systems

LMS is defined as an application used in the management of online learning systems, which enables interaction between the students and instructors and distribution of learning materials [14].

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Therefore, the LMS is essential in facilitating teaching and learning activities as it stores and organises learning resources. According to Joo et al. [13], Han and Shin [15], and Teo et al. [16], students who learn through e-learning interact with different types of media in different classes that the lecturers upload. A school's online learning system might support more than 50 courses offered to hundreds of students who use them at different times of the day. Therefore, media and other learning materials need to be managed well for e-learning to be effectively conducted [12] [17] [18] [19].

Currently, there is a COVID-19 epidemic and LMS significantly influences the learning process. Students interact with the learning materials through the LMS. This means that the LMS needs to be secure and engaging to use, such that the students can efficiently navigate their classes. According to Ohliati and Abbas [14], the standard of the information, services, and systems that learning institutions provide can affect the students' satisfaction level toward the LMS. In addition, the perceived usefulness, availability of the communication channels, ease of use, and flexibility influence the acceptance and actual usage of the LMS. Consequently, schools should invest in high-quality systems, information, course designs, and adaptable courses in the LMS to boost users' satisfaction, which significantly affects their usage and acceptance levels [15] [18] [19].

## B. Barriers of Learning Management Systems

Several factors can impede the success of e-learning, as shown in Table I. Naveed et al. [11] and Uprichard [19] indicated that technical difficulties represent the main barrier in the implementation of e-learning. According to Uprichard [19], the success of e-learning relies on the availability of better connections, qualified technical support, and computer systems. Therefore, a lack of these resources can significantly inhibit the adoption of online learning. For instance, outdated software applications, such as Windows XP, deny students access to the learning materials. In addition, these systems are easy targets for hackers; this was witnessed in 2017 during the WannaCry ransom attack that targeted outdated technology [19] [20]. Therefore, many students cannot access their learning materials owing to technical failure. Furthermore, some courses are not accessible on mobile devices; this restricts a majority of the students who do not have personal computer systems. Instructors also face challenges when designing learning activities that match the learners' needs. Failing to incorporate interactive and engaging content can result in poor satisfaction and low performance in the class [11] [21]. A lack of motivation and expectations on the learners' part can also impact the success of online courses. The desire for the students to succeed in a class is determined by the amount of effort they use to achieve their goals. A study by Regmi and Jones [22] indicated that the internal factors including poor perception, poor engagement, high levels of anxiety, insufficient willpower, low self-worth, and poor communication between the students and teachers. These factors can reduce the students' level of attention or interest in online classes. External factors, such as poor design, a lack of clarity, a poor education management policy, financial independence, limited literacy in technology, and a

lack of learning space, also restrict e-learning. When the students are at home, which might disrupt their learning process. In addition, the lack of space or support within their homes might lower the students' will that should be dedicated to studying [11] [23].

**Table I: Barriers of the e-learning**

Dimension	Barrier Factor
Students	Inadequate knowledge of online learning
	Inadequate knowledge of English language
	Inadequate motivation
Instructors	ICT abilities are lacking
	Opposition to change among instructors
	There is not enough time to create e-courses
Infrastructure and Technology	Infrastructure that is unsuitable
	Technical help that is not up to par
Institutional Management	Inadequate financial support
	Absence of inadequate policies
	Absence of e-learning training
	Inadequate instructional design

Social interactions are an essential part of the learning process. During face-to-face learning, the students might engage in discussions that can help improve their information retention and success in the class. Students can also have a one-on-one meeting with their instructors when they need more help if they have a problem in the class. Conversely, these meaningful social interactions are not present in e-learning [11] [17]. This inhibits communication, especially when the students need to clarify something during the class. Consequently, the lack of social presence negatively influences the students' satisfaction with online tasks, leading to poor learning performance and experience.

## C. Theoretical Background

After reviewing the existing literature for e-learning, it was noted that several theories and models had been used to research the elements that play a major role in the success of e-learning. For example, some researchers [13] [15] [16] [19] used the technology acceptance model (TAM), while other studies, such as Ohliati and Abbas [14] have used the Delone and McLean IS success model. Additionally, other researchers such as Hu and Lai [18] have applied the unified technology adoption and utilisation theory. Table II presents the major theories used in the existing literature for e-learning; further, it indicates that TAM is a frequently used theory in online learning. Thus, TAM is considered to be the most suitable for this study. TAM, invented by Fred Davis [24] in 1989, is a theory of information systems. TAM outlines the critical factors influencing a technology's acceptance and use. TAM is based on the factors of perceived usefulness (PU) and perceived ease-of-use (PEOU).

According to Davis [24], perceived usefulness refers to the degree to which a person believes that using a particular system would enhance his or her job performance.

Meanwhile, perceived ease of use refers to the degree to which a person believes that using a particular system would be free from effort. TAM also has extended literature factors that explain the users' acceptance of technology.

### III. RESEARCH FRAMEWORK AND HYPOTHESIS

Following the literature review, a framework was developed based on TAM that examines factors that influence usage of LMS, including perceived enjoyment, usefulness, and convenience of use. In this study, TAM was developed by combining the technical factors and involving the subject norm, self-efficacy, communication quality, subject norm, and self-efficacy to use the LMS successfully.

This study also researches and analyses the influence of the students' anxiety level regarding using the LMS. Based on the relationships between the constructs of the conceptual framework, 11 hypotheses were developed to attain the objective of this study, as shown in Figure I. The following sub-sections provide explanations for each hypothesis

#### A. Perceived ease of use

The perceived ease of use refers to people's confidence, such that the system does not require any effort to operate. This means that if the learners believe that the system is direct, they consider it more useful [8, 25]. The perceived ease of use is calculated using various elements such as the ability of a system to meet the users' expectations, increased performance, improved user interaction, ease of use, and flexibility [14] [16]. Based on this, the first hypothesis can be stated as:

H1: Perceived ease of use positively influences perceived usefulness.

#### B. Perceived usefulness

People's beliefs about using a particular system that would affect their performance are reflected in this aspect. According to Ohliati and Abbas [14], the parameters that measure the perceived usefulness include how the systems affect the performance such as its ability to accomplish tasks in a short time, increased productivity, overall usability, and improvements in studying. Teo et al. [16] indicated that students and institutions are likely to adopt LMS that is beneficial to the students. From this, the following hypothesis can be stated as:

H2: The students' use of the LMS is positively influenced by perceived usefulness.

#### C. Communication quality

The quality of communication when teaching affects the adoption of the LMS. Several communication quality indicators are used to measure user satisfaction levels. They include the ability to analyse and monitor the communication tools easily and quickly identify the risks and problems, as well as reliability, usability, functionality,

and other factors, that improve the users' satisfaction [14] [26]. Responding to the clients' needs on time would help to improve the communication quality, thus leading to increased contentment; subsequently, the students are more likely to use these systems.

A lack in high communication quality disrupts the learning process because the students cannot effectively use the LMS. Accordingly, the hypotheses proposed in this study are as follows:

H3: The subjective norm of usage is affected positively by communication quality.

H4: The usefulness is evaluated positively influenced by communication quality.

H5: The students' satisfaction is positively influenced by communication quality.

H6: Communication quality positively influences the students when using the LMS.

#### D. Self-efficacy

This factor describes how the individuals' confidence affects their performance for certain activities. Self-efficacy influences people's attitudes toward an object and their behavioural intentions [8] [4]. Therefore, students are likely to adopt a system that they can easily navigate or use. Accordingly, the following hypotheses are proposed in this study.

H7: Self-efficacy positively influences the perceived ease of use.

H8: Self-efficacy positively influences the students' use of the LMS.

#### E. Subject norm

This aspect explores society's external pressure, which encourages people to use the LMS. According to Ohliati and Abbas 2019 [14], students might be influenced by their peers to use a particular LMS. In some cases, the instructors or institutions require the students to use a specific system, which is not the subjective norm. To serve this purpose, the hypotheses proposed in this study are as follows:

H9: Subject norm positively influences the perceived usefulness.

H10: Subject norm positively influences the students using the LMS.

#### F. Satisfaction

AlHamad [19] discovered that the usage of online learning services was significantly correlated with students' satisfaction.

Similarly, Teo et al. [16] agreed that students' satisfaction is an important factor influencing their use of online education services. Based on the present research, the following hypothesis can be drawn:

H11: Students' satisfaction positively influences their use of the LMS.

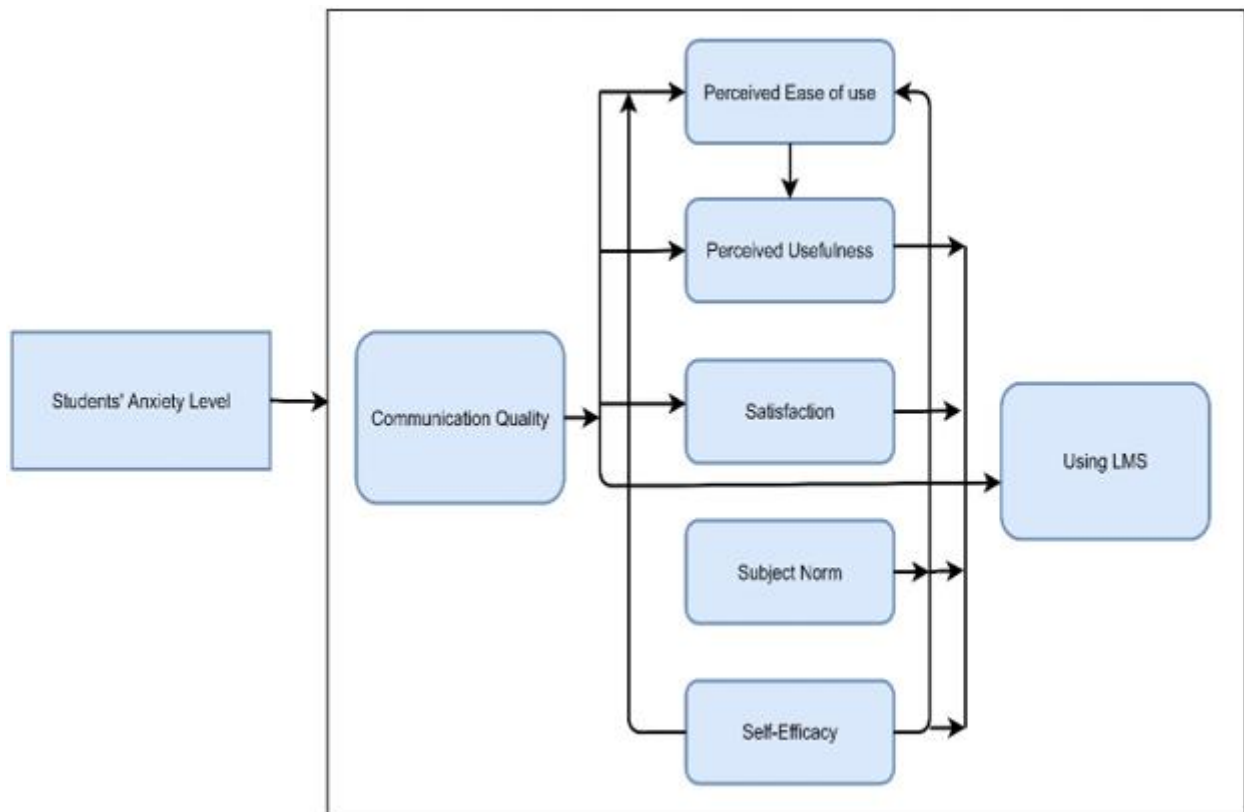


Figure I: Proposed Methodology

Table II: Summary of the selected studies

Authors	Research Aim	Factors studies	Theory/ Model
Teo et al. [16]	Investigating what influences university students' desire to use LMS.	TAM diffusion of innovation theory (DIT)	Perceived ease of use (PE), attitudes towards use (AT), output quality (OUT behavioral intention (BI), anxiety (ANT), trial ability (TRI), subjective norm (SN), technology complexity (TC), Perceived usefulness (PU), perceived behavioral control (PBC),
Han and Shin [15]	Analysis of factors that influence the usage of a mobile virtual classroom by online university students	(TAM and expectation confirmation model (ECM)	perceived usefulness (PU), satisfaction (S), continuance intention (CI), actual usage (U), PE expectation-confirmation (EC),
Joo et al. [13]	Analyzing the factors that at a private university, an online learning management system may be used to affect student satisfaction.	D&M Model TAM	System, service, and information quality, perceived utility, perceived ease of use, and communication quality are all factors to consider.
Fındık-Coşkunçay, Alkış, and Özkan-Yıldırım [8]	Identification of the factors that contribute to online learning system usage in university. A study approach based on the acceptability factors for automation was presented.	TAM D&M Model Self-determination theory TRA	Perceived utility, performance expectancy of use, consciousness, pleasure, subjective norms, satisfaction interaction, and control are all factors to consider.
Hu & Lai.[18]	The aspects that impact e- learning on PCs and android platforms are compared.	Theory of technology adoption and utilization.	Perceived utility, perceived ease of use, social influence, and conducive circumstances are all factors to consider.

IV. RESEARCH METHODOLOGY

A. Sample and Data Collection

The data were collected from an educational institution in Saudi Arabia that switched to online learning systems during COVID-19. Surveys are used to collect data for this study because it ensures that the collected data is valid and reliable [27]. The online survey consisted of 600 respondents. The study was performed using Smart PLS (i.e., a structural equation model (SEM) to analyse the

proposed and final path models. In gathering responses, sixty-one incomplete questionnaires had to be discarded. From this, 539 completed questionnaires were available, and all of them contained valid responses; these questionnaires were taken into account and converted into a sample size

**Table III: Constructs in the questionnaire**

Constructs	Questions
Perceived Usefulness	Using Blackboard during COVID-19 improved my performance in my courses.
	I believe that using the Blackboard system to support classes is beneficial, especially when there is a COVID-19 epidemic.
	Blackboard assists me in carrying out my studying activities efficiently.
	Blackboard is helpful for keeping track of my class's activities online.
Perceived Ease of Use	The blackboard is simple to use.
	The Blackboard system is simple for me to use.
	It's simple for me to learn how to utilize the Blackboard system.
	It takes little mental effort to interact with the e-learning framework.
Communication Quality	Using Blackboard, I can simply share my thoughts with other people.
	I believe that by using Blackboard, other users will exchange information, ideas, questions, and answers with me.
	Blackboard enables me to obtain the other users' feedback easily.
Subjective Norm	I value my instructors' perspectives on the use of Blackboard.
	My instructors believe that we should use Blackboard during COVID-19.
	My fellows recommend that I use Blackboard.
	My decision to use Blackboard is influenced by my classmates' opinions.
Satisfaction	I am pleased with Blackboard's performance in terms of assisting me in following my courses during COVID-19.
	Blackboard is an adequate system for carrying out course-related tasks.
	I am pleased with the Blackboard courses that I have taken.
	The tools in Blackboard are sufficient for studying the courses.
Self-Efficacy	Even if there is no one to show me how to use the Blackboard system, I am confident in my ability to use it.
	Even though I don't have access to an online manual, I am confident in my ability to use the Blackboard system.
	Even though I have never used the Blackboard system before, I am confident in my ability to use it.
	Even though I did not observe someone else using the Blackboard system before attempting it myself, I feel confidence in my abilities to use it.
Using LMS	The Blackboard system should be used to support courses in the future.
	I plan to use Blackboard if I have access to it.
	I aim to utilise Blackboard frequently if the courses are supported by it.
	Instructors, in my opinion, should encourage students to use Blackboard.

**B. Study Instrument**

The hypothesis was tested with the help of a survey instrument, as mentioned previously. In Table III, you can see how many sources are used for the constructs in the questionnaire. The survey consists of 27 items that aim to assess the seven constructs described in the questionnaire. All questions were derived from earlier research and incorporated herein for a more logical and relatable study. The questions from previous research were altered and adjusted to fit the context of the current investigation.

**C. Instrumentation**

Following the selection of some e-learning users and specialists, a rigorous process of pre-testing and pilot testing for some measures was carried out. These A five-point scale was used to assess constructions Likert scale in the questionnaire. The scale ranges from "strongly disagree" to "strongly agree" Interviewees were requested to choose the option they agreed with while considering the statements supplied. The responders demanded demographic information as well.

**D. Pre-test of the questionnaire**

The pilot study used 10% of the overall sample size of the research survey for this investigation. The sample size was

determined using established research procedures [28] [27]. In addition, all of the items in pre-testing was done on the questionnaire on 60 students picked at random. Furthermore, Cronbach's alpha was used to verify the study's reliability; the results show that all of the variables' alpha values are above 0.7. Therefore, the findings highlight that the questionnaire used for this study is highly reliable, and the final questionnaire was understood by all respondents to improve overall survey quality and dependability.

**E. Students' Personal Information/Demographic Data**

Table IV shows the demographic characteristics of the survey participants, revealing that the majority of the respondents are between the ages of 18 and 25 (88% ). As demonstrated from Table IV, the female population (58%) outnumbered the male population by a small margin (42%). In terms of categorising the students, students in their fourth year of their Bachelor's degree had the largest cohort (29%), followed by students in their second year of Bachelor's program (25%). Finally, regarding the students' anxiety level, 49% of the students had moderate anxiety, followed by 26% with severe anxiety and 20% with mild anxiety.



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**Table IV: Frequency test.**

Variable	Group	Frequency	Percentage
Age	18-25 years old	474	88.0
	26-30 years old	54	10.0
	31-35 years old	11	2.0
	36-40 years old	0	0
	Total	539	100.0
Gender	Male	227	42.0
	Female	312	58.0
	Total	539	100.0
Education Level in the Bachelor's Program	First Year	128	24.0
	Second Year	136	25.0
	Third Year	117	22.0
	Fourth Year	158	29.0
	Total	539	100.0
Students' Anxiety Level	Normal	29	5.0
	Mild	107	20.0
	Moderate	266	49.0
	Severe	137	26.0
	Total	539	100.0

## V. RESULTS

### A. Structure equation model (SEM)

Partial least squares structural equation modelling (PLS-SEM) was used to evaluate the suggested framework in this study. This is a multivariate analysis technique comparable to covariance-based SEM that includes a set of endogenous and external constructs assessed by exhibiting variables [29] [30]. On the other hand, PLS-SEM can tolerate smaller sample sizes and non-normal situations than CB-SEM [30]. Furthermore, because the given dataset does not meet the multivariate normality condition, the PLS-SEM is appropriate for this research. Smart PLS was used to show the PLS-SEM technique. Hair et al. [30] present three processes: model formulation, measurement model evaluation, and structural model assessment for evaluating the proposed model in the PLS-SEM. The three phases of this investigation are outlined in the following sections.

### B. Model specification

The model specification's main goal is to create structure and exterior measurement models. According to Hair et al. [30], the structural model depicts relationships among constructs, whereas the measurement model depicts relationships between indicators and constructs.

### C. Measurement Model Evaluation

Two criteria are used to assess the measurement model: reliability and validity. The measuring model's dependability is evaluated using Cronbach's alpha and composite reliability. Table V lists all latent variables with Cronbach's reliability and composite reliability values that are significantly higher than 0.4 is the minimum allowable amount and closer to the desired level of 0.7.

**Table V: Cronbach's alpha and composite reliability.**

	Cronbach's Alpha	Composite Reliability
CQ	0.877	0.924
PEU	0.844	0.897
PU	0.851	0.900
SAT	0.934	0.953
SE	0.898	0.929
SN	0.826	0.884
USE	0.895	0.927

The measurement model's validity is assessed using convergent and discriminant validity. The average variance extracted (AVE) for each variable should be 0.5 or higher to assess the model's validity. Table VI shows all the AVE values that exceed the acceptable threshold of 0.5, indicating that convergent validity has been established.

**Table VI: Average variance extracted (AVE).**

	AVE
CQ	0.802
PEU	0.687
PU	0.691
SAT	0.835
SE	0.765
SN	0.659
USE	0.761

The evaluation of discriminant validity is the second measurement of measuring model validity. The discriminant validity test is used to see if the latent variables differ. With a grey emphasis, Table VII shows the Discriminant validity. When you compare the AVEs' square roots to the other values in each column [27]. The square roots of the AVEs for each latent variable are larger than any association associated with that latent variable. According to the findings of this investigation, the latent variables' discriminant validity is excellent.

**Table VII. Discriminant validity.**

	CQ	PEU	PU	SAT	SE	SN	USE
CQ	0.896						
PEU	0.571	0.829					
PU	0.538	0.621	0.832				
SAT	0.646	0.680	0.703	0.914			
SE	0.528	0.634	0.549	0.596	0.875		
SN	0.571	0.557	0.544	0.581	0.504	0.812	
USE	0.591	0.716	0.736	0.711	0.667	0.650	0.872

### D. Structure model evaluation

The coefficient of determination (R square) is a statistical measure to check how much two variables are related to evaluating the structure model. It is used to see how near the data are to the fitted regression line. R square can be any number between 0 and 1, with a value closer to 1, suggesting that the model accounts for more variation. The R square coefficient of determination for the USE endogenous latent variable is 0.703 in Table VIII. This means that the five latent variables (SAT, CQ, PU, SN, and SE) explain 70.3% of the variance in the USE latent variable. The adjusted R square explains 70.0% of the USE latent variable.

**Table VIII. Coefficient of determination.**

	R Square	Adjusted R Square
PEU	0.479	0.477
PU	0.464	0.461
SAT	0.417	0.416
USE	0.703	0.700

The route coefficient may also test a hypothesis and uncover important supporting associations. The suggested hypothesis's path coefficient and p-values are shown in IX. According to the path analysis model, the CQ has the greatest impact on the SAT (0.646), the SE on the PEU (0.460), and the PU. The hypothesised route link between all latent variables is statistically significant, as shown in Table IX, except for CQ on USE, which is not less than 0.05. Figure II shows the completed structure model together with the path coefficient data.

**Table IX. Hypotheses' path coefficients and p-values**

	Coefficients	P Values
CQ -> PEU	0.329	0.000
CQ -> PU	0.191	0.000
CQ -> SAT	0.646	0.000
CQ -> USE	0.044	0.237
PEU -> PU	0.391	0.000
PU -> USE	0.337	0.000
SAT -> USE	0.174	0.001
SE -> PEU	0.460	0.000
SE -> USE	0.247	0.000
SN -> PU	0.218	0.000
SN -> USE	0.216	0.000

**E. Multiple Group Analysis (PLS-MGA)**

The multi-group analysis MGA approach was used to study and analyse the impact of students' anxiety during COVID-19. For the difference of group-specific outcomes, this is a non-parametric significance test. A finding is significant at the 5% likelihood of error level if the p-value for a difference in group-specific route coefficients is less than 0.05 or greater than 0.95. Starting with the normal level, the influence of the communication quality was not determined to be significant for the perceived ease of use, the perceived usefulness, and LMS use as the p-values become larger than 0.05. However, because the p-values were 0.001, communication student satisfaction was significantly influenced by quality. Furthermore, each of the remaining route coefficients is important.



**Figure II: Completed structure model with the path coefficient data**

When considering students with a mild anxiety level, the influence of the communication quality was determined to

not be significant for the perceived usefulness and using the LMS, even though it substantially impacts the perceived ease of use and students' satisfaction. Because their p-values are less than 0.05, all the remaining path coefficients are significant. Concerning students with a moderate anxiety level, this study highlights that the communication quality is not significant when only the LMS is used. Meanwhile, the communication quality substantially impacts the perceived ease of use, usefulness, and students' satisfaction as the p-values are < 0.001. Furthermore, because the p-value is greater than 0.05, the influence of perceived usefulness, contentment, and subject norm for utilising the LMS is not significant. Because their p-values are less than 0.05, all the remaining path coefficients are significant. In the final group (students with a severe anxiety level), this study determined that the communication quality substantially influences perceived usefulness and simplicity of usage, and students' satisfaction as the p-values are < 0.001. However, the communication quality was determined not to be significant when only the LMS is used. In addition, this study highlights that the influence of the satisfaction and subject norm on the use of the LMS is not significant since the p-value is greater than 0.05. In contrast, all of the remaining path coefficients are significant, in which their p-values are less than 0.05. Overall, this study determined that the students with a low level of anxiety (normal and mild) have similar results, and those with a high level of anxiety (moderate and severe) have similar results. In addition, this study highlights that the students with low-level anxiety have different results than those with a high level of anxiety. Students with a low level of anxiety had a non-significant communication quality in terms of reported ease of use and perceived utility, indicating this. In contrast, the students with a high level of anxiety were significantly influenced by communication quality. Moreover, students with a low level of anxiety displayed significant importance in terms of the perceived usefulness, satisfaction, and subject norm for using the LMS. In contrast, students with a high level of anxiety did not display any significant signs when using the LMS.

**VI. DISCUSSION**

This study provides a deeper understanding of the key factors influencing students' adoption of the LMS during COVID-19. Furthermore, by considering the students' anxiety levels, this study contributes to the literature by examining the influence of individual variances in anxiety levels when utilising the LMS during COVID-19. PLS-SEM is used in this study to examine these hypothesised associations and discover the components by calculating a route coefficient. Finally, multiple group analysis is used to study and analyse the impact of anxiety levels on higher education students' use of the LMS. The results of this study indicate that the students have significantly accepted LMS during COVID-19. Further, this study indicates that the perceived ease of use significantly influence the perceived usefulness, which has positive impacts when using the LMS.

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Currently, many institutions, students, and parents are experiencing the importance of e-learning with everything going on worldwide. During the onset of COVID-19, schools were ordered by governments at all levels to go on lockdown and find alternatives for class-based learning. Therefore, e-learning was adopted because it offers the flexibility of location and time [19]. Consequently, schools can still finish the syllabus despite the stay-at-home orders introduced due to COVID-19. Students can use their time management abilities to satisfy the training requirements that the lecturers create. In such a case, this means that the students can do something during the day and study at night or when they are free, as long as they can read and finish the assigned tasks. The results also highlight a significant influence of subject norm, self-efficacy, and satisfaction when using the LMS. These findings are reinforced by Almarashdeh [31], who found that subject norm and self-efficacy had a favourable impact on e-learning.

Because the p-value of communication quality is 0.136, which is greater than 0.05, it did not significantly impact the students' use of the LMS in this study. This reveals that the communication quality element does not impact students utilising the LMS during the COVID-19 epidemic. The findings of this study differ from those of Almarashdeh [31], who found that communication quality had a substantial impact on the adoption of the LMS during COVID-19. E-learning classes must be more accessible than face-to-face courses. Students with better connections and decent devices can successfully study e-learning courses. For instance, Uprichard [19] indicated that more than 93% of households are connected to the Internet, meaning they can participate in e-learning, especially when social distancing rules are imposed. In addition, governments need to support e-learning infrastructures to be more accessible for students worldwide in comparison to face-to-face classes. Therefore, students who returned to their home countries after the pandemic can still have access to learning and completing their courses. Moreover, students must study at their own pace and use the available resources to understand concepts that they did not initially understand. When the multiple group analyses result for the students' differences in anxiety levels, the COVID-19 epidemic is considered. This study concludes that using the LMS substantially impacts the students' anxiety. This is because students with a low level of anxiety displayed a non-significant communication quality for the perceived ease of use and usefulness. In contrast, students with a high level of anxiety were significantly influenced by it. Moreover, students with a low level of anxiety were significantly influenced by the perceived usefulness, satisfaction, and subject norm when using the LMS. In contrast, these factors were not significant for students with a high level of anxiety.

This study also highlights the importance of e-learning, during COVID-19. It integrates multiple resources, tools, and approaches that facilitate the learning process. Regmi and Jones [22] argue that e-learning uses different structured frameworks that align with the course requirements and help in boosting the students' experience. Thus, instructors have to integrate interactive media and learning simulation tools to acquire better technical skills. The researchers further posit that e-learning is essential for studying and that it

needs an in-depth understanding of the context and practice. Consequently, e-learning is an acceptable approach among healthcare professionals [22]. Students also need to access learning materials before and after the class to ensure that they obtain a more elaborate idea about the concepts being taught. In addition, access to video materials is essential to improve the acquisition of skills and address new concepts.

## VII. CONCLUSION

This study aims to look into and highlight student anxiety when utilising an e-learning LMS during COVID-19. Based on the literature gap and TAM, this study first offers a conceptual framework for the elements that influence students' use of the LMS. It also analyses the impact of the students' anxiety levels while e-learning by adopting a multiple group analysis. The most obvious conclusion drawn from this research is that using the LMS impacts students' anxiety. In particular, the students with a low level of anxiety have a non-significant communication quality in terms of the perceived ease of use and usefulness. In contrast, students with a high level of anxiety displayed a significant influence on this. Moreover, students with a low level of anxiety highlighted the significant importance of the perceived usefulness, satisfaction, and subject norm when using the LMS. However, these factors were not significant for students with a high level of anxiety when using the LMS. The outcomes of this study add to the body of knowledge by giving practical implications for educators, policymakers, and practitioners in implementing successful strategies and strengthening their LMS programmes. Further research might determine how the problem areas identified in this study can be improved through best practices. This study provides a better knowledge of the essential aspects that influence students' acceptance of the LMS during the COVID 19.

## REFERENCES

1. K. Shaukat, T. M. Alam, I. A. Hameed, S. Luo, J. Li, G. K. Auja, *et al.*, "A comprehensive dataset for bibliometric analysis of SARS and coronavirus impact on social sciences," *Data in Brief*, vol. 33, p. 106520, 2020.
2. S. Li, Y. Wang, Y. Yang, X. Lei, and Y. Yang, "Analysis of influencing factors of anxiety and emotional disorders in children and adolescents during home isolation during the epidemic of novel coronavirus pneumonia," *Chin. J. Child Health*, vol. 28, pp. 1-9, 2020.
3. P. P. Mykytyn, "COVID-19 and its impacts on managing information systems," *Information Systems Management*, vol. 37, pp. 267-271, 2020.
4. U. Javed, K. Shaukat, I. A. Hameed, F. Iqbal, T. M. Alam, and S. Luo, "A review of content-based and context-based recommendation systems," *International Journal of Emerging Technologies in Learning (IJET)*, vol. 16, pp. 274-306, 2021.
5. W. Cao, Z. Fang, G. Hou, M. Han, X. Xu, J. Dong, *et al.*, "The psychological impact of the COVID-19 epidemic on college students in China," *Psychiatry research*, vol. 287, p. 112934, 2020.
6. A. Nasir, K. Shaukat, I. A. Hameed, S. Luo, T. Mahboob, and F. Iqbal, "A bibliometric analysis of corona pandemic in social sciences: A review of influential aspects and conceptual structure," 2020.
7. T. M. Alam, M. Mushtaq, K. Shaukat, I. A. Hameed, M. U. Sarwar, and S. Luo, "A Novel Method for Performance Measurement of Public Educational Institutions Using Machine Learning Models," *Applied Sciences*, vol. 11, p. 9296, 2021.



8. D. Findik-Coşkunçay, N. Alkiş, and S. Özkan-Yildirim, "A structural model for students' adoption of learning management systems: An empirical investigation in the higher education context," *Journal of Educational Technology & Society*, vol. 21, pp. 13-27, 2018.
9. D. Batra, "The impact of the COVID-19 on organizational and information systems agility," *Information Systems Management*, vol. 37, pp. 361-365, 2020.
10. B. L. Dey, W. Al-Karaghoul, and S. S. Muhammad, "Adoption, Adaptation, Use and Impact of Information Systems during Pandemic Time and Beyond: Research and Managerial Implications," *Information Systems Management*, vol. 37, pp. 298-302, 2020.
11. Q. N. Naveed, M. R. N. Qureshi, A. O. Alsayed, A. Muhammad, S. Sanober, and A. Shah, "Prioritizing barriers of E-Learning for effective teaching-learning using fuzzy analytic hierarchy process (FAHP)," in *2017 4th IEEE international conference on engineering technologies and applied sciences (ICETAS)*, 2017, pp. 1-8.
12. Y.-S. Wang, H.-Y. Wang, and D. Y. Shee, "Measuring e-learning systems success in an organizational context: Scale development and validation," *Computers in Human Behavior*, vol. 23, pp. 1792-1808, 2007.
13. Y. J. Joo, N. Kim, and N. H. Kim, "Factors predicting online university students' use of a mobile learning management system (m-LMS)," *Educational Technology Research and Development*, vol. 64, pp. 611-630, 2016.
14. J. Ohliati and B. S. Abbas, "Measuring Students Satisfaction in Using Learning Management System," *International Journal of Emerging Technologies in Learning*, vol. 14, 2019.
15. I. Han and W. S. Shin, "The use of a mobile learning management system and academic achievement of online students," *Computers & Education*, vol. 102, pp. 79-89, 2016.
16. T. Teo, M. Zhou, A. C. W. Fan, and F. Huang, "Factors that influence university students' intention to use Moodle: A study in Macau," *Educational Technology Research and Development*, vol. 67, pp. 749-766, 2019.
17. H. Z. Ng and S. S. Baharom, "An Analysis on Adult Learners' Satisfaction in Online Education Programmes," *International Journal of Interactive Mobile Technologies*, vol. 12, 2018.
18. X. Hu and C. Lai, "Comparing factors that influence learning management systems use on computers and on mobile," *Information and Learning Sciences*, 2019.
19. A. Q. M. AlHamad, "Acceptance of E-learning among university students in UAE: A practical study," *International Journal of Electrical & Computer Engineering (2088-8708)*, vol. 10, 2020.
20. T. M. Alam and M. J. Awan, "Domain analysis of information extraction techniques," *International Journal of Multidisciplinary Sciences and Engineering*, vol. 9, pp. 1-9, 2018.
21. L. Alzahrani, W. Al-Karaghoul, and V. Weerakkody, "Investigating the Impact of Citizens' Trust toward the Successful Adoption of E-government: A Multi-Group Analysis of Gender, Age and Internet Experience". *Information System Management*, 35, pp. 124-146, 2018.
22. K. Regmi and L. Jones, "A systematic review of the factors–enablers and barriers–affecting e-learning in health sciences education," *BMC medical education*, vol. 20, pp. 1-18, 2020.
23. T. M. Alam, M. M. A. Khan, M. A. Iqbal, W. Abdul, and M. Mushtaq, "Cervical cancer prediction through different screening methods using data mining," *IJACSA International Journal of Advanced Computer Science and Applications*, vol. 10, 2019.
24. F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS quarterly*, pp. 319-340, 1989.
25. L. Alzahrani, W. Al-Karaghoul, and V. Weerakkody, "Analysing the Critical Factors Influencing Trust in E-government Adoption from Citizens' Perspective: A Systematic Review and A Conceptual Framework", *International Business Review*, vol 26, pp. 164-175, 2017.
26. L. Alzahrani, "Factors Impacting Users' Compliance with Information Security Policies: An Empirical Study". *International Journal of Advanced Computer Science and Applications*, vol 12, 2021
27. E. Bell, A. Bryman, and B. Harley, *Business research methods*: Oxford university press, 2018.
28. T.-I. Baig, Y.-D. Khan, T.-M. Alam, B. Biswal, H. Aljuaid, and D.-Q. Gillani, "ILipo-PseAAC: Identification of Lipoylation Sites Using Statistical Moments and General PseAAC," *Computers, Materials & Continua*, vol. 71, pp. 215--230, 2022.
29. L. Alzahrani, and K. Seth, " Factors influencing students' satisfaction with continuous use of learning management systems during the COVID-19 pandemic: An empirical study" *Education and Information Technologies*, vol. 26, pp. 6787–6805, 2021.
30. J. F. Hair, C. M. Ringle, S. P. Gudergan, A. Fischer, C. Nitzl, and C. Menictas, "Partial least squares structural equation modeling-based discrete choice modeling: an illustration in modeling retailer choice," *Business Research*, vol. 12, pp. 115-142, 2019.
31. I. Almarashdeh, "Sharing instructors experience of learning management system: A technology perspective of user satisfaction in distance learning course," *Computers in Human Behavior*, vol. 63, pp. 249-255, 2016.

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