Determinants of LMS Satisfaction among Pre-University Students at Asia Pacific University of Innovation and Technology

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Abstract
The extensive use of learning management systems or LMS in education provides various benefits to the users, particularly instructors and students. It is also important to investigate the satisfaction of users in using the LMS to ensure its efficient use in the teaching and learning environment. This paper focuses on investigating the factors that affecting LMS satisfaction among pre-university students at a private tertiary institution in Malaysia. Subsequently a quantitative study drawing data from 83 university students was employed. The collected data was analysed using SPSS. Descriptive statistics have been utilized to analyse data in the study. The findings show that there is a moderately high correlation between satisfaction and the independent variables: 1) perceived usefulness, perceived ease of use, and system quality. Several implications are drawn from the results of the study and future research suggestions are provided.
Keywords: Learning Management Systems (LMS), System Quality, Perceived Usefulness, Perceived Ease of Use

Introduction
The transformation in technology has brought along new concepts to human life. Aligning with the current changes, digital technology has become an important concept in daily life and is integrated in various aspects, including communication, banking, trade, service, and other industries. Statistics from Our World in Data (2022) recorded that 89.56 percent of the Malaysian population were Internet users in 2020, and this percentage is equivalent to 29.73 million people. With the widespread of Internet use, Malaysia has been proactive in taking the same steps as other countries in the Asia Pacific region to integrate technology in the education sector. The field of education has progressively been moving along with the advancement by applying elements of technology to support the alignment of this transformation.

A Learning Management System (LMS) is a technology tool that provides functionalities beyond the instructional context such as management tracking, personalized instruction, facilitative learning (Bradley, 2021). In the initial phase of technology integration in education, various technological constraints are faced one of which is limited access. However, the adoption of LMS platforms has been fuelled by the increasing demand for online and hybrid learning. This has accelerated in the wake of the COVID-19 pandemic where education system around the world, including many schools, colleges, and universities had initially adopted online learning to accommodate the physical restrictions. According to the eLearning Industry article, "How COVID-19 Has Impacted the LMS Industry" (Limb, 2021), one billion users were forced to adopt the LMS during the COVID-19 pandemic lockdown. Another study found that the use of LMS systems in higher education increased by 90% during the pandemic (Holmes et al., 2020). As a result, the importance of Learning Management Systems (LMSs) in education has grown by leaps and bounds.

LMSs were traditionally used to supplement face-to-face learning, with instructors uploading lecture-related content, administering quizzes, and facilitating assignment submissions. The pandemic, on the other hand, drove the utilization of LMSs for online learning and teaching, with instructors conducting online classes having the ability to experiment with other effective methods of engaging their students, such as through collaborative learning on the platform. As a result, the adoption of LMS has significantly increased in recent years. With the increasing demand for online learning, it is crucial to understand the factors that affect users' satisfaction with LMS, particularly among Malaysian university students.

Despite the widespread adoption of LMS systems, there is still a need to ensure that these platforms meet the expectations and needs of their users. Students' satisfaction with LMS platforms is viewed to be critical to their learning experience and academic success. Understanding the determinants of LMS satisfaction among pre-university students is crucial in improving the quality of education and the overall learning experience, as this group of students will have more time to spend at the university after progressing to their undergraduate studies.

A critical analysis of the current knowledge of the LMS satisfaction among tertiary students in Malaysia is conducted in this study to shed light on the gap of the topic. It has been identified that there is potential gap on the determinants of continuance use of LMS among pre-university students in Malaysia in examining the role of system quality, perceived usefulness, and perceived ease of use. The critical analysis of present literature shows lack of studies done in Malaysia that investigate the three variables from the perspective of pre-university students. Many present studies within the last three years were done in other regions, including the Middle East and Western countries. In the Asia Pacific region, most studies related to the LMS satisfaction are reported in Indonesia. Moreover, since the continued use of LMS post pandemic is a relatively new practice across the globe, a study that focuses on the system quality, besides perceived ease of use and perceived usefulness will benefit in providing an efficient virtual learning platform for students. Though most current studies have discussed the importance of perceived ease of use and perceived usefulness of LMS, the quality of the system should be given equal importance especially among students of Generation Z and Generation Alpha who have higher competence in technology. A study on the factors that affect the satisfaction of students' use of LMS after the pandemic can significantly contribute to the existing body of knowledge, in particular to the relevance of online learning practices that have been extensively adopted post pandemic, as compared to its use prior to the year 2020.

Hence, an empirical study is important in understanding the impact of various factors, including system quality, perceived usefulness, and perceived ease of use on LMS satisfaction. The primary findings of this study will help educational institutions to improve their LMS features, enhance student satisfaction, and ultimately, improve the quality of education. Therefore, this study aims to identify the determinants of LMS satisfaction among pre-university programmes at Asia Pacific University of Innovation and Technology (APU).

Critical Analysis of Literature
This study uses critical analysis of literature as secondary data in providing an in-depth understanding of the current body of knowledge of the selected topic. This section focuses on describing the current knowledge of variables relevant to the study, particularly on the effects of system quality, perceived usefulness, and perceived ease of use on users' satisfaction of LMS.

After applying all the relevant filters on two respected databases, namely Scopus and Web of Sciences, a total of 15 relevant journal articles were retrieved, which directly pertained to the focus of the study. The articles have been further categorized into their respective themes. However, it was discovered that some of the articles belonged to more than one theme. Table 1 displays the frequency of articles pertaining to the theme of LMS users' satisfaction which are determined by the system quality, perceived usefulness, and perceived ease of use.

Learning Management Systems (LMS) have become an essential tool for delivering and managing online courses, which has been on the rise in recent years (Al-Khateeb & Abdalla, 2021). LMS are designed to support various learning activities such as content delivery, assessment, communication, and collaboration. Several studies have explored the factors that influence users' satisfaction with LMS.

Table 1
Frequency of articles on the theme of system quality, perceived usefulness, and perceived ease of use

System Quality	N	Perceived Usefulness	N	Perceived Ease of Use	N
Accessibility	6	Enhanced learning experience	13	Easy navigation	10
Layout design	6	Enhanced communication	6	User-friendliness	6
Features	1			Content accessibility	2
Total	13		18		18

Based on the gap on the current studies identified through the critical analysis (Table 2), a framework for this research is proposed in Figure 1. This framework seeks to understand the relationship between system quality, perceived usefulness, and perceived ease of use on the satisfaction of LMS use.
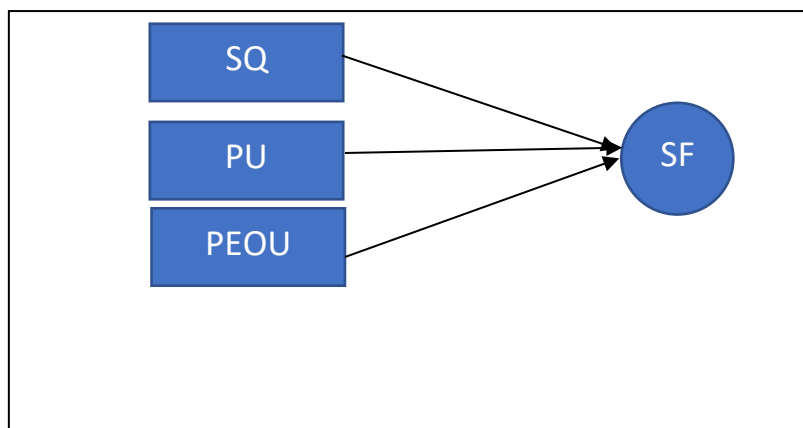
NOTE: SQ = System Quality, PU = Perceived Usefulness, PEOU = Perceived Ease of Use, SF = Satisfaction
Figure 1. Proposed Framework of the Study

System Quality

One of the most influential determinants that affect users' satisfaction with LMS is the system quality. System quality refers to the technical aspects of the LMS such as reliable performance, responsiveness, and user-friendliness (Cavus et al., 2021; Hussein & Hilmi, 2021; Toring et al., 2022). Another study reported in Restianto et al (2022), a high quality LMS should have a system that is easy-to-use, user-friendly, stable, responsive, and easy to navigate. Having an interface that is easy for the users to navigate makes a system more accessible and improves users' experience.

Alkhateeb and Abdulla (2021) in their study at a Palestinian Technical University found that the quality of the learning management system, among other determinants, is a strong predictor in the satisfaction of its users. Masa'deh et al (2023) also found the quality of the system to be a significant factor in determining the satisfaction of the users. The quality of the LMS platform is important to the users as a good quality LMS is crucial in providing a seamless navigation for the users. A system that often faces technical disruptions may result in frustrated users. The quality of the LMS can affect the user experience, such as the reliability and speed of the system, which can impact students' satisfaction with the system. A study by Nguyen et al (2021) found that the system design was a crucial factor affecting the satisfaction of students with LMS, where a design that allows users to reach content without much hassle is preferred. Flexibility and accessibility experienced by the users are dependent on the layout of the LMS. A system that requires users to go through lengthy process with tedious steps affects their overall experience. An LMS with simplified accessibility encourages users to utilize its functions and features.

Perceived Usefulness

Perceived usefulness refers to the extent to which students believe that LMS can improve their learning experience. A study by Nguyen et al (2021) found that the perceived usefulness of LMS was a significant predictor of students' intention to use the system. This includes the use of LMS as a platform to interact with the instructors and fellow students. Such integrated communication platform is useful as it encourages students to interact with the instructors and their classmates pertaining to their studies (Nasir et al., 2021). Students are no longer required to book appointments for a face-to-face consultation with their instructors at an

allocated time. This promotes flexibility in learning and alleviates any discomfort that students may feel through physical interaction.

Moreover, other studies by Ashrafi et al (2022); Nair (2022) also reported that perceived usefulness had a positive effect on the satisfaction of students with LMS. There are many features and functions embedded in the LMS that can help its users access the content based on their needs. Students who perceived LMS as useful were more likely to be satisfied with the system. There is abundance of unreliable sources on the internet which are easily accessible and editable by the public. Having a trustworthy source of information and repos is therefore important for students to ensure that they are provided with the correct information on the subjects studied. This is also important in ensuring the quality of their sources for in their learning process.

Perceived Ease of Use

Perceived ease of use is another important factor influencing students' satisfaction with LMS. Perceived ease of use refers to the degree to which students believe that LMS is effortless to use. A study by Ikhsan et al (2023) found that perceived ease of use had a significant impact on students' satisfaction with LMS. Similarly, Nasir et al (2021) reported that the ease of use of the LMS was a crucial factor affecting students' satisfaction with the system. A system that is easy to navigate will increase the frequency of use amongst its users and while helping them to be more skilful in fully utilizing its functions and features. Students who found LMS easy to use were more likely to be satisfied with the system.

Satisfaction

Satisfaction is the goal of LMS implementation, as it represents the extent to which the system meets students' needs and expectations. The system functionality, content quality, and usability had a significant impact on students' satisfaction with LMS (Nguyen, 2021). Students who perceived the LMS as functional, with high-quality course materials and easy to use, were more likely to be satisfied with the system.

Overall, the literature suggests that system quality, perceived usefulness, perceived ease of use, and satisfaction are crucial factors that affect students' satisfaction with LMS. The critical analysis of literature based on Table 2 also shows there is a gap in the current knowledge of LMS satisfaction in Malaysian tertiary education, that are focusing its use after the pandemic. By understanding these factors, educators and system designers can improve the quality and effectiveness of LMS, enhancing the overall learning experience of students. Research Questions and Research Hypotheses for the study are

RQ1: Is there a significant relationship between system quality and students' satisfaction of LMS use?

RQ2: Is there a significant relationship between perceived usefulness and students' satisfaction of LMS use?

RQ3: Is there a significant relationship between perceived ease of use and students' satisfaction of LMS use?

H_01 : There is no significant relationship between students' satisfaction and system quality.

H_02 : There is no significant relationship between students' satisfaction and perceived usefulness.

H_03 : P There is no significant relationship between students' satisfaction and perceived ease of use.

By testing these hypotheses, the study aims to identify the factors related to students' satisfaction with LMS and provide insights into how Malaysian universities can improve the quality and effectiveness of LMS.

Table 2
Critical Analysis of Literature on Users' Satisfaction of LMS, System Quality, Perceived Usefulness, and Percei

Author(s)	Year	Journal Name	Article Title	WOS	SC	SF	SQ	PU	EOU	MY	Country	Methods
Ahmad Fauzi et al.	2022	International Journal of Advanced Computer Science and Applications	Evaluating Learning Management System based on PACMAD Usability Model: Brighter Mobile Application	√	√	√	√			√		Experiment, Questionnaire
Alkhateeb and Rania	2021	International Journal of Information and Communication Technology Education (IJICTE)	Factors Influencing Student Satisfaction Towards Using Learning Management System Moodle	√	√	√	√	√	√		Palestine	Survey questionnaire
Al-Sofi	2021	Pegem Journal of Education and Instruction	Student Satisfaction with E-learning Using Blackboard LMS during the Covid-19 Circumstances Realities, Expectations, and Future Prospects	√	√	√		√	√		Saudi	Questionnaire
Arifin et al.	2021	International Conference on Cybernetics and Intelligent System	Students' Satisfaction of Learning Management System: A Study of Dipa Makassar University, Indonesia	√	√	√	√				Indonesia	Questionnaire
Ashrafi et al.	2022	Interactive Learning Environments	Exploring factors influencing students' continuance intention to use the learning management system (LMS): a multi-perspective framework	√		√		√	√		Iran	Questionnaire
Cavus et al.	2021	Sustainability	Determinants of Learning	√	√	√	√	√	√		Nigeria	Paper-based questionnaire

Author	Year	Journal	Title								Country	Method
			Management Systems during COVID-19 Pandemic for Sustainable Education									
Hussein and Hilmi	2021	The Electronic Journal of e-Learning	The Influence of Convenience on the Usage of Learning Management System	√	√	√	√	√		√		Online survey
Ikhsan et al.	2023	Journal of Educators Online	Predicting Students' Use of Mobile-Learning Learning Management Systems in Indonesia		√	√		√	√		Indonesia	Online questionnaire
Jayanetti et al.	2022	International Research Conference on Smart Computing and Systems Engineering (SCSE)	Factors Influencing the Secondary Level Students' Satisfaction in E-Learning A Case Study of an Educational Institute in Sri Lanka		√	√	√				Sri Lanka	Online questionnaire
Masa'deh et al.	2023	International Journal of Data and Network Science	Evaluation of factors affecting university students' satisfaction with e-learning systems used during Covid-19 crisis: A field study in Jordanian higher education institutions	√		√	√	√			Jordan	Online survey
Mohd Nasir et al.	2021	Asian Journal of University Education (AJUE)	Student Satisfaction in Using a Learning Management System (LMS) for Blended Learning Courses for Tertiary Education		√	√		√	√	√		Questionnaire
Nair	2022	International Journal of Information and Education Technology	Determinants of Satisfaction and Deep Structure Usage of Post-acceptance Learning Management Systems by		√	√		√		√		Web-based survey questionnaire

												Country	Method
			Malaysian Higher Education Lecturers										
Nguyen	2021	Asia Pacific Management Review	A study on satisfaction of users towards learning management system at International University - Vietnam National University HCMC	√	√	√	√	√	√			Vietnam	Questionnaire
Restianto. Et al.	2022	Quality – Access to Success	Antecedents to Continuance of Use Intention of Adopting Learning Management System (LMS) in E-commerce Learning: Implementation of IS Success Model	√	√	√	√		√			Indonesia	Online questionnaire
Toring et al.	2022	Asia Pacific Management Review	Evaluation of students' satisfaction toward an adopted learning management system at Indiana Aerospace University: A structural equation modelling approach		√	√	√	√				USA	Online survey

NOTE: WOS= Web of Sciences, SC=Scopus, LMS= Learning Management System, SF=Users' Satisfaction of LMS, SQ=System Quality, PU=Perceived Usefulness, PEOU=Perceived Ease of Use, MY=Malaysia

Methodology

Sample in this study consists of pre-university students enrolled in Certificate, Foundation, and Diploma programmes at Asia Pacific University, in Kuala Lumpur, Malaysia. The student population was purposively chosen for the survey because they represent the biggest user group of the LMS used at the university. Distribution of the online questionnaire link was shared via Microsoft Teams channels, and 83 responses was collected. Findings from the survey questionnaire are analysed using descriptive statistics. This study utilizes two types of data collection method, which are primary and secondary data. A survey method via online questionnaire is administered as the primary source of data, while critical analysis of literature obtained from high impact journal articles provides the secondary data.

The secondary data was collected through a critical analysis of scholarly sources through high impact journals from Scopus and Web of Sciences databases in ensuring reliable sources for

the review of literature. The search for the literature was conducted in a systematic process where publications prior to 2021 were excluded, to ensure recency and relevancy of the literature. Secondly, the findings were filtered to only include journal articles in the selection. After relevant filtering, 15 journal articles were selected for the purpose of the critical analysis.

The online survey questionnaire was designed on Google Forms to collect the primary data for the study. The questionnaire consists of three main sections. Section A includes seven items to collect demographic profiles of the respondents, while Section B and Section C aim to understand the correlation between the variables identified for the study. Section B is divided into three sub-sections, each representing an independent variable with five items per variable. Section C focuses on the dependent variable with five items.

Variables included in the questionnaire are derived based on the critical analysis, where the research framework is proposed. Items in the questionnaire are adapted from literature (Hussein & Hilmi, 2021; Masa'deh et al., 2023), while also including six self-developed items, based on past findings. Items in Section B and Section C utilize 5-point Likert scale to provide a balanced response scale, with an equal number of positive and negative response options at the beginner however were changed to all positive based on educational measurement expert suggestion for future studies. This allows participants to express their opinions in a more nuanced way than a binary (yes/no) response scale, while still maintaining a clear direction of agreement or disagreement. A 5-point Likert scale is also easy to administer and score, making it a practical choice to collect data efficiently and quickly. It also minimizes the risk of response bias or confusion among participants. The instrument is validated by two experts in the field of educational technology, one expert in education and an expert in educational measurement, teaching at a local tertiary institution to ensure its validity.

Findings & Discussion

Based on Figure 2, out of the 83 respondents, 58.54% were male and 41.46% female. Most of the respondents (79.52%) were aged between 17 to 19 years as detailed in Figure 3. Figure 4 shows most respondents (55.42%) are studying in the field of Computing and IT, followed by Business and Finance at 25.30%. Most of the respondents involved in the survey are currently in their Foundation programme (68.67%), while 18.07% respondents are currently at Certificate level, and 13.25% are Diploma students as shown in Figure 5.
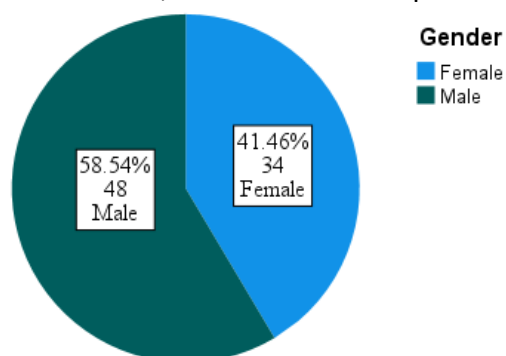

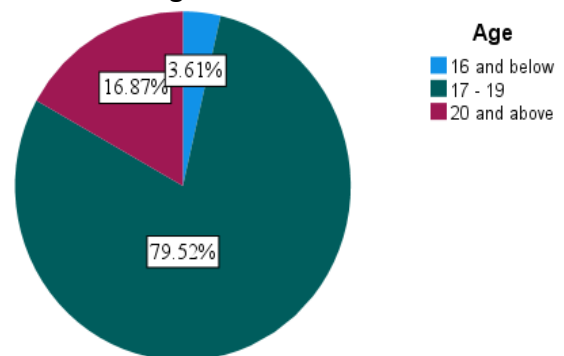Figure 2. Gender distribution of respondents

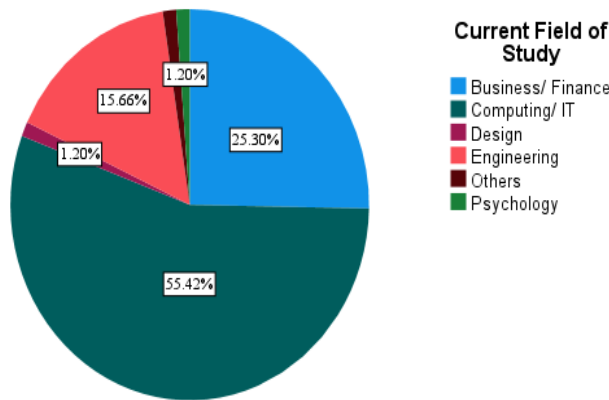Figure 3. Age group distribution of respondents
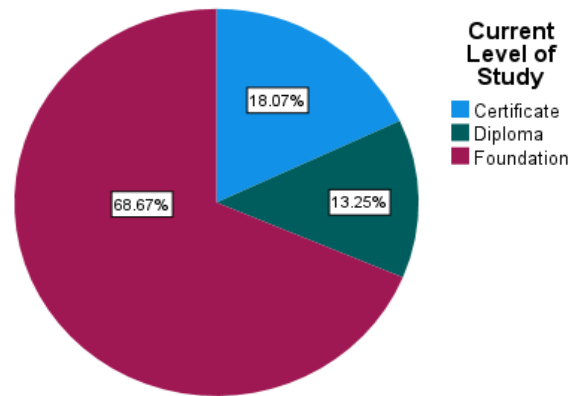
Figure 4. Current field of study

Figure 5. Current level of study

Based on Table 3, most respondents have been using the LMS for 2 semesters (63.9%), followed by students in Semester 3 at 26.5%. Table 4 shows the majority of respondents prefer to use their mobile phone and laptop (48.2). The frequency of the respondents accessing LMS through mobile data and Wi-Fi is the highest at 47% followed by the use of Wi-Fi only at 41% (Refer Table 5).

Table 3
Duration of LMS Use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 semester	8	9.6	9.6	9.6
	2 semesters	53	63.9	63.9	73.5
	3 semesters	22	26.5	26.5	100.0
	Total	83	100.0	100.0	

Table 4
Statistics on Device Type

		Frequency	Percent	Valid Percent
Valid	Laptop	29	34.9	34.9
	Laptop, Desktop	1	1.2	1.2
	Mobile phone	6	7.2	7.2
	Mobile phone, Desktop	1	1.2	1.2
	Mobile phone, Laptop	40	48.2	48.2
	Mobile phone, Laptop, Desktop	6	7.2	7.2
	Total	83	100.0	100.0

Table 5
Statistics on Internet Connection Type

	Frequency	Percent	Valid Percent
Mobile Data, Wi-Fi	39	47.0	47.0
Mobile Data, Wi-Fi, Others	2	2.4	2.4
Others	1	1.2	1.2
Wi-Fi	34	41.0	41.0
Total	83	100.0	100.0

Cronbach's alpha coefficient is the most common method used by researchers to test the internal reliability of the items used in the study. Cronbach's alpha reliability coefficient ranges between 0 and 1. Value of Cronbach's alpha coefficient closer to 1.0, shows greater internal consistency of the items in the scale. According to Nunnally and Bernstein (1994), Cronbach's alpha value of 0.6 and above are acceptable. All 20 items used in this study obtained Cronbach's alpha value with the lowest value of 0.860 which is greater than 0.6. This indicates that all the items for the independent and dependent variables acceptable. The Cronbach's alpha of five items measuring system quality (SQ) is 0.840 which is highest as compared to other variables used in the study. The second highest value of Cronbach's alpha is 0.835 which is used to measure perceived usefulness (PU) with five items. The five items measuring perceived ease of use (PEOU) is recorded at 0.829 Cronbach's alpha. Meanwhile, the Cronbach's alpha value for the satisfaction (SF) is 0.766.

Table 6
Cronbach Alpha Value of Variables

Variable	Cronbach's Alpha
SF	.766
SQ	.840
PU	.835
PEOU	.829

Table 7
Reliability Test of Items

Variables	Item	Cronbach's Alpha if Item Deleted
	no interruptions or continuous technical failures	.871
	well-designed user interface	.862
	download and upload speed	.871
	seamless access to content	.872
	relevant features and functions	.864
	communicate with the lecturer and fellow classmates	.876
	enhances the delivery of the study material	.866
	understand the study material	.866
	assignment submission	.865
	conduct exams	.868
	easy to navigate	.860
	timesaving	.869
	mental effort	.866
	quick information search	.866
	skilful	.869

Table 8
Summary of Mean

	N	Sum	Mean*	Std. Deviation
SF	83	270.60	3.2602	.85696
SQ	83	278.00	3.3494	.74758
PU	83	289.80	3.4916	.77100
PEOU	83	303.00	3.6506	.79685
Valid N (listwise)	83			

*The mean value is based on 5-point Likert Scale

Table 8 illustrates the summary of mean for each variable. Perceived ease of use (PEOU) has the highest mean value (M=3.651, SD=0.797), followed by perceived usefulness (PU) (M=3.492, SD=0.771), system quality (SQ) (M=3.349, SD=0.748), and satisfaction (SF) (M=3.260, SD=0.857). Meanwhile, Table 9 shows the mean value for each item, where the highest mean value is recorded at 3.807 for 'assignment submission' under perceived usefulness. Contrarily, the lowest mean recorded is also an item under perceived usefulness, which is 'to communicate with the lecturer and fellow classmates' (M=2.771). Table 10 shows Pearson correlation test used to determine the relationship between variables in the study based on the following findings.

Table 9
Item Statistics

	Mean	Std. Deviation	N
System Quality			
no interruptions or continuous technical failures	3.0843	1.18120	83
well-designed user interface	3.3012	1.04456	83
download and upload speed	3.0723	1.00951	83
seamless access to content	3.6988	1.02094	83
relevant features and functions	3.5904	.87005	83
Perceived Usefulness			
communicate with the lecturer and fellow classmates	2.7711	1.16164	83
enhances the delivery of the study material	3.7952	.94687	83
understand the study material	3.4578	.97906	83
assignment submission	3.8072	1.10936	83
conduct exams	3.6265	1.14456	83
Perceived Ease of Use			
easy to navigate	3.5783	.96424	83
timesaving	3.7952	1.17659	83
mental effort	3.7952	1.10165	83
quick information search	3.5301	1.07451	83
skilful	3.5542	.99085	83
Satisfaction			
satisfaction level	3.3614	1.03096	83
high quality	3.1687	.97304	83
meeting expectations	3.2410	.95752	83
enjoyment	3.0602	1.15134	83
satisfies needs	3.4699	.96698	83

Table 10
Pearson's Correlation Analysis

		SF	SQ	PU	PEOU
SF	Pearson Correlation	1	.675**	.682**	.680**
	Sig. (2-tailed)		.000	.000	.000
	N	83	83	83	83
SQ	Pearson Correlation	.675**	1	.491**	.528**
	Sig. (2-tailed)	.000		.000	.000
	N	83	83	83	83
PU	Pearson Correlation	.682**	.491**	1	.545**
	Sig. (2-tailed)	.000	.000		.000
	N	83	83	83	83
PEOU	Pearson Correlation	.680**	.528**	.545**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	83	83	83	83

H_01: There is no significant relationship between students' satisfaction and system quality.

It is evident that there is correlation between the satisfaction of students and system quality with correlation value at r(83)=.675, p=.000 < 0.05. According to Cohen (1988), r=.50 to 1.0 is suggested to be large. This shows a moderately strong correlation between satisfaction and system quality. Thus, null hypothesis is rejected.

H_02: There is no significant relationship between students' satisfaction and perceived usefulness.

There is also evidence that there is a correlation between students' satisfaction and perceived usefulness with r(83)=.682, p=.000 < 0.05. This shows a moderately strong correlation between students' satisfaction and perceived usefulness. Hence, there is a significant relationship between satisfaction and perceived usefulness. Null hypothesis is rejected.

H_02: There is no significant relationship between students' satisfaction and perceived ease of use.

It also evident that there is a correlation between students' satisfaction and perceived ease of use with r(83)=.680, p=.000 < 0.05. This shows a moderately strong correlation between satisfaction and perceived ease of use. Hence, there is a significant relationship between satisfaction and perceived ease of use. Null hypothesis is rejected.

Implications of the Study
This study contributes to the existing corpus of knowledge by shedding new light on the factors that influence university students' continued use of learning management systems. This research contributes to the expansion of existing theories concerning LMS adoption and users' satisfaction. On the basis of these theoretical contributions, future research could investigate other factors influencing LMS use and the efficacy of various strategies for promoting the adoption of LMS in higher education.

The findings may help university administrators, LMS developers, and instructors. This research can contribute to the design, implementation, and support of LMS platforms in higher education institutions by identifying the benefits, challenges, and strategies associated with LMS use. Universities could, for instance, provide targeted training and support to resolve the challenges identified in this study, promote LMS usage among lecturers and students, while fostering best practices in its use. Using findings from this study, policymakers can develop guidelines and frameworks that encourage and support the use of learning management systems by university instructors. This may involve providing adequate technical support, training, and resources, as well as routinely updating and enhancing LMS features in response to user feedback.

Conclusion
This study was conducted to fill in the gap of the current knowledge on the LMS satisfaction among tertiary students in Malaysia after the Covid-19 pandemic, and proposed a set of three independent variables which represent the common criteria. Findings from the study show that all the three determinants show correlation with the satisfaction of LMS use. The findings are consistent with the previous studies (Alkhateeb & Abdalla, 2021; Nguyen, 2021). The most significant factor found in this study is perceived usefulness, followed by perceived ease of use, and system quality.
The findings show that users, particularly students, prioritize the usefulness of the system and this can affect the level of satisfaction while using LMS. Having autonomous learning ability with the use of LMS, encourages students to self-explore their study materials at their own pace, convenience, and needs. Students are free to move around the topics as they prefer and are not tied to how others do.
The second most significant factor affecting students' satisfaction of LMS is found to be perceived ease of use. This is also supported by the finding of past study by Al-Sofi (2021) and Restianto (2022). One possible reason for this finding is that LMSs are characterized by its application of technology in education, which focus is to transform the education industry to be effortless. Easy navigation of the system ensures an effective use on the users' end.
System quality is also significant in determining satisfaction of users. This finding is also in line with the study done by Jayanetti (2023); Masa'deh (2023). A high quality LMS ensures efficiency in the use of the system by its users. Thus, system developers and management of the institution should carefully choose the functions and features of the LMS, while maintaining its principal uses in teaching and learning.
Although this study provides some insights into users' satisfaction in LMS use, there are limitations concerning the research. The small and homogenous sample size resulted in the findings to be only representative of one particular university enrolled in pre-university programmes. Consequently, the sample chosen for the study does not represent views held by the various segments of the tertiary students in the Malaysian setting.
This study provides the foundation for future research into the determinants of LMS utilization in other contexts or among diverse populations. Future research may consider extending the sampling beyond a particular university, as to allow for a more representative assessment of factors influencing LMS satisfaction among other groups of users. Future studies should also include more variables for a better understanding of the correlations. In addition, future research could employ quantitative or mixed-method approaches to examine the relationships between the identified themes and their impact on LMS usage, satisfaction, and motivation.

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