Predictors of Acceptance of Learning Management System in Higher Education Learning

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ABSTRACT

The purpose of the study is to identify important factors that determine college students' acceptance of learning management system(s) in learning in a COVID-19 pandemic setup. In addition, acceptance of LMS was determined using external variables (personal IT innovativeness, social support, client convenience, system quality, interface quality, service quality, and management support) and two measures of acceptance (perceived usefulness and perceived ease-of-use), according to the Technology Acceptance Model (TAM). This study employed the descriptive-causal method of research, and the respondents were a random sample of 365 college students from a state university in Davao Oriental. Mean scores, Pearson correlation analysis (with heatmap), and regression analysis were statistical tools. Students rated the external variables service quality and management support highly, while the rest were rated moderately, according to the survey results. In terms of usefulness and usability, technology acceptance was

mediocre. While all external variables were found to be significant positive correlates of LMS acceptance, personal IT innovativeness, system quality, and interface quality were found to have a significant influence on LMS ease-of-use. Almost all external variables, with the exception of management support, were found to significantly influence the usefulness of the LMS.

Keywords: *information system, Technology Acceptance Model, learning management systems, external variables, usefulness, ease-of-use, college students, Philippines*

INTRODUCTION

The COVID-19 pandemic has wreaked havoc on higher education, compelling institutions to adopt remote and online education. College students increasingly rely on learning management systems (LMS) to access course materials, communicate with instructors and peers, and complete assignments (Kaleliolu, 2017). Adoption and utilization of LMS can be challenging, particularly for students who are not accustomed to using technology for academic purposes (Unal & Uzun, 2021). Despite the benefits of LMS, college students continue to encounter obstacles and difficulties when adopting and utilizing these systems, especially during the pandemic (Almaiah, Al-Khasawneh & Althunibat, 2020). Some students may lack adequate access to technology or a stable internet connection, impeding their ability to use the LMS effectively (Maphalala & Adigu, 2021). In addition, students may have varying degrees of technological experience and familiarity, which can affect their perceptions of the LMS's utility and usability (Jordan & Duckett, 2018).

As a result of the COVID-19 pandemic, institutions have been compelled to transition rapidly to remote and online learning, which has created a unique environment for the adoption of LMSs. This has made it difficult for students to adapt to new technologies and learning environments (Oliveira, Grenha-Teixeira, Torres, & Morais, 2021) while also coping with the stresses of the pandemic (Herman, Sebastian, Reinke & Huang, 2021). In addition, the pandemic has created a highly volatile, uncertain, complex, and ambiguous (VUCA) situation, which can impact student behavior and LMS adoption (Raza, Qazi, Khan & Salam, 2021). In such a scenario, students may experience elevated levels of stress and anxiety, which can impair their ability to learn and effectively use new technologies (Khoa, Kien & Oanh, 2021). In addition, the abrupt shift to online and remote learning may have disrupted the traditional classroom's social and cultural norms, making it more difficult for students to adapt to new technologies and learning environments (Oyedotun, 2021).

The lack of acceptance of learning management systems (LMS) among college students is a problem faced exclusively by universities in the Philippines. This could be due to limited access to technology and the internet (Fabito, Trillanes, and Sarmiento, 2020; Garcia, 2017), unfamiliarity with technology for academic purposes (Bognot, Oluyinka, and Adewale, 2022), and a preference for traditional classroom-based learning (Latchem & Jung, 2009; Topacio, 2018). Furthermore, the sudden shift to online and remote learning during the COVID-19 pandemic has exacerbated these issues, as students may be struggling to adapt to new technologies and learning environments (Rotas & Cahapay, 2020).

Extensive research has been conducted on the adoption of LMS in higher education, and several studies have identified factors that influence student adoption and use of

LMS. These factors include individual characteristics such as gender (e.g., Alfalah, 2023; Su & Chen, 2022), age (Han & Shin, 2016), and prior technology experience (Garcia et al., 2021; Joo, Kim & Kim, 2016), as well as system-related factors such as ease of use and perceived usefulness (Juhary, 2014), and perceived compatibility with existing systems (Islam, 2016). Moreover, social influence, such as the opinions of peers and teachers, has been demonstrated to be a significant factor in LMS adoption (Ziraba, Akwene & Lwanga, 2020). The Technology Acceptance Model (TAM) is a widely used theoretical framework for comprehending user behavior and technology adoption, even for LMS use (Alharbi & Drew, 2014). TAM suggests that user acceptance and utilization of technology is determined by two primary factors: perceived usefulness (PU) and perceived ease of use (PEOU).

In the context of learning management systems (LMS), students' lack of acceptance may be attributable to a lack of perceived usefulness and/or usability (Bove & Conklin, 2020; Ifinedo, Pyke & Anwar, 2018), especially in the context of the pandemic setup. For one, students who are accustomed to traditional classroom-based learning may have a diminished perception of the utility of LMS (Mehrolia, Alagarsamy & Sabari, 2021). They may perceive learning management systems to be less effective than in-person classes, especially for collaborative learning and interactive discussions (Courtney & Wilhoite-Mathews, 2015). In addition, students may have trouble adapting to the new learning environment, particularly if they lack the technology and internet access necessary to use the LMS effectively (Octaberlina & Muslimin, 2020). This lack of perceived utility may cause students to reject learning management systems. Additionally, the perceived usability of LMS may also contribute to students' rejection of these systems. During the pandemic, the abrupt transition to remote

and online learning may have caused confusion and uncertainty among students, particularly those unfamiliar with using technology for academic purposes (Asamoah, 2021). In addition, the complexity and dynamism of the pandemic situation may have increased the cognitive load of students (Kyne & Thompson, 2020), making it more difficult for them to effectively learn and apply new technologies. These factors may contribute to a lack of perceived LMS usability, thereby decreasing student acceptance.

Given the importance of LMS in facilitating remote and online learning, universities must conduct an evaluation of student acceptance of these systems regularly. This evaluation can provide valuable insights into the factors that influence student adoption and use of LMS (Kayali, Safie & Mukhtar, 2019), as well as the challenges and problems students face. Universities can develop strategies to promote the adoption and use of LMS among college students by understanding these factors, such as providing training and support for using LMS (Hussein, 2011), ensuring access to technology and the internet (Alfadly, 2013), and addressing student concerns and feedback (Weaver, Spratt & Nair, 2008). In addition, assessing students' acceptance of LMS can assist universities in enhancing the quality of online and remote learning, fostering student engagement and satisfaction, and ultimately enhancing the overall educational experience for college students.

Statement of the Problem

This study seeks to determine the factors that influence acceptance of learning management systems among college students in a COVID-19 pandemic setup. Specifically, the study seeks to:

1. Assess the level of external variables related on learning management system acceptance, such as students' personal IT innovativeness, social support, client convenience, system quality, interface quality, service quality, and management support.
2. Assess the extent of acceptance of college students on learning management system in terms of perceived ease-of-use and perceived usefulness.
3. Establish if external variables of LMS use significantly correlated with LMS acceptance.
4. Identify which of the external variables significantly influence perceived ease-of-use and perceived usefulness of the LMS

Hypotheses

The following statements are the null hypotheses that were tested using 0.05 level of significance:

1. There are no external variables that significantly correlate with LMS acceptance.
2. None of the external variables significantly influence perceived ease-of-use and perceived usefulness of the LMS.

Conceptual Framework

Fred Davis first introduced the Technology Acceptance Model (TAM) in 1986, as seen in Figure 1. Its purpose is to explain and predict user acceptance of information systems. The model suggests that a user's behavioral intent to use a particular system determines that system's utilization. In turn, this behavioral intention is influenced by the user's attitudes toward the system, which are determined by two beliefs: perceived usefulness and perceived ease of use.

Perceived usefulness is the extent to which a user believes the technology will improve their job performance, whereas perceived ease of use is the extent to which a user believes using the technology will be effortless. According to TAM, these two factors influence a person's decision to adopt and utilize a new technology.

In the context of this study, TAM is used as a framework to comprehend college students' acceptance of Learning Management Systems (LMS) in a remote learning environment resulting from the COVID-19 pandemic. The research extends the fundamental TAM by incorporating external variables such as personal IT innovativeness, social support, client convenience, system quality, interface quality, service quality, and management support. These variables represent potential influences on perceived usefulness and perceived ease of use, and are therefore used to provide a more nuanced understanding of students' LMS acceptance.

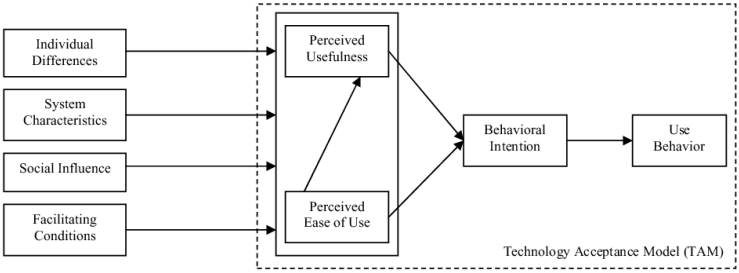

Figure 1. Technology Acceptance Model

METHOD

Design. This descriptive-causal study was designed to identify the significant factors influencing college students' acceptance of a Learning Management System (LMS) throughout the COVID-19 pandemic. This research design allowed for an examination of the relationship between the independent variables (personal IT innovativeness, social support, client convenience, system quality, interface quality, service quality, and management support) and the dependent variables (perceived usefulness and perceived ease-of-use), as proposed by Davis and Venkatesh's Technology Acceptance Model (TAM). This methodology provided the foundation for the collection, analysis, and interpretation of data, resulting in a thorough comprehension of the LMS acceptance phenomenon.

Data Collection. A survey administered online to a random sample of 365 college students from a state university in Davao Oriental was used to collect data. Given the pandemic conditions and the technologically-focused nature of the study, this online method was particularly appropriate. The survey included questions designed to assess the students' perceptions of the various external variables as well as their overall acceptance of the LMS, as measured by perceived utility and usability. All data was self-reported, and the survey ensured the participants' anonymity.

Data Analysis. In terms of data analysis, mean scores were computed to provide a general overview of the responses, and Pearson correlation analysis was used to determine the relationships between the various factors. These correlations were visually represented using a heatmap, and regression analysis was performed to determine the influence of external variables on LMS acceptance.

Ethical Considerations. All participants were informed of the purpose of the study and their right to withdraw at any time for ethical reasons. All responses were kept confidential and used exclusively for this study. The ethical principle of respect for persons was upheld throughout the research, ensuring that the autonomy and confidentiality of the participants were safeguarded.

RESULTS AND DISCUSSIONS

Table 1 shows the extent of external variables on learning management system use among college students. Based on the results of the descriptive analysis, service quality (mean=4.19, SD=0.635) and management support (mean=3.94, SD=0.689) were rated high among college students pertaining to their LMS use, while the rest of the external variables were found to be of moderate levels. In particular, college students' social support (mean=3.22, SD=0.632) on LMS use and their convenience (mean=3.22, SD=0.890) towards its use are rated the least among the external variables. This means that students are still reconciling on whether LMS use could actually bring them the desired outcomes in learning given that college students are divided in its use and their felt convenience.

Moreover, Table 2 shows the extent of acceptance of learning management system among college students. Based on the results of the descriptive analysis, perceived ease-of-use (mean=3.25, SD=0.782) and perceived usefulness (mean=3.16, SD=0.802) were rated moderate among college students. This means that students are still divided on the ease of using and the usefulness of using LMS.

Table 1. *Extent of external variables of learning management system use (N=365)*

External Variables	Mean	SD
personal IT innovativeness	3.345	0.528
social support	3.218	0.632
client convenience	3.218	0.890
system quality	3.464	0.780
interface quality	3.392	0.704
service quality	4.185	0.635
management support	3.935	0.689

Table 2. *Extent of acceptance of learning management system among college students (N=365)*

External Variables	Mean	SD
perceived ease-of-use	3.246	0.782
perceived usefulness	3.158	0.802

Meanwhile, to graphically illustrate the results of the Pearson correlation analysis that seeks to establish the relationship between external variables and technology acceptance, Figure 2 shows the extent of these bivariate relationships using a heatmap. In specific, we focus on correlation heatmap squares on perceived ease-of-use and perceived usefulness. We found out that there are significant correlations between the external variables and perceived ease-of-use (r-values ranging 0.276 to 0.725) and perceived usefulness (r-values ranging 0.129 to 0.660). These correlation values were seen to be in deeper purple as the r values are

higher and are paler when the r values are lower. As to significance, we noted that all r values are significant at $p<0.05$.

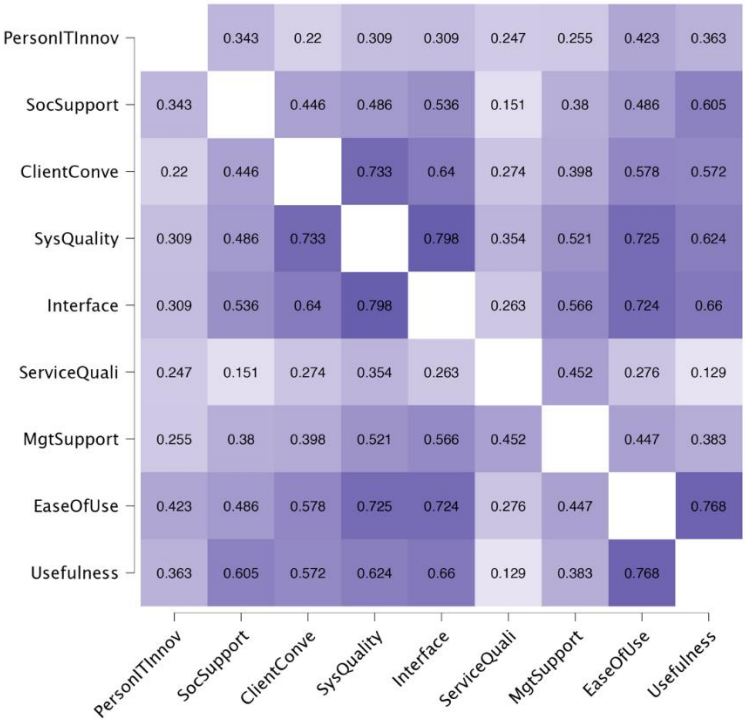

Figure 2. *Correlation heatmap of the variables*

Finally, multiple regression analyses were used to determine causalities among external variables on acceptance of LMS, with the external variables as regressors and perceived ease-of-use (Model 1) and perceived usefulness (Model 2) as the regressands/outcomes. As seen in Table 3, Model 1 reveals that the combination of the external variables in the regression

model is significant, F=83.743, p<0.05. Overall variance based on adjusted R2 is 0.614, which means that the regressors explain 61.4% of the variance of perceived ease-of-use of LMS, while the unaccounted variance can be explained by other factors not included in the study. Of the external variables estimated, three were found to be significant: personal IT innovativeness (B=0.273, t=5.154, p<0.05), system quality (B=0.334, t=5.274, p<0.05), and interface quality (B=0.381, t=5.808, p<0.05).

Table 3. *Multiple regression analysis showing the combined influence of external variables of LMS use among college students on their perceived ease-of-use*

		B	S.E.	β	t	p
1	(Intercept)	-0.460	0.226		-2.038	0.042
	personal IT innovativeness	0.273	0.053	0.184	5.154	< .001
	social support	0.072	0.050	0.058	1.435	0.152
	client convenience	0.045	0.043	0.051	1.054	0.292
	system quality	0.334	0.063	0.333	5.274	< .001
	interface quality	0.381	0.066	0.343	5.808	< .001
	service quality	0.006	0.047	0.005	0.134	0.894
	management support	-0.015	0.049	-0.013	-0.308	0.758

$F = 83.743$, $p<0.05$
$R^2 = 0.622$, $\Delta R^2 = 0.614$

With system quality, personal IT innovativeness, and interface quality being strong predictors of perceived ease-of-use, this means that these factors directly influence how effortlessly students can interact with the LMS, underscoring the importance of a well-designed, intuitive, and reliable system in fostering user satisfaction and subsequent

acceptance (Alshehri, Rutter & Smith, 2020; Lee et al., 2021; Millennial-Oriagbo & Agbenyo, 2023).

As seen in Table 4, Model 2 reveals that the combination of the external variables in the regression model is significant, F=68.055, p<0.05. Overall variance based on adjusted R2 is 0.563, which means that the regressors explain 56.3% of the variance of perceived usefulness of LMS, while the unaccounted variance can be explained by other factors not included in the study. Of the external variables estimated, all were found to be significant, with the exception of management support.

Table 4. *Multiple regression analysis showing the combined influence of external variables of LMS use among college students on their perceived usefulness*

		B	S.E.	β	t	p
2	(Intercept)	-0.107	0.246		-0.435	0.664
	personal IT innovativeness	0.193	0.058	0.127	3.344	< .001
	social support	0.364	0.054	0.287	6.682	< .001
	client convenience	0.148	0.047	0.164	3.166	0.002
	system quality	0.151	0.069	0.147	2.189	0.029
	interface quality	0.316	0.072	0.277	4.403	< .001
	service quality	-0.143	0.051	-0.113	-2.809	0.005
	management support	-0.007	0.053	-0.006	-0.127	0.899

F = 68.055, $p<0.05$
$R^2 = 0.572$, $\Delta R^2 = 0.563$

On the other hand, almost all external variables, except for management support, significantly affected the perceived usefulness of the LMS. This suggests that students recognize the functional benefits of the LMS, such as enhanced learning

efficiency and flexibility, which are crucial in a remote learning environment (Veluvali & Surisetti, 2022).

Meanwhile, the non-significant impact of management support on perceived usefulness indicates a potential gap between institutional support measures and student expectations or needs. This could be an area for further investigation and intervention by educational institutions to align support services more closely with student requirements.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This study, grounded in the Technology Acceptance Model (TAM), explored factors affecting the acceptance of Learning Management Systems (LMS) among college students during the COVID-19 pandemic. Key findings indicate that system quality, personal IT innovativeness, and interface quality are significant predictors of LMS ease-of-use. These elements enhance how effortlessly students can use the LMS, emphasizing the critical role of intuitive and reliable system design in promoting user satisfaction and acceptance. Conversely, all external variables, except management support, significantly influenced the perceived usefulness of the LMS, highlighting the essential nature of the LMS's functional benefits, such as enhanced learning efficiency and flexibility in a remote learning context.

The study also revealed that management support did not significantly affect perceived usefulness, suggesting a misalignment between institutional support and student expectations. This insight points to a potential area for educational institutions to reevaluate and enhance support mechanisms to better meet student needs. Overall, these

insights underscore the necessity for educational institutions to focus on both technical excellence and comprehensive support to foster a more effective and satisfying online learning experience.

Recommendations

When using learning management systems (LMS) in an online learning environment, it is evident from the study's findings that students place a high value on service quality and management support. Therefore, it is recommended that university administrators invest in providing high-quality LMS-related services, such as prompt and helpful technical support, prompt responses to issues, and continuous system maintenance. Moreover, management support, which may include training for faculty to effectively use LMS, clear communication of expectations and responsibilities related to online learning, and student-friendly policies, should be a priority. Focusing on these factors can significantly improve the acceptance and efficacy of online learning platforms.

Moreover, this study demonstrates that external factors such as personal IT innovativeness, system quality, and interface quality have a significant impact on the perceived usability of the LMS, with the exception of management support. Therefore, academics must take into account these factors when designing and implementing online courses. Efforts should be made in particular to provide user-friendly interfaces and high-quality systems to improve the overall user experience. In addition, initiatives aimed at fostering IT innovation among students can bolster their confidence and skill in using the LMS, thereby enhancing its usability.

In light of the findings of this study, it is crucial to acknowledge the significance of personal IT innovation in enhancing the perceived usability of a Learning Management

System (LMS). This primarily refers to the willingness and ability of students to explore and adopt new technologies. Therefore, actively developing their IT skills and remaining curious about new technologies will not only improve their LMS experience, but also better prepare them for the digital demands of contemporary academia and the workforce. Students are also encouraged to provide proactive feedback regarding the system, service, and interface quality of the LMS. Their perspective as a user is invaluable in assisting university administrators and academics to optimize these platforms for the benefit of all. Finally, they are encouraged to take full advantage of the study's top-rated service quality and management support. When they encounter difficulties using the LMS, they should not hesitate to ask for assistance, as these resources are available to assist them.

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