

# TEACHERS' ACCEPTANCE OF LEARNING MANAGEMENT SYSTEM (LMS) DURING TRANSITION TO ONLINE DISTANCE LEARNING: A STRUCTURAL EQUATION MODEL APPROACH

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**Abstract:** The study examined the teachers' acceptance of a Learning Management System (LMS) during the transition to online distance learning (ODL). A confirmatory research design with 250 teachers, using the Technology Acceptance Model (TAM), was investigated with system characteristics (SC), individual differences (ID), and facilitating conditions (FC) as external variables using a Structural Equation Model (SEM). The results showed that teachers have moderate acceptance of the LMS ( $M=5.84$ ;  $SD=1.36$ ) and moderate agreement on all TAM internal variables except for behavioral intention (BI), where there was strong agreement ( $M=6.17$ ;  $SD=1.37$ ). The SEM revealed SC and FC as significant factors and drivers of LMS acceptance, with SC having the strongest influence in terms of establishing perceived ease of use (PEU) ( $P_{PEU,SC}=0.672$ ) and perceived usefulness (PU) ( $P_{PU,SC}=0.402$ ). A significant path coefficient was also observed for overall faculty evaluation (OFE) on actual use (AU) ( $P_{OFE,AU}=0.609$ ), reinforcing that high-quality ODL courses are a function of time and effort by the teachers. On the other hand, a significant negative path coefficient emerged for FC on AU ( $P_{FC,AU}=-0.193$ ), suggesting efficient use of the LMS by the teachers. The model provides teachers and institutions with directions on how to build LMS acceptance further.

**Key Words:** Technology Acceptance, Online Distance Learning, Learning Management System

## 1. INTRODUCTION

Educational institutions continue to transition to online distance learning as a way to ensure teaching and learning continuity. Online distance learning (ODL) is learning that can be done at any time or place, provided learners have access to the internet (Miao, Huang, Liu & Zhuang, 2022). Schools often use an online Learning Management Systems (LMS) platform in their ODL delivery. LMSs are software applications for administering, documenting, tracking, reporting, and delivering educational courses and training programs. As such, selecting and implementing a new LMS is important (Chao, 2008). A strong variable when it comes to ODL effectiveness is users' acceptance of technology

(Rashid, Shukor, Tasir, & Sina, 2021; Kirmizi, 2015). As the designers and facilitators of ODL, teachers' acceptance of the LMS is critical as it, in turn, initiates and promotes learners' utilization of LMS.

This study examined teachers' technology acceptance towards Canvas LMS during the transition to ODL brought on by the lockdown during COVID-19 pandemic. Technology acceptance as learning behavior identifies perceived usefulness and perceived ease of use as necessary components for an individual's attitude, intention, and actual use of an instructional system (Venkatesh & Davis, 2000, as cited by Chuttur, 2009). TAM has been used in various studies looking into the use of LMS (Al-Busaidi & Al-Shihi, 2010; Alharbi & Drew, 2014) and can serve as a technological backbone for effective ODL.

There is a need to further evaluate the impact

of these variables from the vantage point of the teacher's experience in order to find key determinants, and their implications for ODL. The findings of this study can improve understanding regarding the LMS acceptance and therefore of particular interest to teachers and educational planners as they continue to restructure towards ODL.

### *1.1 Online Distance Learning (ODL)*

The COVID-19 pandemic has forced educators to transform their lessons into online versions quickly. Teachers are hard pressed to learn the new platforms. A study conducted by van der Spoel et al. (2020) investigated the comparison of 200 Dutch teachers' perception regarding their online teaching expectations (prior to the transition to remote teaching) and experience (after a month of online teaching) through two surveys. Findings revealed a significant change in the perception of teachers regarding their resolutions to implement technology in their lessons in a post-corona era. Interestingly, teachers' gender and prior experiences with the use of ICT seem to play a small role as there were implications for the professionalization of teachers, such as characteristics of teachers and intentions to implement technology in teaching.

Teacher's perception of online learning is affected by a variety of challenges, including non-authentic interaction and a lack of the spontaneity that in-person teaching provides. Teachers quickly learned to use technological platforms, but interaction through it was not of as high quality teaching delivery. Teachers were also worried about students' progress and failed to recognize students' heavy workload and motivation problems in the way that students described them (Niemi & Kousa, 2020). Simultaneous and multiple exploration on chances of catching up the requirements of online learning both for teachers and students. Two areas of crisis rise to prominence when it comes to online education: digital divides based on disparities in access, skill, and technological features; and the reassertion of neoliberal approaches to education (Schwartzman, 2020).

Important issues highlighted when it comes to the teacher's individual performance in terms of online delivery, key profile and contextual variables. These variables pertain to the teachers' gender and prior OTL experience, the context of the OTL shift, the innovation potential in education, and cultural orientation (Scherer et al., 2021).

### *1.2 Technology Acceptance of LMS*

Scherer et al. (2021) underscored the importance of teacher's adoption to complete the robust learning experience. The ability of teachers to adapt quickly and be adept with the technology is of utmost importance. For teachers, a good starting point for being effective in ODL is to learn to adapt quickly to the use of technology. Technology acceptance as learning behavior identifies perceived usefulness and perceived ease of use as necessary components for an individual's attitude, intention, and actual use of an instructional system (Venkatesh & Davis, 2000, as cited by Chuttur, 2009). TAM has been used in various studies looking into the use of LMS (Al-Busaidi & Al-Shihi, 2010; Alharbi & Drew, 2014). The work of Scherer et al. (2021) using meta-analyses of 114 empirical studies of TAM revealed that outcome variables of behavioral intention, technology use; and external variables of subjective norm, computer self-efficacy, and facilitating conditions were found to successfully predict user behavior and can thus be of interest to all potential users of technology.

The internal component of TAM suggests a wide range of permeating behavioral learning. Since education must continue despite the global crisis of pandemic, educational institutions rapidly resorted to a variety of ways of finding the most effective yet user-friendly online platform for both teachers and students. Al-Busaidi & Al-Shihi (2010) developed a theoretical framework for evaluating instructors' acceptance of LMS based on the TAM. Primary factors include perceived usefulness, which pertains to whether the user finds the instructional system beneficial, and perceived ease of use, which refers to whether the user finds the instructional system non-threatening and user-friendly. Moreover, relevant external variables influence the instructors' acceptance of LMS. Instructor factors include self-efficacy, attitude toward e-learning, teaching style, experience with the use of technology, and personal innovativeness. Organization factors include motivators/demotivators, training, technology alignment, organization support, and technical support. Technology factors include system quality, information quality, and service quality.

### *1.3 Conceptual Framework*

The TAM was the baseline framework that guided the study, with the TAM constructs as the endogenous variables (see Figure 1). Technology acceptance refers to the degree to which a person will use technology, motivated by two main factors: perceived usefulness (whether the user finds the

system beneficial) and perceived ease of use (whether the user finds the system non-threatening and user-friendly). This, in turn, drives attitude towards, behavioral intention, and actual use of the technology.

Venkatesh and Bala (2008) mentioned different determinants of perceived usefulness and ease of use. For the study, individual differences, system characteristics, and facilitating conditions served as the exogenous variables. Individual difference variables included were demographics, namely teacher age, prior experience, and resources for online instruction. System characteristics are accessibility and features that help individuals develop favorable (or unfavorable) perceptions of LMS. Facilitating conditions represent organizational support that facilitates the use of technology.

For the study, LMS data analytics represented actual usage. Specifically, two measures were utilized to approximate the teacher activity: page views (based on requests to the LMS server) and participation (which collectively describe events where a user takes an action within a course).

The current study also extends the model by looking at the effect of TAM on faculty evaluation, which is also an endogenous variable. Faculty evaluation refers to the overall rating of the online students to their teachers based on the university's end-of-term evaluation tool.

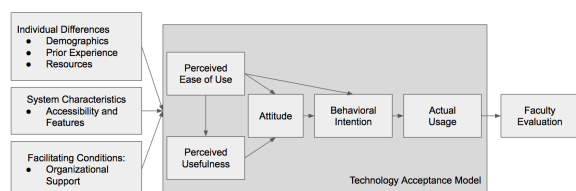


Fig 1. The external variables and their hypothesized relationship with TAM

### 1.4 Purpose of the Study

This study examined the teachers' acceptance of LMS during the transition to ODL delivery. Specifically, it aimed to answer the following questions:

- (1) What are the teachers' acceptance of the LMS?
- (2) How are teachers' acceptance of LMS influenced by individual differences, system characteristics, and facilitating conditions? and
- (3) How do teachers' acceptance of LMS influence their faculty evaluation?

## 2. METHODOLOGY

### 2.1 Research Design and Participants

A confirmatory study research design was used to describe teachers' acceptance of the LMS using the Technology Acceptance Model (TAM) (McBee & Field, 2017). Quantitative data consisted of teachers' TAM ratings. The 250 participants of the study that were ODL teachers, and did not include department chairs. This is to ensure that participants only have experience with the course-level tools available in the LMS and no experience with the administrative tools in the LMS. Convenience sampling was employed in the study. Since all courses were delivered online, teachers had to use the LMS and were automatically the study's targeted respondents. In this regard, data were readily available based on whoever is willing to respond to the given survey (Baxter et al., 2015). Teachers both in basic education and higher education at the time were prompted to respond to a survey in the LMS upon login. Responses from teachers who answered the survey and signed their consent to participate became part of the study. There were 129 female (51.6%) and 121 (48.4%) male respondents with 88 (35.2%) over 50 years old. The majority are handling higher education students (84.4%). There is a good mix of part-time and full-time teachers. In terms of length of use of LMS, the majority had one to three years (37.2%) or less than a year (26.8%) experience. Participants expressed that the quality of their internet connection is just enough for their LMS needs (68.0%) or fast (22.0%).

### 2.2 Instrumentation

The study utilized a teacher questionnaire containing three different sections. Section one sought the informed consent of the participants and only upon agreement that participants proceed in answering the entire questionnaire. Section two included questions on the participants' demographic profiles. The third section contains statements about the TAM adapted from the questionnaire of Alharbi and Drew (2014). It is a 29-item 7-point Likert response scale where 1: Strongly disagree up to 7: Strongly agree, which measures the PEU, PU, ATU, and BI dimensions of the TAM, as well as external variables of FC and SC. Table 1 outlines the Measurement Component of the TAM.

Another source of data for the study is the LMS analytics reports. Specifically, the User Access Reports show all the activity from users enrolled in a given course or all courses in a given term. The times

viewed and times participated in their courses which served as a measure of their actual use of the LMS. Finally, the end-of-term student faculty ratings were requested, which served as the measure for faculty evaluation. Mean ratings from 1 - hardly to 5 - Always were retrieved for the six (6) components, namely assessment, course design and organization, engagement, facilitation/instruction, learning outcomes, and student feedback.

Table 1. Measurement Component of the Technology Acceptance

	Reliability		Validity
	$\alpha$	CR	AVE
PEU	0.901	0.925	0.652
PU	0.956	0.957	0.787
ATU	0.940	0.940	0.838
BI	0.901	0.902	0.697
FC	0.847	0.851	0.655
SC	0.885	0.886	0.565

Note: *PEU=Perceived Ease of Use; PU=Perceived Usefulness; ATU=Attitude Toward Use; BI=Behavioral Intentions; FC=Facilitating Conditions; SC=System Characteristics*

### 2.3 Data Collection and Analysis

Upon approval of the University Research Ethics Office, the teacher questionnaire was converted into a digital format using Google Forms. This was then disseminated through the LMS global announcement feature. To participate in the survey, teachers approved the consent form and proceeded to answer an online questionnaire that took approximately 15-20 minutes to answer. The data collection took two months to capture the teachers' experience during the transition to full online delivery. The LMS analytics (User Access Reports) were also extracted through the LMS Admin Reports dashboard at the end of this period.

The resulting CSV files were then subjected to Microsoft Access to consolidate the times viewed and participated. The data from each respondent were evaluated for completeness based on a set of criteria that were necessary to perform the intended

statistical analyses.

Descriptive statistics (mean and mode) were computed for the demographic profile and TAM components. For the LMS analytics, the total views and participation were computed. The overall mean for faculty evaluation was also computed. Afterward, the structural equation model (SEM) was used to determine significant multiple interrelationships existing among variables found in the multidimensional structure of TAM, the external factors, and faculty evaluation. SEM is a powerful tool that enables the researchers to test the entire theory considering all possible information in examining a series of dependence and interdependence relationships simultaneously (Hair et al., 2010).

## 3. RESULTS AND DISCUSSION

### 3.1 Teachers' Acceptance of the LMS

Teachers expressed moderate agreement on all of the TAM internal variables, except for BI on the use of the LMS, which had a strong agreement ( $M=6.17$ ;  $SD=1.37$ ). Together, this led to an overall moderate acceptance of the LMS during the transition to ODL ( $M=5.84$ ;  $SD=1.36$ ).

All items under PEU had a mode distribution of leaning towards moderately agree ( $Mo = 6$ ). However there is a slight discrepancy for the item "I feel my ability to determine LMS ease of use is limited by my lack of experience" as the mean suggests they only have a slight agreement ( $M=4.74$ ;  $SD=1.83$ ). There were few respondents who strongly disagreed with the statement (17 out of 250). This indicates that teachers who responded negatively slightly affected the mean response in this item.

Under PU, all items were rated as moderately agree based on the mean. Moreover, the highest rated items had a mode distribution of leaning towards strongly agree ( $Mo = 7$ ), namely "I find LMS useful in my job" ( $M=5.98$ ;  $SD=1.44$ ), "Using LMS made it easier to do my job" ( $M=5.67$ ;  $SD=1.54$ ), and "Using LMS increased my productivity" ( $M=5.65$ ;  $SD=1.51$ ).

Likewise, all items under ATT and BI were rated as moderately agree based on the mean and had a mode distribution of leaning towards strongly agree ( $Mo = 7$ ).



### 3.2 Actual Usage of the LMS

On average, teachers viewed the LMS facility 8,271.39 times and participated 789.57 times on the average in an academic term. It is also important to note the high standard deviation for both activities indicating a large variation in the analytics data among the teachers.

### 3.3 External Variables to TAM

Overall, teachers expressed moderate agreement on the external variables of SC (M=5.62; SD=1.27) and FC (M=5.68; SD=1.39). Moreover, all items under SC and FC were rated as moderately agree based on the mean. Similarly, all items in SC had a mode distribution leaning towards moderately agree (Mo = 6), while all items in FC had a mode distribution leaning towards strongly agree (Mo = 7).

### 3.4 Structural Equation Model for Teachers' Acceptance of LMS

Figure 2 illustrates the initial research model for the study. It reflects the seventeen (17) hypotheses based on the framework, wherein each of the external variables posited as relating to the TAM, particularly to PEU and PU (H1 to H10), the established TAM relationship (H11 to H16), and TAM in relation to overall faculty evaluation (H17).

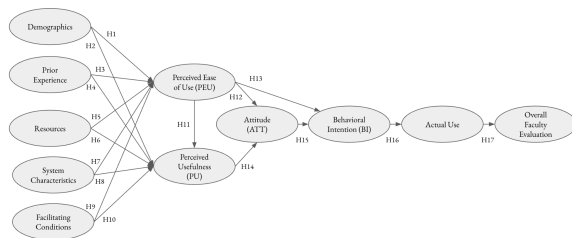


Fig. 2. Initial Research Model

Based on the structural component, out of the initial 17 hypotheses tested, only nine (9) were found to be supported by the model. Mainly, hypotheses under individual differences (H1 to H6) were not supported. This means that the data in the study do not support the hypotheses that ID variables of

demographic profile, prior experience, and resources influence PEU and PU.

As such, an alternative model was explored, taking out the external ID variables that were not supported in the initial research model. The alternative research model tested the remaining 11 hypotheses together. Based on the structural component, all 11 hypotheses were found to be supported by the alternative model, with overall faculty evaluation having a significant positive path coefficient on AU instead. Moreover, a significant negative path coefficient emerged for FC on AU.

Results of the model comparison between the research and alternative models using the Akaike Information Criterion (AIC) and Expected Cross-Validation Index (ECVI) are summarized in Table 2. The alternative model yields lower values for both AIC and ECVI, indicating that the data better fit the alternative model.

Table 2. Model Comparison/ Goodness of Fit

Index	Research Model (Model 1)	Alternative Model (Model 2)
AIC	936.436	722.96
ECVI	3.761	2.903

Figure 3 illustrates the Alternative Model for the study. The SEM results support the TAM. Additionally, it shows significant path coefficients among the external variables and TAM. This indicates that SC and FC influence the PEU and PU. That is, teachers with higher ratings for these external variables also have higher PEU and PU of the LMS. The SEM results also show that holding other predictors constant, the System Characteristics (SC) of the LMS have the biggest influence on PEU ( $P_{PEU,SC}=.672$ ) and PU ( $P_{PU,SC}=.402$ ) for acceptance of the LMS.

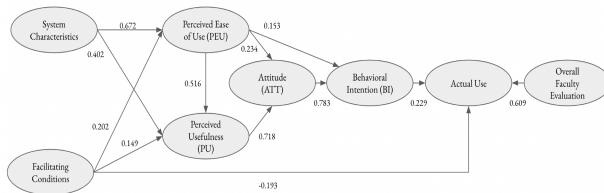


Fig. 3. Alternative Model for Acceptance of LMS

### *3.5 System Characteristics as Primary Drivers of LMS Acceptance During Transition to ODL*

The resulting LMS acceptance model of the current study is not far from the established TAM, indicating the applicability of the model for examining LMS acceptance during the transition to ODL. SC and FC were the drivers of LMS acceptance, with SC as the primary driver having the biggest influence on PU and PEU. Several past studies showed similar findings that FC, such as technical support, training, and administrative support affecting technology use (Waheed, 2010; Al-Busaidi & Al-Shihi, 2010); and SC, such as system reliability, accessibility, functionality, interactivity, and response (Al-Busaidi & Al-Shihi, 2010) were significant for e-learning acceptance.

On the other hand, the result that ID variables do not support PEU and PU suggests that LMS acceptance is not influenced by teachers' demographic profiles, prior experience, and resources. This is similar to the study of Buana & Linarti (2021), wherein instructor characteristics also had no significant relationship with perceived usefulness. However, previous studies also found the opposite, with Individual differences hypothesized to moderate the effects of TAM constructs on BI and technology use (Tarhini., Elyas, Akour, & Al-Salti, 2016).

### *3.5 Efficient Actual Use of LMS*

This research uncovered a nuance on teachers' LMS acceptance during the transition to ODL, with the emergence of a significant negative path coefficient for FC on AU. FC refers to LMS training and support availability, while AU refers to times viewed and participated in the LMS. This

means that an increase in the provision of LMS training and support led to decreased teachers' actual use of the LMS. A possible explanation of this is that the effectiveness of such LMS training and support enabled the teachers to accomplish their LMS tasks more efficiently (i.e. leading to fewer clicks and participation analytics). During the transition to ODL, the office in charge of LMS implementation rolled out increased training and support materials for teachers in various forms, including LMS interface prompting. A similar finding was found in the study of Utami (2021), where the effect of training and support weakens the relationship between the perceived ease of use of technology and the behavioral intention to use technology.

### *3.5 High-Quality Courses Reflected as Actual Use of LMS*

It was initially hypothesized that AU influences overall faculty evaluation. Instead, the results of the current study indicated that overall faculty evaluation had a significant positive path coefficient on AU. The ODL faculty evaluation covered dimensions such as learning outcomes, course design and organization, engagement, facilitation, student feedback, and assessment. This suggests that teachers who had higher ratings from their students in these dimensions had more views and participation in the LMS. The results reinforce that high-quality ODL courses are a function of time and effort by the teachers in design and delivery, echoing faculty online teaching best practices mentioned by Martin, Ritzhaupt, Kumar and Budhrani (2019) such as systematic design process, timely response and feedback, availability, and presence.

## **4. CONCLUSIONS**

This study looked into the LMS acceptance of teachers during the transition to ODL, revealing SC and FC as drivers of acceptance. As such, efforts to promote LMS acceptance must focus on the SC and FC variables. Specifically, as SC had the biggest influence on PEU and PU, LMS acceptance should be driven by ensuring accessible, reliable, and safe access to the LMS and improving mobile learning and customization features. Moreover, as faculty

evaluation influences AU, it is recommended that institutions continue to build the capacity of teachers in online instructional design and delivery, as this will be beneficial not just in ODL but also in blended and hybrid learning modalities.

Several limitations in the current study can be addressed in future research. As the respondents are from one institution in the Philippines that uses the same LMS, the generalizability of the results may be influenced. Thus, there is a need to validate the model in other settings. Moreover, as the majority of the participants are HEI teachers, balancing this with basic education respondents may possibly yield different results. As there were no ID variables (e.g. demographic profile, prior experience, and resources) that supported PEU and PU, other ID variables can be examined, such as their teaching style and computer efficacy. Likewise, other outcomes aside from overall faculty evaluation can be examined as relating to TAM, such as their well-being and student satisfaction.

## 5. ACKNOWLEDGMENTS

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