Adoption of Academic Staff to use the Learning Management System (LMS): Applying Extended Technology Acceptance Model (TAM2) for Jordanian Universities

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Article Info	Abstract
	Starting from March of 2020, the outbreak of the COVID-19 caused Jordanian universities to close their campuses and forced them to initiate online teaching. Learning management system (LMS) is an important tool and suitable as tool for learning and activities in a higher education. However, each university has a different LMS tool that allows users to use it in their activities. This paper is interested in investigating the acceptance of Jordanian academic staff in using an LMS after getting back to work post the COVID-19 period. The study sample consisted of 500 faculty members of different ranks, selected randomly from all Jordanian universities, for the second semester of the academic year 2020-2021. The Technology Acceptance Model (TAM2) has been adopted to identify the Acceptance and use of LMS. The questionnaire developed by the researcher was based on past research studies. Simple linear regression was used to calculate the relationships between factors. The research results presented that there is a statistically positive effect of Perceived Usefulness(PU), Perceived Ease of Use (PEOU) and Subjective Norm(SN) on adoption to use LMS, and Perceived Ease of Use(PEOU), lecturers' Image(LI), Subjective Norm(SN), Job Relevance(JR), and, Result Demonstrability(RD) Output Quality(OQ) on Perceived Usefulness(PU). This study indicates that we must always conduct workshops and training programs related to learning management systems and computers to enhance the usability of learning management systems among faculty members.

Introduction

In general the higher education sector has been significantly affected by the coronavirus disease (COVID-19), which has conducted to the unexpected closure of universities (Hale et al. 2020; Flaxman et al. 2020). Jordan was no exception to this impact, as the Minister of Higher Education announced the early closure of universities on March 18, 2020 (Ministry of Higher Education, 2020), which was necessary to protect the general student population from the pandemic. The indefinite closure along with the desire to save the school year has necessitated the need to explore the development of alternative methods of teaching and learning.

The impact of growth and development in information and communication technology on the education sector

in general and higher education in particular, as it affected teaching and learning methods (Priya, Elayampalayam & Nadu 2018; Jere 2020). As a result of this development, the concept of e-learning emerged (Al-Samarraie et al. 2018; Ting, Smith & Gomez 2018). Over the years, university students have become more knowledgeable and tech-savvy and spend a lot of time Online for social purposes in addition to educational (Azhar, Kim & Salman 2018; Jere, 2020). As a result of the COVID-19 pandemic, a new model in education has been adopted that depends on educating students in their places and from a distance (Baltodano & Gomez-Zermeno 2017, Jere, 2020).

The higher education sector has witnessed a rapid and remarkable change as a result of the growth and development in information and communication technology (ICT) (Singh 2017; Jere 2020). As a result of the continuous changes, a new model of education has emerged, known as e-learning (Ting, Smith & Gomez 2018). As a result of university students spending a lot of time on the Internet, they have become smarter and technologically advanced (Azhar, Kim & Salman 2018; Mládková 2017; Jere, 2020; Öztürk, 2023). With the advent of the Corona pandemic and the use of technology in education and teaching students remotely to achieve educational goals as much as possible, led universities in the world to adopt distance learning (Jerry, 2020).

Faculty members and students are the main element in the implementation of e-learning, and the success of E-learning on the faculty member because it is the first guide in education (Rogers, 2010). As a result, the adoption of e-learning techniques depends on the acceptance of faculty members, which is they have an impact on students' acceptance of these technologies (Tarhini et al. 2017). One of the factors for the success of e-learning is the knowledge and understanding of the faculty member and his adoption of these technologies (Xhaferi & Bahiti, 2018; Opoku, Pobee & Okyireh 2020).

Proceeding from the Jordanian government's vision (2025), which focuses on "making Jordan a gateway to the region in the fields of information technology, communications and e-commerce, and transforming Jordan into an information society that has all the capabilities and capabilities it requires. Challenges of the global knowledge economy." The Jordanian Ministry of Higher Education has developed an executive action plan to integrate e-learning in an integrated and e-learning manner (2021-2023) in Jordanian higher education institutions. Improving the quality of education in it and ensuring the desired shift in the performance of higher education institutions and the quality of their outputs in line with global developments in this field. Therefore, in Jordan, higher education institutions have adopted a learning management system in the educational process, and they are adopting a mixture of face-to-face and online learning which is commonly mentioned to as blended learning. Several researchers consider that blended learning is the best educational model for the future (Alkhateeb & Abdalla, 2020; Abbad, 2021).

Despite the advantages of the learning management system in the education process, its capabilities have not been used to support the learning process (Álvarez, et al., 2013). To date, however, only 55% of courses at the university are offered through the system. The results of Azlim et al., (2014) show low percentages of LMS use from teachers even though they have a positive perception towards the potential of LMS to enhance the teaching

and learning process. Besides, the study also found that teachers were not much exposed to the use of tools in LMS. In addition, the results of the García-Murillo et al. (2020) that Moodle gave users a high degree of technology satisfaction. In his study, AlQudah, (2014) confirmed that 18.8% of teachers find it easy to download study materials for students on Moodle, compared to 27.5% who think that this is not easy, and 27.5% cannot determine whether it is easy or not to download the materials.

At the present time, most Jordanian universities implement learning management systems in teaching at all university levels through many platforms such as the Moodle platform, which is a platform used in Jordan and the rest of the world. According to Al Amoush and Sandhu, (2017), however, point that several obstacles to successful IT implementation are the lack of knowledge and the user's deep understanding of IT applications. In addition, the existence of consistent security among Jordanian Universities (Al-Bakri, 2013). Al-Shboul (2013) found that one of the most difficulties related to the application of e-learning is the lack of sufficient time to learn and use new tools, lack of training and provision of new systems, in addition to the lack of institutional support. Bataineh et al., (2021) study confirmed that most students in Jordanian universities are not satisfied with distance learning due to the difficulties they encountered, such as designing electronic content, communication and internet speed.

Many previous studies (Opoku, Pobee, & Okyireh, 2020; Sulaiman et al., 2019) emphasized the assessment of behavior by relying on the technology acceptance model(TAM). Although TAM contributes understanding ease of use to and the impact of learning management system management on the faculty member's intention to use, it has not yet identified user factors, so ta TAM2 has been suggested (Chuttur, 2009; Sulaiman et al., 2019). Additionally, studies on TAM2 adoption in Jordan are still limited.

The LMS has been widely accredited in institutions of higher education internationally (Dahlstrom, et al., 2014). Jordan is no exception. In the context of Jordan, the majority of Jordanian universities (97%) have adopted a learning management system where Moodle is the dominant system, and the teacher can upload course descriptions, materials, assignments, course news, and tests online. A student can use many features in LMS as announcements, download e-material, assignments, online exams (Aljuhney & Murray, 2016; Abbad, 2021). However, the use of the learning management system in Jordan is minimal (Alsaid, 2016; Alharbi & Drew, 2014). Several studies have also concluded that Jordanian lecturers use e-learning systems ineffectively (Kim & Park, 2018; Al-Adwan et al., 2018; Abbad, 2021), and therefore, the main objective of this study is to explore the factors that influence the accreditation of faculty members based on TAM2.

Literature Review

The Theoretical Model

According to Ajzen and Fishbein (1975), Reasonable action theory (TRA) clarifies the investigation of human behavior. The theory of planned behavior (TPB) gets from the TRA and includes awareness factors to control behavior to develop behavioral prediction (Ajzen, 1985). Davis (1989) introduced a TRA and TPB based TAM model with two factors of perceived usefulness (PU) and perceived ease of use (PEOU). TAM is used only to

accept computer technologies, and its model provides insight into predicting methodological characteristics that influence the behavior and attitude of using systems. TAM is a global model that a number of scientists have applied and developed for a long time. Venkatesh and Davies (2000) suggested extended technology acceptance model (TAM2 dependent on technology acceptance model (TAM). According to Al-Fraihat et al.)2020), the extended technology acceptance model (TAM2), was introduced depending on the original TAM by Venkatesh and Davis (2000), which extended the original model by adding a subjective norm, voluntariness, experience, image, job relevance, output quality, and result demonstrability. Güllü et al. (2016) emphasize that TAM2 demonstrated better user acceptance than TAM. TAM2 model is presented in Figure 1.
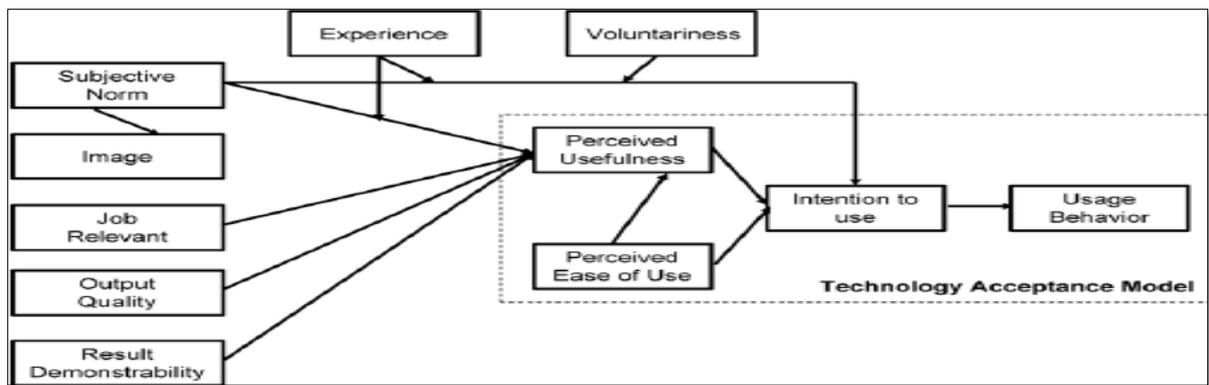
Figure 1. Technology Acceptance Model (TAM2)

The theoretical model used in this study is based on the TAM2 model involved Perceived Usefulness, Perceived Ease of Use, Adoption to Use, Subjective Norm, Lecturer's Image, Job Relevance, Output Quality, and Result Demonstrability, the theoretical model are presented in Figure 2.
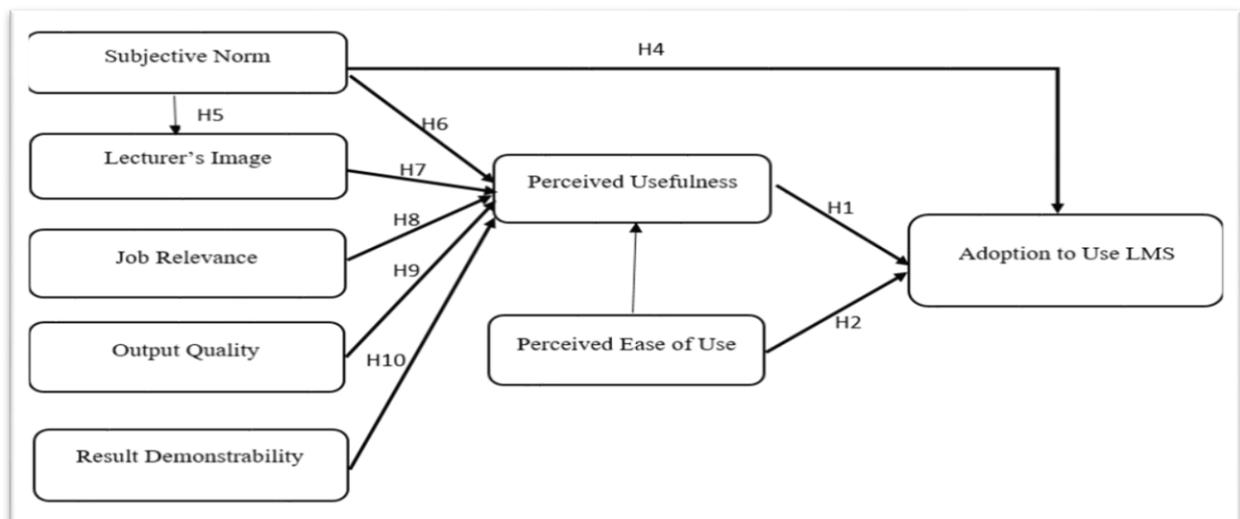

Figure 2. Theoretical Model

Based on the previous studies referred to in table 1, Definitions of TAM2 constructs were defined.

Table 1. Definitions of Constructs

Construct	Definition	Reference
Subjective norm	"Influence of people in one's social environment on his behavioral intention"	Davis (1989)
Voluntariness	"Degree to which use of the innovation is perceived to be voluntary or of free will the extent to which potential adopters perceive the adoption decision to be non-mandator"	Moore and Benbasat(1991)
image	"Degree to which the use of the innovation is seen as enhancing to an individual's image or social status belief of a group important to an individual that a certain behavior should be implemented and implementation of this behavior by the individual can persistently enhance the quality of internal works of the organization"	Venkatesh (2000)
Job relevance	"An individual's perception regarding the degree to which the target system is applicable to his or her job"	Moore and Benbasat (1991
Output quality	"Degree to which one thinks that a new system can perform required task"	Moore and Benbasat (1991)
Result demonstrability	"Tangibility of the results of using the innovation"	Moore and Benbasat (1991)

Venkatesh and Davies (2000) reported that perceived usefulness (PU) is based on intentions of use in several TAM studies. It is important to understand the determinants of perceived usefulness construction because they drive usage intentions and how these determinants affect changes over time, as system use increases. Although the original TAM model was based on the determinants of perceived usability, the determinants of perceived utility enabled organizations to design organizational interventions that would increase user acceptance and use of new systems. For this reason, Venkatesh and Davis (2000) conducted a study published in 2000 to expand the TAM that examined how perceived interest and use structures change as the information system (IS) continues to be used.

Many previous studies have shown that ease of use is directly or indirectly related to the adoption of use, through its effect on the perceived usefulness (PU) (Davis, Bagozzi, & Warshaw, 1989). If the faculty member knows that using the learning management system will require fewer effort, he will consider it beneficial and will use it in the class more than usual. From previous studies, the current study found that perceived usefulness (PU) and ease of use (PEOU) are indicators that lead to the adoption and use of the learning management system in classes (Segars & Grover, 1998). Consequently, the hypotheses are proposed as follow:

H1: Perceived Usefulness (PE) will have a positive influence on academic staff's Behavioral Intention to use learning management system (LMS).

H2: Perceived Ease of Use (PEOU) will have a positive influence on academic staff's Behavioral Intention to use the learning management system (LMS).

H3: Perceived Ease of Use (PEOU) will have a positive influence on academic staff's Perceived Usefulness of learning management system (LMS).

Subjective norm is defined as a person's awareness that most significant people believe that they should or should not perform the behavior in a state. According to Taylor & Todd (1995) Subjective criteria effect the intent to use the system, whether a person loves it. Subjective norm has a significant effect on behavioral intention. It has been found that the beliefs of people who use new and original technology are measured to strengthen the personality's position in the social system. The concept of the image refers to the knowledge of an individual's group of influential people that a certain behavior must be carried out because by performing an action, that individual can constantly improve the quality of his internal work in the organization (Blau, 2017). If personalities carry out the actions likely by the group standards, then the performance of the whole group can also be developed; consequently, individuals can get the sustenance of the whole group and society (Pfeffer, 1982).

Based on Kim et al, (2021) study, shown that personal criterion significantly affected the perceived usefulness (PU) and ease of use (PEOU) detected in the group of faculty members. Therefore, we can increase the acceptance of the LMS by support it. Personal standard positively affects faculty adoption of the learning management system. The use of LMS in learning is applied at the department, college or university level; hence, other faculty using the system will affect the adoption of the individual, as well as positively influence the image of the lecturers. In the universities, faculty may consider LMS as a means Useful for use in the lecture if people who are important to faculty members such as colleagues, dean, vice dean or students believe that LMS is necessary to improve performance, increase interaction with students, and to overcome epidemiological difficulties (Zadeh, 2014; Cigdem & Topcu, 2015). Therefore, the research put forward the hypotheses:

H4: Subjective Norm (SN) will have a positive influence on academic staff's Behavioral Intention of using the learning management system (LMS).

H5: Subjective Norm (SN) will have a positive influence on academic staff's Image of the learning management system (LMS).

H6: Subjective Norm (SN) will have a positive influence on academic staff's Perceived Usefulness of the learning management system (LMS).

H7: The academic staff Image (IMG) will have a positive influence on academic staff's Perceived

Usefulness of the learning management system (LMS).

Job relevance is a concept in TAM2 that is a critical component in the process of evaluating the effectiveness of using a particular system in education and was defined by Moore and Benbasat (1991) as the individual's perception of the degree to which the target system applies to his or her job. Based on (Kieras & Polson, 1985; Polson, 1987), it is shown that it has a direct effect on the perceived usefulness The individual's perception of the degree to which the target system applies to his or her job. If a learning management system is used in teaching, it will improve the effectiveness of teaching and teachers, and it is a system designed for educational purposes, in addition to enhancing interaction in case the communication is not direct. Thus, the following hypotheses are proposed:

H8: Job relevance (JR) will have a positive influence on the perceived usefulness (PU) of LMS

Moore and Benbasat (1991) defined Output quality as "The degree to which one thinks that a new system can perform the required task". The study of (Davis, Bagozzi, & Warshaw ,1992) showed that the Output quality (OQ) has a positive relationship with perceived usefulness (PU). If users are satisfied with the service provided by the LMS, they will tend to consider the system useful, lecturers' use of the system will facilitate interaction with students and thus improve the quality of education, and lecturers will evaluate the LMS as useful. Therefore, the study proposed the hypothesis:

H9: Output quality (OQ) will have a positive influence on the perceived usefulness (PU) of LMS

According to Moore and Benbasat (1991), Result Demonstrability is defined as "The tangibility of the results of using the innovation" from this definition the Users of the LMS will view the system positively if the output is positive, The easier it is to see the benefits that an LMS can provide, the more useful this LMS will be. In addition, one of the advantages of the system is that a faculty member can present lectures and assignments, follow up on student assessments, and archive their grades. Consequently, the study proposes the following hypotheses:

H10: Result Demonstrability (RD) will have a positive influence on the perceived usefulness (PU) of LMS.

Research Methodology
Participants

The participants in this research are faculty members from different departments of colleges, who use the learning management system in Jordanian universities at all Jordanian universities.

Data Collection

A quantitative approach was used to collect data in this research using a survey questionnaire. The data was collected during the second semester 2020/2021 by distributing electronic questionnaires to faculty members in all Jordanian universities via social media groups and their emails. 500 questionnaires were retrieved and used for quantitative analysis.

Males are distributed about 60.8% and females 39.2%. The academic position consists of: assistant professor (54.4%), associate professor (20.6%), instructor (15.4%), and professor (9.6%). The table below gives a clear description of the participants in this study.

Table 2. Participants

Classification	Frequency	Percentage %
Gender		
Male	304	60.8%
Female	196	39.2%
Total	500	100%
Academic Position		
Professor	48	9.6%
Associate professor	103	20.6%
Assistant professor	272	54.4%
Instructor	77	15.4%
Total	500	100%

Instrument

The instrument used for this study includes two parts:

  The first one includes the academic member demographic information: Gender, experience with learning management systems, university, faculty academic rank and type of the learning management system.

  The second part includes eight concepts of TAM2: Intention to Use (ATU), Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Subjective Norm (SN), Lecturer's Image (LI), Job Relevance (JR), Output Quality (OQ), Result Demonstrability (RD).the factor items which were adapted from Venkatesh and Davis (2000).

SPSS 21 was used to analyze data, where a five-point Likert scale was used to measure the instrument's items, ranging from "1" indicating "strongly disagree" to "5" indicating "strongly agree". Five experts checked validity. The experts comprised three educational technology professors and two Arabic language professors. According to the result of Cronbach's Alpha, the questionnaire reliability, which measured .861, was considered high.

Result and Discussions

Ten hypotheses were developed supported the initial TAM2 model developed by Vankentesk & Davis (2000). Every hypothesis was tested for significance and regression statistics were supported. Table 2 provides an outline of the regression information for each hypothesis. Larger beta values were validated for larger t-values and smaller p-values across all hypotheses. The table is followed by an in-depth discussion of each hypothesis.

Table 3. Hypotheses Regression Statistics

Hypothesis		t	P	Beta	R	R^2	Hypothesis supported
H1	PU→ATU	6.39	.000	.738	.82	.67	Yes
H2	PEOU→ATU	3.65	.000	. 821	.73	.54	Yes
H3	PEOU→PU	1.78	.000	.807	.80	.65	Yes
H4	SN→ATU	3.53	.000	.721	.72	.52	Yes
H5	SN→LI	3.87	.000	.713	.73	.50	Yes
H6	SN→PU	10.8	.000	.522	.52	.22	Yes
H7	LI→PU	7.51	.000	.482	.48	.23	Yes
H8	JR→PU	4.57	.000	.480	.48	.23	Yes
H9	OQ→PU	4.57	.000	.495	.49	.24	Yes
H10	RD→PU	4.32	.000	.455	.44	.23	Yes

In Table (3), the p-value is less than 0.05, these values archived significantly. The study results contributed to the evaluation of TAM2 a positive contribution when adopting the learning management system in Jordanian universities. The research presented the following conclusions:

All hypotheses in this study are accepted confidence. Study shows that perceiving usefulness (PU) has a positive effect on Behavioral Intention of using the learning management system (Beta =0. 738, p = 0.00). This result is consistent with results (Fathema & Sutton, 2013). Using the learning management system in class will get several profits to the faculty, leading to the intent to use it in the future or continue to use the LMS. Furthermore, the perceived ease of use (PEOU) has an impact on the acceptance of LMS for academic staff in universities (Beta =0,821, p = 0.00). The most prominent challenges faced by faculty members is the transition to technology, especially in serious and emergency situations as the Corona pandemic In the event that faculty members who did not use the system consider that ease of use is important for using the LMS.

In addition, ease of use is also a positive introduction to the faculty's perception of the usefulness of the learning management system (beta = 0.807, p = 0.000). This study result correspond and supports the study's conclusion of Busbahi and Razjan (2015) and Al-Fraihat et al. (2020), and is considered by the lecturers as a useful characteristic of the system. Subjective norm is a direct determinant of behavioral intention and also an essential component of TAM2 (Ajzen, 1985; Ajzen & Fishbein, 1975; Cigdem & Topcu, 2015; Venkatesh & Davis, 2000; Kim et al., 2021). The hypotheses concerning the subjective norm including H4, H5, and H6 are accepted.

The subjective norm positively affects the lecturers' image (beta = 0.713; p = 0.000). It can be concluded in universities that important people to a faculty member as dean, deputy dean, colleagues, and students who believe that the system is necessary to increase interaction with students, improve performance, and overcome difficulties, so lecturers consider it a useful method to use in the lecture (Zadeh, 2014; Cigdem & Topcu, 2015). The result of (Venter, van Rensburg, & Davis, 2012) which identifies TAM2 factors that influence the perceived

usefulness (PU) of system users was also confirmed the experimental results of this study with the hypotheses H6, H7, H8, H9, and H10. In particular, the subjective criterion is the most positive effect on the perceived usefulness (PU) of the learning management system (beta = 0.522, p = 0.000), then output quality (beta = 0.595, p = 0.000), lecturer's image (beta = 0.482, p = 0.000), job relevance (beta = 0.480, p = 0.000), and lastly the result demonstrability (beta = 0.455, p = 0.000).

Learning management system is only beneficial when using the system to achieves the quality of the output as well as the possibility of demonstrating the result in the lecturers teaching process. Online lecture will become more difficult if there isn't interaction between teacher and students. Consequently, learning management system supports teachers to develop the teaching quality, beside the better work together with the online classroom by assignments, tests, presentations, online student registration, homework, or student test storage. The Learning Management System exclusively is planned and established for education and training, Hence, applying the Learning management system (LMS) in the lecture is an activity related to the process of teaching, and it also improve the perfect image of the students, instructors, and colleagues.

Conclusion

Technological development has transformed many areas of life, including education and university education. Technology adoption has become essential for students. Moreover, unforeseen events, such as COVID-19 that occurred, make universities have to choose students to stay at home for an extended period, or learn online. Consequently, Lecturers will play an essential role in the process of acceptance and adopting technology in education. Based on the results of this research, it confirmed that extended technology acceptance model (TAM2) is in the context of adopting the learning management system in Jordanian universities, the positive relationship between all the factors in the study model was shown. Therefore, to enhance the lecturers' dependence on the use of the learning management system in the lecture, this study suggests some management implications. First, universities must to construct a user-friendly LMS system, conduct training workshops, create introductory manuals on how to use the system and add specialists about the system to inquire and deal with problems and situations during use. Furthermore, create regulations standers for the use of a learning management system when teaching to improve the usefulness of the system. There are strong standards for evaluating the outputs quality after the teacher accreditation, i.e. comparing the results of the students and the student satisfaction survey before and after use the LMS. Despite many hard work, there are still some limitations in this study, first, it was applied only to the extended technology acceptance model (TAM2) model to verify that the academic staff accepts the use of the LMS. This context did not fully explain the principles that led to the adoption of the system. Thus, other studies may combine extended technology acceptance model (TAM2) with Planned Behavior Theory (TPB), TAM2 with Unified Technology Acceptance and Use Theory (UTAUT), extended technology acceptance model (TAM2) and Innovation Diffusion Theory (IDT). Secondly, the topics evaluated in this study are just an endorsement of using the Moodle system, so that future research can extend distance learning, which uses synchronous learning such as Microsoft, Google Meet, Zoom, Simultaneously with using LMS for teaching in order to achieve more meaningful and complete results.

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