Instructors' and students' perspectives on Moodle's effectiveness as a Learning Management System

Narmin Mohammed NOORI[1], Awaz Naaman SALEEM[2]

[1] Computer Education Department, Faculty of Education,
Tishk International University, Erbil, Iraq

[2] Information Technology Department, Duhok Polytechnic University, Duhok, Iraq

narmin.mohammed@tiu.edu.iq, awaz.saleem@dpu.edu.krd

Abstract: *Learning Management System (LMS) has recently gained significant popularity. Modern learning is scientifically based and has adapted the education and learning systems accordingly. Today, the Moodle LMS platform, the most widely used in the learning process, positively impacts the learning system. As a result, the platform is utilized in both developed and developing countries. Therefore, understanding the factors affecting Moodle LMS usage is crucial. This study focuses on exploring students' and instructors' perceptions and viewpoints regarding the success of Moodle LMS in e-learning. Questionnaires were distributed to universities in Iraq that use Moodle, as well as to Near East University. The data was collected from 416 voluntary instructors and students from various universities utilising the survey method, and statistical analysis was performed using SPSS. Regression analysis revealed variations between the quality factors that predict user satisfaction, usefulness, system use, and benefits. The dependent variable's quality factors were technical, information, service, support system, education, instructors, and learners. The results showed that two factors — technical system quality and information quality — did not support the model. Additionally, educators did not accept the instructor quality factor. Some hypotheses were supported by students' viewpoints but were rejected based on instructors' perceptions.*

Keywords: learning management system, LMS, Moodle, student perception, instructors' perception, E-learning, TAM, DeLone AND McLean.

1. Introduction

Online learning, facilitated by ICT, bridges educational gaps between educators and students and enhances virtual interactions, revolutionizing educational perspectives and system structure, making IT-based learning tools essential (Noori & Ozdamli, 2024; Mthethwa-Kunene & Maphosa, 2020; Gunawan et al., 2019). ICT-driven innovations, including personal computers, social media, broadcasting, and Learning Management Systems (LMS), have gained increasing attention in education (Sabr & Neamah, 2017). The 21st century has seen transformative changes in technology, the economy, society, and education

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(Cakrawati, 2017). Learning technology facilitates knowledge dissemination, engagement, and collaboration, enhancing learning (Gunawan et al., 2019). E-learning, an ICT-driven approach, provides access to knowledge and educational opportunities through digital platforms (Mohammed & Ozdamli, 2022; Salloum & Shaalan, 2018; Boateng et al., 2016). LMS platforms like Moodle support web-based education by enabling interaction and structured learning experiences (Munasinghe et al., 2016). Moodle is a widely used open-source LMS that enhances learning through constructivist and social learning theories (Mustapha et al., 2020). It allows instructors to effectively develop, manage, and deliver online courses, improving learning outcomes (Mthethwa-Kunene & Maphosa, 2020). Ziraba et al. (2020) identified various factors influencing Moodle's effectiveness, including social, technological, and motivational aspects.

This study examines Moodle LMS perceptions and effectiveness, incorporating DeLone and McLean Information Systems Success Model elements, assessing system success across six dimensions (Quinn & Gray, 2020). It is widely used to establish causal relationships in theoretical and applied research (Mtebe & Raphael, 2018). Technology Acceptance Model (TAM) developed by Davis (1989), TAM evaluates user technology adoption based on perceived ease of use and usefulness (Al-Fraihat et al., 2020). User Satisfaction and Learning Quality Models user satisfaction, a key determinant of e-learning success, includes perceptions of content, system performance, and instructor effectiveness (Mohammed & Ozdamli, 2022; Marjanovic et al., 2016). The Demand-Driven Learning Model (DDLM) assesses online education by analysing instructional design, content delivery, and learning outcomes (Al-Fraihat et al., 2020). Additionally, models based on Total Quality Management (TQM), ISO, and EFQM standards help measure e-learning effectiveness by balancing instructional quality, user expectations, and technological efficiency (Al Jaber, 2022). By integrating TAM with the DeLone and McLean model, this study presents a comprehensive approach to evaluating Moodle LMS, emphasizing the interplay between system quality, user satisfaction, and learning effectiveness.

2. Methods and material

A total of 426 responses were collected from Iraq and Cyprus universities. 13 incomplete responses were excluded, leaving 416 valid responses for analysis. using RAOSOFT software. The sample size was sufficient, with 174 instructors and 242 students, with a nearly equal gender distribution. The study found 370 participants from Iraq and 46 from Northern Cyprus. The questionnaire consisted of three sections: the first gathered demographic details (age, gender, occupation, and university), the second assessed LMS experience with four items, and the third explored factors affecting Moodle LMS usage through 58 elements. The study adopted the questionnaire and model developed by Al-Fraihat et al. (2020).

The research model used in this study is illustrated in Figure 1, considering technical systems, information, services, educational systems, supporting systems, learners, and instructors and related hypothesis.

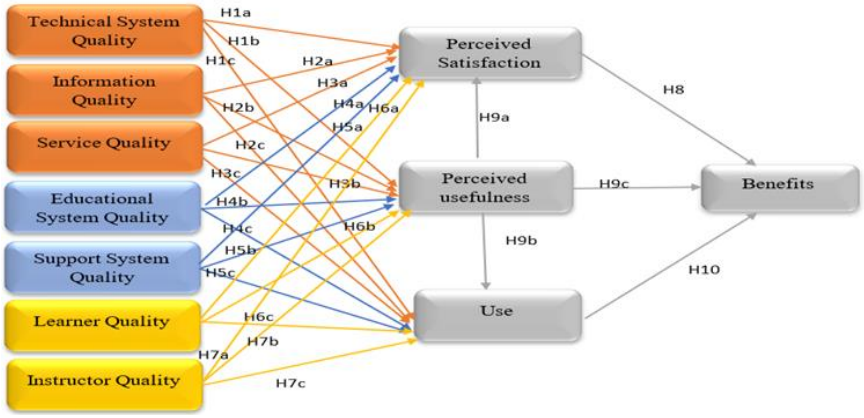

Figure 1. An adopted model for this study

The study assessed users' experience with Moodle and other learning management platforms. Four questions were asked to teachers and students, with students having the most experience (68.2%), followed by 1-2 years (22.3%) and 3-5 years (7.9%). Only 1.6% used Moodle for more than six years, as shown in Figure 2.

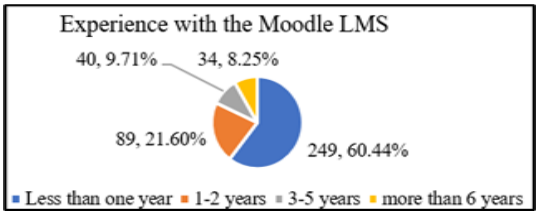

Figure 2. Experience with Moodle LMS

The majority of 174 teachers (48.3%) reported using Moodle for less than one year, followed by 1-2 years (20.1%), 3-5 years (14.4%), and over six years (17.2%), as shown in Figure 3.

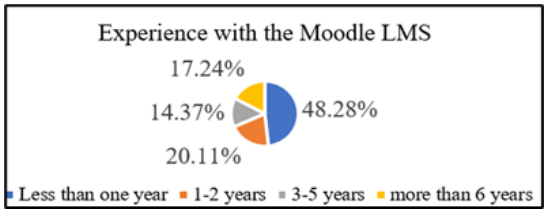

Figure 3. Instroctors' experience with Moodle LMS

The survey revealed that 32.2% of 242 student respondents used Google Classroom, followed by Edmodo (20.2%), Moodle (19%), and Blackboard

Learning (11.6%). Moodle was the most commonly used LMS by 74.7% of 174 as shown in Figure 4.

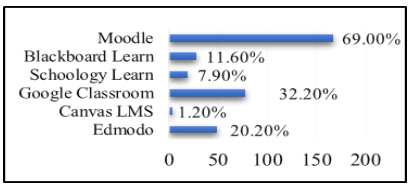

Figure 4. Students using LMS platforms

instructors, followed by Edmodo (23%), Blackboard Learning (18.4%), and Schoology (12.1%). As shown in figure 5.

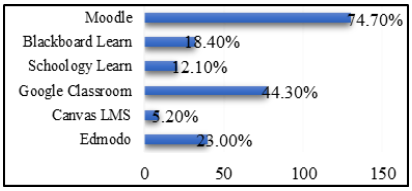

Figure 5. Instructors using LMS platforms

The study analyzed seven key factors influencing the success of the Moodle Learning Management System (LMS), obtained ethical approval from the University's Ethical Committee for Science Study, and used a questionnaire with 11 dimensions and a 5-point Likert scale. The structured approach ensured reliability and participant evaluation. The structured approach ensured reliability and participant evaluation, with a Cronbach's alpha (α) of 0.988, exceeding the recommended threshold (Al-Fraihat et al., 2020).

The study used descriptive statistics to analyze demographics and ANOVA to test the model's significance. A linear regression analysis was used to evaluate hypotheses. A validated questionnaire was identified, and ethical approval was obtained. A Google Form survey was used for data collection. The study followed a structured process outlined in Figure 6.

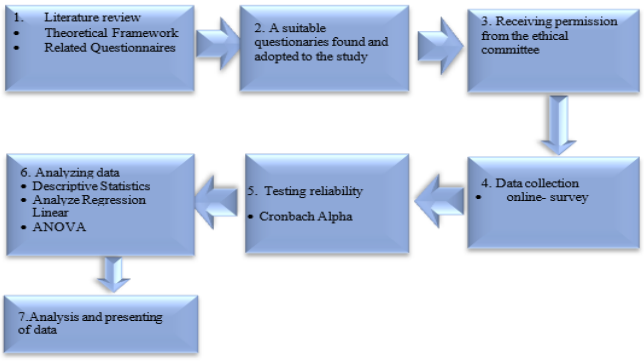

Figure 6. The research procedure

3. Result and discussion

3.1 Correlations among the critical factors

Table 1 shows the correlation matrix indicating the connection between the structure of the research model. The correlation matrix was found using bivariate analysis. The correlation result identified eleven critical factors significantly associated with each other. Consequently, the design was supposed to be convenient for regression analysis.

Table 1. Validity correlation matrix of eleven critical factors of the study

	BN	SU	PUSF	PSAT	IQ	LQ	SSQ	ESQ	SQ	INQ	TSQ
students' validity perceptions											
BN	1										
SU	0.881	1									
PUSF	0.878	0.869	1								
PSAT	0.877	0.86	0.883	1							
IQ	0.857	0.871	0.877	0.879	1						
LQ	0.841	0.831	0.854	0.869	0.896	1					
SSQ	0.838	0.808	0.832	0.847	0.869	0.85	1				
ESQ	0.851	0.804	0.836	0.846	0.861	0.86	0.874	1			
SQ	0.828	0.774	0.766	0.803	0.802	0.79	0.85	0.84	1		
INQ	0.817	0.771	0.782	0.806	0.829	0.81	0.818	0.85	0.859	1	
TSQ	0.874	0.852	0.856	0.856	0.875	0.87	0.866	0.9	0.862	0.911	1
Instructors' validity perceptions											
BN	1										
SU	0.724	1									
PUSF	0.71	0.658	1								
PSAT	0.775	0.744	0.795	1							
IQ	0.752	0.725	0.71	0.762	1						
LQ	0.709	0.63	0.695	0.737	0.757	1					
SSQ	0.636	0.661	0.553	0.639	0.671	0.67	1				
ESQ	0.671	0.589	0.61	0.652	0.698	0.71	0.699	1			
SQ	0.646	0.671	0.693	0.697	0.677	0.69	0.665	0.65	1		
INQ	0.631	0.596	0.652	0.721	0.69	0.61	0.631	0.64	0.703	1	
TSQ	0.703	0.653	0.698	0.752	0.708	0.68	0.654	0.66	0.693	0.791	1

3.2 Hypothesis testing

The study's results, obtained through multiple regression analysis, are presented in Table 2. The framework, based on the findings of the Analysis of Variance (ANOVA), was found to be significant ($p < 0.05$). The input technique was used to determine which predictors — technical system quality, information quality, service quality, educational system quality, support system quality, learner quality, and instructor quality — affect the dependent variables: perceived satisfaction, usefulness, system use, and benefits.

Table 2. Hypothesis testing and path analysis result for influence factors on moodle LMS

Dependent variable: Students' Perceptions Towards Using Moodle LMS							
Hypothesis	Path	Unstandardized Coefficients		Standardized coefficients	T-Statistical	P-Value	Support
		B	Std. Error	β Coefficients			
H1a	TSQ → PSAT	.070	.133	.856	. 523	. 601	Not support
H1b	TSQ → PUSF	.083	.134	.856	.617	.538	Not support
H1c	TSQ → SU	.094	.133	.852	.707	.480	Not support
H2a	INQ → PSAT	.110	.159	.806	.692	.490	Not support
H2b	INQ → PUSF	.218	.169	.782	1.291	.198	Not Support
H2c	INQ → SU	.255	.168	.771	1.513	.132	Not support
H3a	SQ → PSAT	.442	.145	.803	3.041	.003	Support
H3b	SQ → PUSF	.593	.158	.766	3.749	.000	Support
H3c	SQ → USE	.549	.152	.774	3.612	.000	Support
H4a	ESQ → PSAT	.298	.129	.846	2.308	.022	Support
H4b	ESQ → PUSF	.352	.134	.836	2.619	.009	Support
H4c	ESQ → SU	.456	.142	.804	3.204	.002	Support
H5a	SSQ → PSAT	.331	.128	.847	2.591	.010	Support
H5b	SSQ → PUSF	.399	.134	.832	2.974	.003	Support
H5c	SSQ → SU	.475	.140	.808	3.404	.001	Support
H6a	LEQ → PSAT	.354	.116	.869	3.064	.002	Support
H6b	LEQ → PUSF	.421	.122	.854	3.438	.001	Support
H6c	LEQ → SU	.486	.128	.831	3.805	.000	Support
H7a	IQ → PSAT	.252	.114	.879	2.223	.027	Support
H7b	IQ → PUSF	.273	.115	.877	2.368	.019	Support
H7c	IQ → SU	.287	.115	.871	2.488	.014	Support
H8	PSAT → BN	.439	.108	.877	4.502	.000	Support
H9a	PSUF → PSAT	.381	.107	.883	3.549	.000	Support
H9b	PSUF → SU	.429	.111	.869	3.868	.000	Support
H9c	PSUF → BN	.424	.108	.878	3.922	.000	Support
H10	SU → BN	.418	.107	.881	3.896	.000	Support

Table 3. Hypothesis testing and path analysis result for influence factors on moodle LMS

Dependent variable: Instructors' Perceptions Towards Using Moodle LMS							
Hypothesis	Path	Unstandardized Coefficients		Standardized coefficients	T-Statistical	P-Value	Decision
		B	Std. Error	β Coefficients			
H1a	TSQ → PSAT	.410	.224	.752	1.834	.068	Not Support
H1b	TSQ → PUSF	.473	.257	.698	1.843	.067	Not Support
H1c	TSQ → SU	.468	.276	.653	1.694	.092	Not Support
H2a	INQ → PSAT	.141	.264	.721	.535	.593	Not support
H2b	INQ → PUSF	.300	.305	.652	.981	.328	Not Support
H2c	INQ → SU	.377	.329	.596	1.146	.253	Not support
H3a	SQ → PSAT	.617	.242	.702	2.545	.012	Support
H3b	SQ → PUSF	.420	.254	.707	1.651	.101	Not Support
H3c	SQ → USE	.336	.269	.678	1.250	.213	Not Support
H4a	ESQ → PSAT	.722	.252	.675	2.865	.005	Support
H4b	ESQ → PUSF	.774	.281	.628	2.754	.007	Support
H4c	ESQ → SU	.715	.295	.595	2.425	.016	Support
H5a	SSQ → PSAT	1.033	.244	.647	4.233	.000	Support
H5b	SSQ → PUSF	1.269	.281	.558	4.520	.000	Support
H5c	SSQ → SU	.587	.256	.666	2.290	.023	Support
H6a	LEQ → PSAT	.437	.222	.751	1.964	.051	Not Support
H6b	LEQ → PUSF	.465	.253	.705	1.841	.068	Not Support
H6c	LEQ → SU	.587	.281	.632	2.092	.038	Support
H7a	IQ → PSAT	.268	.224	.765	1.196	.223	Not Support
H7b	IQ → PUSF	.331	.259	.710	1.279	.203	Not Support
H7c	IQ → SU	.043	.252	.725	.170	.865	Not Support
H8	PSAT → BN	.992	.173	.779	5.722	.000	Support
H9a	PSUF → PSAT	.912	.166	.796	5.490	.000	Support
H9b	PSUF → SU	1.063	.222	.657	4.787	.000	Support
H9c	PSUF → BN	1.379	.186	.708	7.433	.000	Support
H10	SU → BN	1.474	.171	.723	8.613	.000	Support

The impact of Technical System Quality (TSQ) on perceived satisfaction, usefulness, and system use in the e-learning system was analyzed. From students' perspectives, TSQ did not significantly influence perceived satisfaction (H1a: $\beta = .856$, $t = .523$, $p = .601$), perceived usefulness (H1b: $\beta = .856$, $t = .617$, $p = .538$), or system use (H1c: $\beta = .852$, $t = .707$, $p = .480$), as shown in Table 2. Similarly, from instructors' perspectives, TSQ showed no significant effect on perceived satisfaction, perceived usefulness, or system use, as indicated in Table 3. Since the p-values were more significant than 0.05 ($p > 0.05$) for both students and instructors, TSQ did not support the model. However, the result for H1a aligns with findings from Yakubu and Dasuki (2018), and a similar effect for H1c was observed in previous studies (Aparicio et al., 2017; Cidral et al., 2018). Influence of Information Quality on Perceived Satisfaction (PSAT), Perceived Usefulness

(PUSF), and System Use (SU) in the E-Learning System As shown in Tables 4 and 5, both teachers and students rejected Information Quality (INQ) after hypothesis testing. From students' perspectives, INQ did not significantly influence PUSF, or SU Similarly, instructors' perceptions also showed no significant impact on PSAT or PUSF, H1a, H2b with p-values exceeding 0.05. The result for H2a aligns with Lwoga (2014), while H2c supports findings by Al-Fraihat et al. (2020). These findings suggest that providing high-quality information does not necessarily impact students' usage of the e-learning system. One possible explanation is that students primarily rely on the system to access the Moodle Reading Capture resource and submit assignments electronically (Al-Fraihat et al., 2020).

Influence of Service Quality on Perceived Satisfaction (PSAT), Perceived Usefulness (PUSF), and System Use (SU) in the E-Learning System The statistical analysis indicates a positive correlation between service quality and perceived satisfaction from both educators' and students' perspectives. The coefficient for H3a shows significant support for students and educators with p-values less than 0.05, as shown in Table 2. This finding aligns with previous research (Mtebe & Raphael, 2018). However, for H3b and H3c, the results differ between students and instructors. While students accepted both hypotheses H3b, and H3c. Instructors rejected them. As shown in Table 3, the p-values for instructors were greater than 0.05, indicating no significant impact from their perspective. As shown in Table 2. Influence of Educational System Quality on Perceived Satisfaction (PSAT), Perceived Usefulness (PUSF), and System Use (SU) in the E-Learning System. The impact of Educational System Quality (ESQ) on PSAT (H4a) received significant support from both students and instructors. The hypothesis was accepted with students' responses and instructors' responses, with p-values less than 0.05. These findings align with Mohammadi (2015). However, for H4b (ESQ → PUSF) and H4c (ESQ → SU), the results differed between students and instructors. Students supported both hypotheses (H4b and H4c) while instructors rejected them. The p-values for instructors in H4b and H4c were greater than 0.05, indicating that ESQ did not significantly influence their perception of usefulness and system use. Influences of Support System Quality on PSAT, PUSF, and SU with the e-learning system: The expectation of influencing the support system quality on three dependent variables was significant, as can be seen in Table 2 and Table 3. Instructors and students have accepted all hypotheses, and the p-values are less than (0.05). Hence, all suggestions support the system model. As the from response students' for H5a and H5b; PUSF, then H5c for SU (β=.808, t=3.404, p=.001). On the other side, from instructors' responses are same, this finding parallels the result of (Alfaki, 2021). Influences of learner's quality on PSAT, PUSF, and SU with the e-learning system: Table 2 shows that hypotheses H6a and H6b have two different reactions as students accept both. For instructors, the viewpoint is rejected. While from instructors' response PSAT and PSUF the p-value for instructors' response is greater than (0.05). Nevertheless, for H6c, a similar reaction is shown for students and instructors, as has been accepted. After testing the hypothesis, the p-value of p is less than (0.05). Consequently, the impact

of learners' quality on System use is significant, and it supports the model — the finding result for H6c supports other study (Mohammadi, 2015).

Influences of instructor's quality on PSAT, PUSF, and SU with the e-learning system: The statistical analysis result shows the optimistic finding in students' responses as the student accepts the H7a, H7b, and H7c. The instructor is the main person who is essential to students in the e-learning environment (Al-Fraihat et al., 2020). Therefore, instructor quality positively impacts learners' satisfaction with E-learning. Hypothesis H7a was accepted and H7b, which is predicted to impact the perceived usefulness and H7c for SU. As shown, the value of p is less than (0.05). So, in the student's opinion, the instructor's quality supports the model. Moreover, the finding of testing hypotheses is like the study outcome (Al-Fraihat et al., 2020). While the results from instructors' responses were pessimistic, all hypotheses do not support the model from the instructors' viewpoint, H7 and H7b. The hypotheses are insignificant if the p-value is more than (0.05). Al-Fraihat et al. (2020) for H7c explained that a potential explanation for this insufficient relationship might be that students depend on Moodle to access the tools teachers upload and send assignments using the online submission method. Consequently, factors relating to teachers were closely linked to their perceived satisfaction and usability of the program but not to their usage of it.

Influences of Perceived Satisfaction on Benefits with the E-learning System: Hypothesis H8 was predicted to impact the benefits of online learning. Which ($P<0.05$) represents that the perceived satisfaction has significantly influenced benefits and has been accepted by students and instructors. Therefore, the hypothesis supports the model. A similar study was found by other researchers (Aparicio et al., 2017; Cidral et al., 2018). Influences of Perceived Usefulness on PSAT, PSUF, and BN with the e-learning system: Predicting hypotheses related to perceived usefulness has significantly supported the model. As H9a, H9b, and H9c are accepted by both learners and educators. The positive result is that perceived usefulness is a critical determinant of instructors'/students' perceived usefulness, satisfaction, and system use. Students should be fulfilled because they find that the program increases their academic success and behaviours, allows them to complete their assignments quickly and efficiently with less energy, and thus succeed more efficiently (Al-Fraihat et al., 2020). The p-value ($p<0.05$) for H9a, H9b and H9c from students' perception. Likewise ($p<0.05$), H9a, H9b and H9c from instructors' perception. The hypothesis results parallel the findings of (Al-Fraihat et al., 2020; Lwoga, 2014). From the above, it has become clear that if students and lecturers believe that the e-learning system improves the learning process, helping them to perform their duties quickly and effectively with less effort and benefit, they will be motivated to use it. Influences of the use of benefits with the e-learning system: Despite the reality that advantages are gained when students use learning Processes and systems (Al-Fraihat et al., 2020). The model's last dimension is that teachers and students have accepted SU. As the hypotheses, H10 is associated with using the e-learning system and its effects on student benefits. The student's perspective

and the viewpoint of instructors, the p-value less than (0.05), the testing hypothesis indicating that the system user has a significant positive impact on benefits, and it supports the model. Consequently, the effect of System use is substantial, and it supports the model. The findings support the results obtained by researchers (Cidral et al., 2018).

4. Conclusion and recommendation

The Moodle Learning Management System (LMS) is an essential platform for online learning, enhancing learner independence and facilitating efficient resource management. A study examined students' and instructors' perceptions of Moodle LMS and its effectiveness using various models. Survey findings showed that most users have less than a year of experience, with Moodle, Google Classroom, and Edmodo being the most frequently used LMS platforms. Enhancing service quality, educational system quality, support system quality, learner quality, and instructor quality directly increases students' satisfaction and engagement with e-learning platforms. Future studies should include a broader range of institutions for a more comprehensive evaluation.

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