ESIC2024, Vol 8.2, S1 Posted: 15/08/2024

Exploring Instructors' Experiences with Learning Management Systems: A Technological Perspective on User Satisfaction in Distance Learning

Samah Ramzy Abdulghani[1], Muneerah Alshabanah[2], Daniah Alrajhi[2], Hanouf Alkhaldi[2], Reham Abdullah Ghanem[3], Mohamed Talaat Gohari[4], Ahmed Mohamed Abas[4], Bassam Ahmad Alshorman[5], Abderrazak Ben Salah[2], Hany Anwar Shoshan[6]

[1]Department of Self-development, Deanship of Preparatory Year, Imam Abdulrahman Bin Faisal University, P.O. Box 1982, Dammam, Saudi Arabia.
[2]Department of MIS, College of Applied Studies and Community Service, Imam Abdulrahman Bin Faisal University, P.O. Box 1982, Al-Dammam, Saudi Arabia.
[3]Basic Science Department, Deanship of Preparatory Year and Supporting Studies, Imam Abdulrahman Bin Faisal University, P.O. Box 1982, Dammam, Saudi Arabia.
[4]Computer Department, Deanship of Preparatory Year and Supporting Studies, Imam Abdulrahman Bin Faisal University, P.O. Box 1982, Dammam, Saudi Arabia.
[5]Department of General Courses, College of Applied Studies and Community Service, Imam Abdulrahman Bin Faisal University, P.O. Box 1982, Dammam, Saudi Arabia.
[6]Department of Quantitative Methods, College of Business Administration, Imam Abdulrahman Bin Faisal University, P.O. Box 1982, Dammam, Saudi Arabia.

Abstract

The rapid growth of educational technology in higher education has led to the widespread use of Learning Management Systems (LMS) in distance learning. However, limited research has focused on measuring instructors' satisfaction with these systems, despite its critical role in course engagement and enhancing student interaction with course content. This study proposes a comprehensive framework for evaluating instructors' satisfaction with LMS usage. Thus; We adopted DeLone and McLean's Information System Success Model to empirically assess the relationships between Information Quality (INQ), System Quality (SYQ), Service Quality (SQ), Perceived Usefulness (PU), User Loyalty (UL), and User Satisfaction (US). The results indicate that SQ has a greater effect on the US than SYQ, PU, and INQ. Moreover, the results show that the US has a significant direct influence on UL. The study focuses on higher education instructors and employs a questionnaire-based survey for data collection. Based on the results, it is recommended that LMS design should consider the needs of both instructors and students, incorporating the latest technological advancements. Neglecting instructors' satisfaction in LMS development could negatively influence the outcomes of distance learning courses.

Keywords: Learning management systems; Perceived Usefulness; System quality; Service Quality; Distance learning; Information quality; User satisfaction.

1. Introduction

Information technology has opened up new opportunities for learning and easy access to information [1]. It has revolutionized education by enabling learning beyond traditional classroom settings, offering the potential to enhance learning quality at a lower cost compared to conventional methods. The use of IT in education, commonly referred to as e-learning, is recognized for its cost-effectiveness and efficiency. E-learning is a broad term encompassing teaching through various electronic media such as the Internet, audio, interactive TV, and more [1]. According to Weggen and Urdan [2], e-learning began in the 1960s, with the University of Illinois being one of the first institutions to implement it. By the 1980s, software applications were widely adopted to support e-learning. In the 1990s, the University of Phoenix pioneered distance education through e-learning platforms.

The development of the learning management system (LMS) is the current focus for many institutions and organizations that consider e-learning as an alternative approach to education [3]. LMS is utilized for both campus-based and distant education, classroom and online education, as well as traditional, modern, and massive open online courses [4]. Various technological tools are integrated into an LMS to support and enhance learning at each step of the distance educational method. The success of LMS implementation has been associated with several predictors of information systems (IS) such as system quality (SQ), information quality (IQ), and service quality (SE). Another critical factor influencing satisfaction is user satisfaction (US). It is an imperative and primary performance indicator used to evaluate information system and information technology success [5].

In recent years, technology platforms have become increasingly integral in supporting higher education [6, 7]. LMS, in particular, have become vital tools for online learning [8]. LMSs are defined as "web-based software platforms that provide an interactive online learning environment and automate the administration, organization, delivery, and reporting of educational content and learner outcomes" [9]. These systems offer various features, including course management, assessment, progress tracking, gradebooks, communication tools, security, and smartphone access [8], all of which enhance the online learning experience [10]. The effectiveness of online learning is closely linked to the quality of these platforms [10]. Furthermore, LMSs have proven to be essential during the shift to online education prompted by the COVID-19 pandemic [7].

The use of LMS in online or distance learning courses is prevalent in higher education [11]. The integration of LMS into teaching and learning practices has become increasingly common in the higher education sector [12]. Research on motivational factors and instructional technology integration reveals a connection between teaching practices and motivational drivers [5]. As the number of institutions adopting LMS for online courses grows, evaluating the US and the

effectiveness of LMS becomes crucial. Understanding how educators develop expertise in using online media can lead to higher levels of satisfaction [5].

Today, LMS are extensively used in education. Consequently, universities must evaluate the effectiveness of these systems by measuring the US, which is essential for the success of any program or organization [5, 13]. Assessing the US is crucial for enhancing classroom quality. Since online platforms require instructors to interact with students without the benefit of observing their body language, careful consideration of online content is necessary [14, 15]. Understanding both the limited formal use of LMS and the varied implementations is vital for their future success [5]. However, most research has focused on measuring instructors' acceptance of LMS or their intention to use these systems, rather than their satisfaction. Evaluating the US and the outcomes of using LMS can offer a more comprehensive view of overall preferences [16]. Given the scarcity of studies on the US [14] and the need for more focus in this area [17], this study will specifically address the US as a key component of the learning process.

Transitioning from traditional face-to-face teaching to online instruction can be challenging for instructors [5, 17]. The effectiveness of online classrooms is closely tied to instructors' satisfaction with the online format and their overall experience [18]. Instructors strive to engage and support more students, which is a primary objective for universities. Recent research shows that learners also expect full engagement from online instructors [17]. Higher US often leads to increased utilization of LMS [5]. Consequently, the successful adoption of LMS and educational technology depends on achieving high levels of US to enhance usage and interaction in distance learning courses [19].

US is defined as the extent to which users feel that the information system available to them meets their informational needs [5, 20]. In a competitive marketplace, the US is a crucial differentiator [21]. Analyzing the US is also valuable for improving products [22]. For faculty or instructors, satisfaction is described as "the extent to which faculty perceive that the institution provides a climate ensuring professional autonomy and activity commensurate with specialized expertise" [23]. Researchers suggest that when an information system (IS) meets user needs, satisfaction with the IS increases [5, 24]. Conversely, if the IS fails to provide the necessary information, it can lead to instructor dissatisfaction [25]. In this context, many instructors are dissatisfied with online classrooms due to issues related to technical skills, personality types, and unfamiliarity [5, 26]. These issues often involve technological difficulties, such as systems that are not user-friendly, complex or suffer from low bandwidth and accessibility problems.

2. Research model

The D&M model identifies key factors for information system (IS) success, including intention to use, SYQ, INQ, SQ, usage, US, and net benefit [27]. The Technology Acceptance Model (TAM) focuses on predicting user acceptance of new technology by evaluating PU and intention to use as predictors influencing actual usage [28]. This study presents a research model that combines the TAM [28] with the DeLone and McLean Information Systems (D&M IS) success model, both of which have been widely applied in various empirical studies [29, 30]. While TAM

uses PU to assess user behavior, it does not address overall quality, service, and information aspects, even though these factors significantly influence user behavior [31]. Conversely, the D&M IS success model does not incorporate factors such as usefulness and ease of use, despite previous studies demonstrating their strong impact on technology acceptance and US [32].

In technology acceptance research, PU has been commonly utilized as a key variables to measure user behavior. However, the TAM does not account for the overall quality of information and service, despite their significant influence on user behavior [31]. Conversely, the DeLone and McLean Information Systems (D&M IS) success model does not incorporate factors such as usefulness, even though previous studies have shown their strong impact on user acceptance of new technology and US [32]. More effort is needed to develop and validate appropriate instruments for assessing learning outcomes [33].

In this study, US is employed as a predictor of overall user behavior, which encompasses both the potential impact of a LMS and the user's general evaluation of their experience within a distance learning environment. Although US is associated with net benefits, this research also independently assessed net benefits as the direct outcomes of LMS use in distance learning, where net benefits represent the specific advantages gained from the system [34]. Nevertheless, the need for a direct measurement of net benefits remains [35].

Information Systems (IS) research confirms that "INQ and SQ significantly impact member loyalty through the US" [36, 37]. In the context of LMS, UL is defined as the "involvement and participation rate of students in e-learning activities" [37, 38]. The authors in [37, 38] also found a direct relationship between learner satisfaction and loyalty. Continuance intention to use the LMS plays a key role in enhancing UL.

This research highlights the importance of measuring LMS success from an Information Systems (IS) perspective. Specifically, it identifies key factors that contribute to the continuous improvement and development of services for distance learners. Figure 1 outlines the main factors of the proposed US Evaluation (USE) Model.

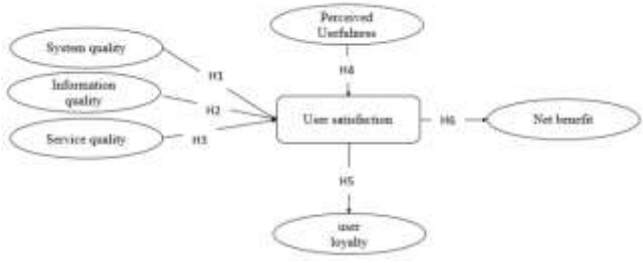

Figure 1: outlines the main factors of the proposed User Satisfaction Evaluation (USE) Model.

The proposed model was utilized to identify the primary constructs that influence US and UL. This process began with the formulation of additional hypotheses, ultimately resulting in the final concept shown in Figure 1. The following hypotheses will be tested in our model:

- H1: SYQ positively affects the US;
- H2: INQ positively affects the US;
- H3: SQ positively affects the US;
- H4: PU positively affects the US;
- H5: US positively affects UL;
- H6: US positively affects Net benefit.

Table 1 shows the indicators that have been used to investigate the main factors of the proposed USE Model.

Table 1: indicators that have been used to investigate the main factors.

Factor	Indicators
INQ	• Understandability • Accuracy • Security • Completeness • Availability
SYQ	• Maintain ability • Reliability • Usability • Trust
SQ	• Integrity • Functionality • Efficiency
PU	• Users' expectation • Cost and time savings
UL	• LMS recommendation • Shift to full e-learning
US	• Personalization • Enjoyment • Repeat visits • Self-efficacy
Net Benefit	• Decision quality • Effectiveness • Effects • Error reduction • Efficiency

3. Research Methodology

This section provides an overview of the data collection process, the methods used for data analysis, demographic details, descriptive statistics, model fit assessment, hypothesis testing, and the subsequent discussion.

3.1 Data collection

This study engaged a sample of 190 respondents, selected with careful consideration to capture the diversity of the relevant population. This intentional choice provided strong representation and results with broader applicability. Data was gathered through a survey using a thoughtfully designed questionnaire. The collected data was analyzed, beginning with a description of the sample's demographic information, followed by reliability and validity tests. The targeted sample includes instructors involved in distance learning at five universities (three public and two private). In September 2022, the study successfully reached its target sample size of 190 respondents. A 5-point Likert scale, spanning from "strongly disagree" to "strongly agree," was employed to evaluate the questionnaire items.

3.2 Data analysis

In this analysis, we first estimate the measurement model to evaluate the reliability and validity of the construct. Next, we estimate the structural model to test the proposed relationships between variables. The Structural Equation Modeling (SEM) analysis was performed using the AMOS software to process and analyze the primary data. The first step was to conduct a reliability test, which showed Cronbach's alpha values between 0.80 and 0.90, indicating a well-constructed scale [39]. The reliability test for the administered questionnaire resulted in a value of 0.877, further affirming the scale's robustness. Table 2 displays the reliability test results for each construct.

Table 2: Cronbach's Alpha.

Item Reliability	Item Reliability
SYQ	0.872
INQ	0.821
SQ	0.825
PU	0.815
US	0.870
UL	0.831
Net benefit	0.816

3.3 Demographic information

The background information of the sample reveals that the majority of instructors are male, representing 55% of the sample, while females account for 45%, as shown in Table 3 below. In terms of academic job positions, the largest group consists of lecturers in distance learning courses, comprising 46% of the total sample. The smallest group is associate professors, representing only 7% of the sample. Regarding LMS usage experience, 27% of instructors have 3-7 years of experience, while 5% have less than one year of experience. Additionally, 15% of respondents reported more than 10 years of LMS experience, as shown in Table 3.

Table 3: Demographic information.

Gender	Frequency	Percentage
Male	105	55%
Female	85	45%
Total	190	100%
Job positions	Frequency	Percentage

Professor	13	7%
Associate professor	19	10%
Senior lecturer	25	13%
Lecturer	88	46%
Other	45	24%
Total	190	100%
LMS Usage	Frequency	Percentage
less than 1 year	10	5%
1-3 years	57	30%
3-7 years	51	27%
7-10 years	43	23%
more than 10 years	29	15%
Total	190	100%

3.4 Descriptive statistics

Descriptive statistics aim to simplify and summarize extensive datasets, converting them into graphical representations and numerical measures for easier interpretation by readers [40]. To offer a clear overview and emphasize the features of the collected data, frequency distributions and descriptive statistics were utilized [5]. For the scaled variables, descriptive statistics such as means and standard deviations were calculated, as detailed in Table 4 below.

The results indicate that the mean values for all factors are above 3.68 and relatively similar, which shows that the responses are closely clustered around the mean. This suggests a high level of consistency in the instructors' opinions. Furthermore, the fact that all standard deviations are below 1.00 indicates minimal variation in their responses.

Table 4: Descriptive statistics.

Factors	Mean	SD
SYQ	3.89	0.888
INQ	3.68	0.872
SQ	3.70	0.873
PU	3.69	0.882
US	3.88	0.881
UL	3.72	0.870
Net benefit	3.70	0.836

3.5 fit Measure

Assessing a model in Structural Equation Modeling (SEM) is frequently one of its most challenging aspects [41]. Before delving into the structural components, it is essential to grasp how to assess the model. Within SEM, Confirmatory Factor Analysis (CFA) encompasses several types, each serving a distinct purpose in model evaluation. These include parsimony measures, minimum sample discrepancy functions, goodness-of-fit indices, assessing population discrepancy, and comparisons to baseline models [42-44].

The first step in developing a structural model to define relationships among observed variables is to use empirical research and theoretical insights. Subsequently, statistical techniques are employed to test the proposed hypotheses. CFA is a key statistical method for validating the

structure of these variables and testing the model's hypotheses. However, the effectiveness of CFA is influenced by several factors, interpretation of fit indices, including the adequacy of the sample size, measurement tools, missing data, multivariate normality, the specific hypothesis being tested, outliers , and parameter identification [45].

When evaluating fit measures in structural equation modeling, the chi-square statistic (χ^2) is the most commonly reported index [46]. This statistic measures the extent to which the observed data deviates from the hypothesized model. A higher P-value (associated with CMIN) signifies a better fit between the hypothesized model and an ideal fit [44, 47]. In the current research model, the chi-square value is 14.988 with a P-value of 0.010, indicating that the model is consistent with prior theories and shows minimal deviation. The overall fit of the model, represented by a Chi-square/df ratio of 2.998 with 5 degrees of freedom, demonstrates a very good fit. A summary of the fit measures for the proposed model is provided in Table 5.

Table 5 summarizes the fit measures for the proposed model, demonstrating a clear fit to the data. These goodness-of-fit measures follow established recommendations from prior research. The chi-square measure of discrepancy assesses the difference between the implied and sample covariance matrices, with the null hypothesis asserting no difference. The test results support the model hypotheses, suggesting that the proposed model is well-founded.

Table 5: Overview of fit measures utilized in this study.

Fit measures	Model fit	Recommended value
P value	0.010	>0.05
CFI	0.971	>0.90
RMSEA	0.135	<0.08
CMIN/Df	2.998	<3

3.6 Hypotheses Testing and Discussion

SEM is ideally suited for testing multiple hypotheses concurrently through a model, but it can be beneficial to examine and evaluate each hypothesis separately [48] (see Table 6). In the proposed model, all paths were found to be statistically significant. AMOS offers a metric known as the critical ratio (C.R.), which is calculated by dividing the coefficient by its standard error.

The lowest C.R. was found in H2, between INQ and US, with a C.R. value of 2.042, which is significant. In contrast, the highest C.R. was in H3, between SQ and US, with a value of 2.688. The US also had a second strong impact on Net benefit (H6), with a C.R. of 2.687 and a significant p-value at the 0.001 level. The C.R. results indicate that SQ has a greater effect on the US than SYQ, PU, and INQ.

Table 6: Results of Hypothesis Testing

Hypothesis	C.R.	P	Result
H1: SYQ positively affects the US	2.064	0.001	Significant
H2: INQ positively affects the US	2.042	0.001	Significant
H3: SQ positively affects the US	2.688	0.002	Significant
H4: PU positively affects the US	2.574	0.001	Significant
H5: US positively affects UL	2.682	0.001	Significant
H6: US positively affects Net benefit.	2.687	0.001	Significant

In this study, we examine the US with the use of technology in online courses, specifically focusing on LMS. The results indicate that SQ, PU, SYQ, and INQ significantly impact the US, which, in turn, mediates the effect on the overall net benefit of using the LMS. This research contributes to the literature on the US by incorporating key factors identified in previous studies that influence satisfaction. Analyzing the LMS through the proposed model reveals the hypothesized interrelationships within the model, aiming to measure the cause-and-effect dynamics between success factors and success measures. It is proposed that the proposed model influences the quality of the LMS, either positively or negatively, which subsequently affects US, UL, and the overall net benefit. The findings of this study have several important implications as follows:

- SQ is the most influential factor in the US. This suggests that if the LMS offers reliable, 24/7 support, user-friendly services, and comprehensive training, US will increase, thereby promoting greater usage of the system.
- The proposed model indicates that the PU of the LMS encourages instructors to use online courses more frequently and to motivate students to do the same. This is because PU is a significant factor contributing to the US with the platform for interacting with distance-learning students.
- The SYQ plays a significant role in the US, as factors such as availability and accessibility can hinder its usage. When these issues arise, they can lead to dissatisfaction and a subsequent reduction in usage.
- INQ holds the smallest share among the factors mentioned because its effectiveness depends on the accuracy and quality of the content, which in turn relies on the instructor's utilization and the services offered by the LMS.
- SQ and PU had the greatest impact on the US. Therefore, the LMS should be designed to meet the needs of both instructors and students by incorporating the latest technologies. Conversely, developing the LMS without considering the specific requirements of instructors in distance learning courses will negatively affect the outcomes and benefits of these courses.
- The study provides valuable insights into the US and its impact on loyalty toward the university. The findings indicate that the US has a significant direct influence on UL, supporting H5. Similar results from previous research [49] also demonstrate a positive relationship between US and loyalty.

4. Conclusion

Previous attempts have been made to combine models to address their limitations and demonstrate how LMS success can be achieved. This research provides an empirical investigation into the key factors influencing LMS success by addressing the technical aspects involved in its evaluation. The study led to the development and validation of an LMS success model, incorporating factors such as INQ, SYQ, SQ, PU, UL, and US. The model is complex due to the variety of constructs used and the strength of the relationships between them. The

findings highlight that SQ is the most influential factor in the US, while PU encourages instructors to adopt online courses more frequently and motivates students to engage with them. SYQ also plays a crucial role in the US, as aspects like availability and accessibility can hinder usage. INQ, although the least influential factor, depends on the content's accuracy and quality, which are influenced by both the instructor's use and the services provided by the LMS. Overall, SQ and PU have the greatest impact on the US, while the US has a significant direct influence on UL. Future research should explore strategies to motivate instructors to integrate available technology into their teaching methods. This, in turn, will likely encourage students to adopt these technologies in their learning processes.

WORKS CITED

Y. Yosep, "Analysis of relationship between three dimensions of quality, user satisfaction, and e-learning usage of binus online learning," CommIT (Communication and Information Technology) Journal, vol. 9, no. 2, pp. 67-72, 2015.

C. C. Weggen and T. Urdan, "Corporate e-learning: Exploring a new frontier," WR Hambrecht and Co. www. wrhambrecht. com/research/coverage/elearning/idir explore. html, 2000.

F. T. Al-Dhief et al., "Review of learning management systems: history, types, advantages, and challenges," Indonesian Journal of Electrical Engineering and Computer Science, vol. 33, no. 1, pp. 350-360, 2024.

B. Bervell and V. Arkorful, "LMS-enabled blended learning utilization in distance tertiary education: establishing the relationships among facilitating conditions, voluntariness of use and use behaviour," International Journal of Educational Technology in Higher Education, vol. 17, no. 1, p. 6, 2020.

I. Almarashdeh, "Sharing instructors experience of learning management system: A technology perspective of user satisfaction in distance learning course," Computers in Human Behavior, vol. 63, pp. 249-255, 2016.

H. Jiang, A. A. Islam, X. Gu, and J. M. Spector, "Online learning satisfaction in higher education during the COVID-19 pandemic: A regional comparison between Eastern and Western Chinese universities," Education and information technologies, pp. 1-23, 2021.

M. A. de Souza Rodrigues, P. Chimenti, and A. R. R. Nogueira, "An exploration of eLearning adoption in the educational ecosystem," Education and Information Technologies, vol. 26, no. 1, pp. 585-615, 2021.

D. Turnbull, R. Chugh, and J. Luck, "Issues in learning management systems implementation: A comparison of research perspectives between Australia and China," Education and Information Technologies, vol. 26, no. 4, pp. 3789-3810, 2021.

D. Turnbull, R. Chugh, and J. Luck, "Learning management systems, an overview," Encyclopedia of education and information technologies, pp. 1052-1058, 2020.

A. A. Islam, Applying the Rasch Model and Structural Equation Modeling to Higher Education: The Technology Satisfaction Model. Chapman and Hall/CRC, 2023.

N. J. Navimipour and B. Zareie, "A model for assessing the impact of e-learning systems on employees' satisfaction," Computers in Human Behavior, vol. 53, pp. 475-485, 2015.

A. Ashrafzadeh and S. Sayadian, "University instructors' concerns and perceptions of technology integration," Computers in Human Behavior, vol. 49, pp. 62-73, 2015.

S. del Barrio-García, J. L. Arquero, and E. Romero-Frías, "Personal learning environments acceptance model: The role of need for cognition, e-learning satisfaction and students' perceptions," Journal of Educational Technology & Society, vol. 18, no. 3, pp. 129-141, 2015.

L. B. Swartz, M. T. Cole, and D. J. Shelley, "Instructor satisfaction with teaching business law: Online vs. onground," International Journal of Information and Communication Technology Education (IJICTE), vol. 6, no. 1, pp. 1-16, 2010.

R. McLawhon and M. Cutright, "Instructor learning styles as indicators of online faculty satisfaction," Journal of Educational Technology & Society, vol. 15, no. 2, pp. 341-353, 2012.

H. Cigdem and A. Topcu, "Predictors of instructors' behavioral intention to use learning management system: A Turkish vocational college example," Computers in human behavior, vol. 52, pp. 22-28, 2015.

V. M. Margalina, C. De-Pablos-Heredero, and J. L. M. Botella, "Achieving job satisfaction for instructors in e-learning: the relational coordination role," International Journal of Human Capital and Information Technology Professionals (IJHCITP), vol. 6, no. 4, pp. 64-79, 2015.
P. Shea, W. Pelz, E. Fredericksen, and A. Pickett, "Online teaching as a catalyst for classroom-based instructional transformation," 2002.
V. Kumar, B. Mukerji, and I. Butt, "Factors for Successful E-Government Adoption: A Conceptual Framework," Electronic Journal of E-government, vol. 5, no. 1, pp. pp63-76-pp63-76, 2007.
B. Ives, M. H. Olson, and J. J. Baroudi, "The measurement of user information satisfaction," Communications of the ACM, vol. 26, no. 10, pp. 785-793, 1983.
L. J. Gitman and C. McDaniel, The future of business: the essentials. South-Western College Publishing, 2007.
H. Li, L. Zhang, L. Zhang, and J. Shen, "A user satisfaction analysis approach for software evolution," in 2010 IEEE international conference on progress in informatics and computing, 2010, vol. 2, pp. 1093-1097: IEEE.
E. B. Pollicino, "Faculty Satisfaction with Institutional Support as a Complex Concept: Collegiality, Workload, Autonomy," 1996.
R. Cyert and J. March, "Behavioral Theory of the Firm WileyBlackwell," ed, 1992.
B. M. Bergersen, "User satisfaction and influencing issues," Network and System Administration Research Surveys, vol. 1, no. 1, pp. 5-26, 2004.
D. C. Llewellyn, "University System of Georgia Learning Management System Transition Task Force Final Report," University System of Georgia, 2011.
W. H. DeLone and E. R. McLean, "The DeLone and McLean model of information systems success: a ten-year update," Journal of management information systems, vol. 19, no. 4, pp. 9-30, 2003.
F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," MIS quarterly, pp. 319-340, 1989.
A. Alshardan, R. Goodwin, and G. Rampersad, "A benefits assessment model of information systems for small organizations in developing countries," Comput. Inf. Sci., vol. 9, no. 1, pp. 1-20, 2016.
W. H. DeLone and E. R. McLean, "Information systems success: The quest for the dependent variable," Information systems research, vol. 3, no. 1, pp. 60-95, 1992.
B. H. Wixom and P. A. Todd, "A theoretical integration of user satisfaction and technology acceptance," Information systems research, vol. 16, no. 1, pp. 85-102, 2005.
A. Rai, S. S. Lang, and R. B. Welker, "Assessing the validity of IS success models: An empirical test and theoretical analysis," Information systems research, vol. 13, no. 1, pp. 50-69, 2002.
N. M. Seel, Encyclopedia of the Sciences of Learning. Springer Science & Business Media, 2011.
T. D. Nguyen, T. M. Nguyen, and T. H. Cao, "Information systems success: a literature review," in Future Data and Security Engineering: Second International Conference, FDSE 2015, Ho Chi Minh City, Vietnam, November 23-25, 2015, Proceedings 2, 2015, pp. 242-256: Springer.
N. Urbach and B. Müller, "The updated DeLone and McLean model of information systems success," Information Systems Theory: Explaining and Predicting Our Digital Society, Vol. 1, pp. 1-18, 2012.
H.-F. Lin and G.-G. Lee, "Determinants of success for online communities: an empirical study," Behaviour & Information Technology, vol. 25, no. 6, pp. 479-488, 2006.
I. Dorobăţ, A. M. I. Corbea, and M. Muntean, "Integrating student trust in a conceptual model for assessing learning management system success in higher education: An empirical analysis," IEEE Access, vol. 7, pp. 69202-69214, 2019.
A. Hassanzadeh, F. Kanaani, and S. Elahi, "A model for measuring e-learning systems success in universities," Expert systems with Applications, vol. 39, no. 12, pp. 10959-10966, 2012.
U. Sekaran, "Research methods for business: A skill-building approach. John Wiley & Sons, Inc.," 2003.
P. M. Podsakoff, S. B. MacKenzie, J.-Y. Lee, and N. P. Podsakoff, "Common method biases in behavioral research: a critical review of the literature and recommended remedies," Journal of applied psychology, vol. 88, no. 5, p. 879, 2003.
J. L. Arbuckle and W. Wothke, "Amos 6.0 user's guide. Chicago, IL: SPSS," Bentler, PM, & Bonett, DG, 2005.
R. C. MacCallum, "The need for alternative measures of fit in covariance structure modeling," Multivariate Behavioral Research, vol. 25, no. 2, pp. 157-162, 1990.
P. Holmes-Smith, "Introduction to structural equation modeling using AMOS 4.0 & LISREL 8.30," (No Title), 2000.

B. M. Byrne, Structural equation modeling with Mplus: Basic concepts, applications, and programming. routledge, 2013.
R. E. Schumacker and R. G. Lomax, A beginner's guide to structural equation modeling. psychology press, 2004.
A. Davey, Statistical power analysis with missing data: A structural equation modeling approach. Routledge, 2009.
J. Arbuckle, Amos 17.0 user's guide. SPSS Inc., 2008.
R. H. Hoyle and G. T. Smith, "Formulating clinical research hypotheses as structural equation models: a conceptual overview," Journal of consulting and clinical psychology, vol. 62, no. 3, p. 429, 1994.
K. S. M. Appuhamilage and H. Torii, "The impact of loyalty on the student satisfaction in higher education: A structural equation modeling analysis," Higher Education Evaluation and Development, vol. 13, no. 2, pp. 82-96, 2019.