Prospects and Challenges of Learning Management Systems in Higher Education

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***Abstract*—Many higher education institutions nowadays are equipped with Learning Management Systems (LMS) to provide rich online learning solutions and utilize its functions and capabilities to improve the learning practices. The current study aims to gain instructors' perspective of LMS, investigate the use of its functions, and identify the barriers that may influence LMS utilization at the Gulf University for Science and Technology (GUST). This research aims to examine current practices, opinions, and challenges that help academicians and system developers contribute to better learning practices and academic achievement. The study used a quantitative method that included a sample of 58 faculty members. Findings obtained from the questionnaire indicated that instructors were generally comfortable and had positive perceptions about LMS Moodle. The results revealed that LMS's administrative functions, such as files and announcements, are widely used compared to the advanced interactive learning activities. Moreover, LMS's use on mobile devices is infrequent, and more emphasis must be placed on using LMS friendly user interfaces that can enable all tools and functions to use LMS.**

Keywords*—Learning Management Systems (LMS); e-learning; Information Communication Technology (ICT); Higher Education (HE)

I. Introduction

Online learning includes many terms used in the literature, such as e-learning, distance learning, flexible learning, virtual learning, blended learning, and technology-enhanced learning [1]. E-learning involves using hardware, software, and telecommunication technologies to support and manage teaching and learning activities to transform traditional learning environments and create new and effective learning practices. The advancements of technologies helped developers provide learning management tools that encourage engaged and collaborative learning [2]. Interactive and flexible learning is a term that generally refers to activities that enhance learning opportunities and aims to create self and independent learners, while instructors facilitate the learning process [3]. Learning management systems have been employed to administer and manage online courses, track student activities, develop learning materials, deliver content to the students, monitor students' participation, and evaluate their performance [4]. Technology-enhanced learning can be merged within the classrooms, which is known as blended learning or be used to provide remote access to be part of the learning environment.

There is no single teaching method; however, some learning methods and strategies are more effective than others. Learning methods and strategies play an essential role, and significant consideration should be given to the teaching and learning style when taken from the traditional classroom and adapted to online education. Learning management systems (LMS), collaboration devices, and e-learning platforms play a vital role in allowing instructors and learners to manage, plan, deliver, and track the learning process to achieve the pedagogical objectives. Moreover, significant consideration should be given to the teaching and learning style when taken from the classroom and adapted to technical devices. Learning management systems have been implemented in many educational institutions to enhance pedagogy due to their functionalities and implementations [4]. Universities were encouraged to use LMSs to improve the collaborative environment between students and instructors. As stated by [5], most learning facilities use LMS as a tool for instruction delivery in traditional classroom settings.

LMS has been carried out since 2003 for effective teaching and learning practices. Now a day, LMSs play a vital role to achieve the learning objectives if it is used correctly; however, little attention is paid to its utilization in universities [6]. It is stated by [7] that students and instructors have the flexibility to collaborate through LMS; however, they insisted that instructors must give the support to encourage students to be actively involved in LMS. It is stressed by [8] that instructors and students rarely use the advanced functions and tools of LMS and believed that user engagement is highest for basic LMS features and lowest for features that allow interactivity, collaboration, and engagement. Since mobile devices have become ubiquitous and increasingly important, learning environments nowadays require anytime/anywhere access to course materials, collaboration, and engagement by mobile-friendly devices. Therefore, more attention needs to be paid to design friendly user interfaces for mobile devices that can encourage LMS use all tools and functions.

There are many learning management systems such as Blackboard; Moodle; Desire2Learn; Google Classroom; Schoology; TalentLMS; Canvas LMS; eCoach; A Tutor; Skillshare; LearnUpon; Edmodo. According to [9], Blackboard is the most popular LMS in the USA. Blackboard represents (33%), while Moodle (19%) is the second most popular LMS by many institutions. According to [4], LMSs may be divided into commercial and open sources. Open-source LMS can be improved and developed and then used free of charge. Examples of LMSs widely used open source is Moodle. On the other hand, commercial source LMSs are owned by private

companies and are only used by registered users. The analysis of several LMSs conducted by [10] revealed that Moodle offers a wide range of features that improve pedagogical quality and includes a large number of required resources available for an online learning system. Moodle provides various functions and tools such as files, interactive lessons, folders, assignments, announcements, Hotpot quizzes, forums, chat, labels, URL links, and Turn it in [11]. These tools and functions, not only enrich managing class activities online, but also facilitate communication and collaborations between students and instructors [12].

The use of LMSs creates opportunities and helps educational institutions globally [13]. However, the adoption of LMSs requires an ongoing assessment compared to other newer technologies [4]. Various studies have been conducted to investigate the effectiveness and adoption of LMSs [4, 11, 13, 14, 15]. The current research is an attempt to gain instructors' perspective on the use of LMS, to investigate the use of its functions, to shed light on LMS opportunities, and to identify the various barriers that may influence LMS utilization at the Gulf University for Science and Technology (GUST), in Kuwait. Therefore, this research seeks to address the following questions:

1) What are the instructors' perceptions of LMS?

2) What is the instructors' use of LMS tools and functions?

3) What are the barriers to LMS utilization?

This article is structured as follows: Section 2 provides an overview of previous research, and Section 3 describes the methodology used for this study. Section 4 presents the results and discussions, while Section 5 concludes the study and proposes possible future directions.

II. Literature Review

Electronic learning is defined by [16], as an innovative learning experience that can be synchronous or asynchronous using electronic devices such as laptops, tablets, and smartphones with Internet access. Learning Management System allows instructors and students to share classroom resources, tools, and activities. According to [8] online learning is defined as a platform that facilitates the delivery and management of teaching and learning practices. LMS has tools and functions that allow schools and universities to encourage instructors to utilize them for teaching and learning processes [17], and assist them in evaluating students' activities, allowing better collaboration and interaction [18]. The proper implementation of LMS, as stated by [19], can provide students with self-paced learning, offers unlimited access to e-Learning materials, integrates social learning experiences, tracks learner progress, and increases cost-effectiveness. Furthermore, LMS offers a variety of functions and tools such as interactive books, assignments, announcements, quizzes, forums, chat, labels, and links to learning resources [19, 5, 20]. These tools and functions enrich the management of class activities online and facilitate communication and collaborations between students and faculty members [3, 21].

Many researchers believe that LMS supports teaching and learning practices. Although the study by [22] documented that LMS functions and tools help and enrich the learning environment, their research shows that LMS is primarily used as a course management tool to facilitate and enhance the learning process. Besides, [23] investigated the use of several LMS features by geology graduates at King Fahd University of Petroleum and Minerals. He used a survey to seek students' perceptions of the utilization of the LMS. The study showed that students were favoring the online discussion and believed it as a handy tool. Other tools, such as e-mail, announcement, and grade book, were also important from the students' point of view. Also, [24, 25] stressed that LMS has great potential to promote interactive, adaptive, and student-centered learning. However, the study of [24] indicated that LMS focus on the organization, management, and delivery of the learning materials. They suggest that instructors need to utilize advanced tools and activities to develop learning situations based on pedagogical approaches.

An interesting research conducted by [7] aimed to understand instructors' utilization of LMS in Malaysian HE institutions. A quantitative approach was used, in which a questionnaire was distributed to 93 instructors. The investigation included some LMS functions and tools such as announcements, files, chat, forums, exercises, and documents. The study revealed that instructors have positive perceptions of these functions; however, results showed a low percentage of instructors' utilization of LMS. Similarly, [17] examined the relationship between 222 instructors representing six Saudi Arabia universities. The investigation was conducted to understand instructors' perceptions of LMS tools and functionalities. The findings revealed that LMS capabilities were not utilized for most of the courses; however, the study indicated some barriers, such as fear of usage.

A comparative analysis of several commercial LMS was reported by [3]. The study revealed That LMSs include similar features that allow the delivery and management of different courses. However, functions that assist students and instructors in performing online laboratory experiments are not available since most engineering and science courses require these tools. The study proposed that the online learning of engineering and science courses should be facilitated via a virtual laboratory supported by LMSs. Also, [24] examined LMS usability, in which an analysis of 36 LMSs was performed. Findings have shown that all LMSs support multimedia elements such as text, files, images, audio, and videos. There is, however, a lack of communication support for LMS, which leads to using social networks outside the LMS.

Furthermore, a new study by [15] aimed at gaining student and instructor perspectives on the use of Blackboard LMS. The results showed that students were most comfortable using Blackboard and indicated that their performance and communication with instructors improved considerably. The Instructors considered the time factor to be a fundamental challenge related to the use of the LMS. Despite the challenges, however, the Blackboard Platform was a positive experience for the instructor and well received by the students.

Although LMS offers many advantages, it is argued that there is a debate about its effectiveness in education. Due to the technical requirements, LMS demands many commitments and

requires technical skills from instructors [26]. Studies such as [27, 28] listed some barriers to LMS implementations: instructor commitment, lack of students, and instructors' feedback, and technical support. Research by [27] indicates that LMS platforms should be more adaptive and customized, offering easy-to-use interfaces and supporting instructors with limited technical skills. Other barriers were listed by [29] include the technical infrastructure, network capabilities, pedagogical approaches, and instructor proficiency. Concerning the LMS interactive functions [8] demonstrated that instructors and students believe that LMS enriches teaching and learning processes; however, more advanced tools and LMS interactive functions have rarely been used. As far as LMS barriers [4] administered a questionnaire to students in three universities in Saudi Arabia. The study revealed that the main obstacles to using LMSs were inadequate technical support, a negative attitude toward technology, and insufficient training on the LMS platforms. Less recognized barriers include poor Internet connectivity and networking, limited infrastructure support, lack of hardware and LMS software, and English-speaking challenges.

This article introduced an e-learning framework and implementation models to provide e-learning solutions at the Gulf University for Science and Technology. The e-learning framework was introduced by [30] to give a full-fledge e-learning implementation at GUST. The structure includes important components allowing students and instructors to access course materials through LMS anytime/anywhere. Furthermore, an e-learning implementation model was also presented by [31], which expanded the previous e-learning framework and included both the internal and external factors to implement an efficient e-learning environment at GUST. Moreover, [32] developed a new mobile learning model, which systematically integrates the mobile functions with teaching and learning practices. The model allows smooth access to the virtual learning environment, the learning management system, electronic content, and collaboration. The model also illustrates the external environment that is considered to support the model implementation.

III. Methodology

A. Survey Instrument

This study's methodological approach is a quantitative method wherein a questionnaire was designed and developed to investigate instructors' perceptions of LMS, their use of LMS tools and functions, and the barriers that may affect LMS usage by GUST instructors. The questionnaire was adapted from [7] and reviewed by experts in the field. The questionnaire is divided into four sections, section 1: demographic data, Section 2: instructors' perceptions towards LMS, Section 3: instructors' use of tools and functions provided in LMS, and Section 4: consists of questions about the barriers to the use of LMS. The items in the questionnaire consisted of a 5-point Likert type scale as 1 for strongly disagree, 2 for disagree, 3 for neutral, 4 for agree, and 5 for strongly agree, and 4-point Likert type scale as 1 for I don't use, 2 seldom, 3 for sometimes, and 4 for always. The instrument was pilot tested on a sample of 15 instructors to measure the reliability the instrument. The total score of Cronbach's Alpha is 0.901, so the questionnaire can be generalized to the primary study sample, and the results can be trusted.

B. Study Sample

This study's participants are 58 male and female instructors from the Gulf University for Science and Technology, representing around 32% of the total instructors at GUST. The authorized participants were contacted by e-mail with the information about the questionnaire. The questionnaires were sent as links by e-mail to all faculty members. Based on the questionnaires' data, statistical analysis was performed in which some analytical tools such as Frequency, Percentage, Mean, Standard Deviation (SD) were used. Data were then analyzed, as presented in the following section. The study sample distribution is illustrated in Table I, according to the demographic variables such as gender, age, and college.

TABLE I. Sample Distribution According to the Demographic Variables

Variable		Frequency	Percent
Gender	Male	40	69.0
	Female	18	31.0
Age	30 - 50 years	39	67.2
	More than 50 years	19	32.8
College	College of Business	25	43.1
	College of Art and Science	24	41.4
	Foundation program unite	9	15.5

IV. Results and Findings

This section presents the analysis results, which includes instructors' perceptions of LMS, the degree of LMS utilization among instructors, and barriers faced by instructors in the use of LMS. The mean value was used to assess instructors' perceptions.

A. Instructors' Perceptions of LMS

Table II shows the results obtained from the preliminary analysis to reflect instructors' perceptions of LMS. Instructors' responses were statistically analyzed using percentage, mean, and standard deviation (SD). Among the ten items presented in Table II, each item's mean value is higher than 3.0, which indicates that instructors have positive perceptions about LMS. Item four got the first rank with a mean value of 4.31, which demonstrates that instructors most likely want to use LMS in their teaching practices. Also, item one, "LMS helps me to communicate better with my students," got the second rank with mean value 4.22. Question 2 "The use of LMS helps me prepare learning activities" comes in third with a mean value of 4.17. The above findings are consistent with the research [15] who indicated that with Blackboard LMS, respondents' performance improved communication enhanced significantly. Given the challenges, the learning management system was a positive experience for the professors and the students. Similarly, [7] stated that students and instructors have the flexibility to collaborate through LMS, allowing better collaboration and interaction [18].

The lowest mean values ranked 9 in this section, item nine, with a mean value of 3.6, which implies that the instructors moderately believe that LMS is easy to use. The sixth element, "I like to use LMS via mobile devices," came last, with a mean value of 3.05. This element is relatively lower than the previous items in this section, whereby the instructors do not have the confidence to use LMS with mobile devices in our case. Recent research [14] has confirmed these results. Data from the LMS transaction records were collected and carried out using log-data from different courses, showing the activities performed. The findings revealed that web LMS visits were 1,554,101 compared to 41,217 visits by mobile LMS. Remarkably, mobile, in this case, is seldom used for accessing LMS activities, which could be linked to the limited functions of mobile-based LMS. Therefore, as growing users are going mobile, LMS functions should be available and become fully compatible with mobile devices [33]. Instructors and learners can have quick and smooth access to rich services and online courses anytime and anywhere, enabling instructors to manage their learning activities effectively.

B. Instructors' use of LMS Tools and Functions

The data presented in Table III reflect instructors' use of LMS tools and functions. Considering the eleven items' mean values in this section, item six, "I upload files through LMS," ranked first with a mean of 3.83. Also, item eleven, "I post announcements via LMS," ranked second with a mean value of 3.38. Comes third item one, "I use LMS assignment function" with a mean 3.34. However, question 10, "I create digital book via LMS" and question 11, "I use chatroom with my students" ranked 10 and 11 with mean values of 1.52, and 1.40, respectively.

TABLE II. INSTRUCTORS' PERCEPTIONS OF LMS

NO	Item	Strongly agree %	Agree %	Neutral %	Disagree %	Strongly disagree%	Mean	SD	Rank
1	LMS helps me to communicate better with my students	51.7	32.8	6.9	3.4	5.2	4.22	1.077	2
2	The use of LMS helps me to prepare learning activities	53.4	22.4	15.5	5.2	3.4	4.17	1.094	3
3	LMS provides effective learning for students	43.1	24.1	24.1	5.2	3.4	3.98	1.100	6
4	I will try to use LMS as part of my teaching activities	56.9	24.1	13.8	3.4	1.7	4.31	0.959	1
5	I intend to learn more about the functions and features of LMS	43.1	34.5	13.8	5.2	3.4	4.09	1.048	4
6	I like using LMS via mobile devices	19.0	13.8	32.8	22.4	12.1	3.05	1.276	10
7	LMS helps me to monitor students' performance	36.2	32.8	20.7	6.9	3.4	3.91	1.081	8
8	LMS saves my time as an instructor	32.8	43.1	13.8	5.2	5.2	3.93	1.074	7
9	I believe that LMS is easy to use	20.7	41.4	20.7	12.1	5.2	3.60	1.107	9
10	I would recommend others to use LMS	36.2	43.1	15.5	1.7	3.4	4.07	0.953	5

TABLE III. INSTRUCTORS' USAGE OF LMS TOOLS AND FUNCTIONS

No.	Item	always	Sometimes	Seldom	I don't use	Mean	SD	Rank
1	I use LMS assignment functions	58.6	25.9	6.9	8.6	3.34	0.947	3
2	I use Chatroom with my students	0.0	15.5	8.6	75.9	1.40	0.748	11
3	I use Discussion/Forum function to communicate with my students	13.8	25.9	10.3	50.0	2.03	1.154	9
4	I create Quizzes via LMS	22.4	25.9	17.2	34.5	2.36	1.180	7
5	I create digital book via LMS	5.2	12.1	12.1	70.7	1.52	0.903	10
6	I upload files via LMS	87.9	8.6	1.7	1.7	3.83	0.534	1
7	I create Folders via LMS	50.0	24.1	6.9	19.0	3.05	1.161	4
8	I use Label (information) function through LMS	36.2	13.8	6.9	43.1	2.43	1.365	6
9	I post URL links through LMS	36.2	37.9	6.9	19.0	2.91	1.097	5
10	I use Turnitin to check students' work (Plagiarism)	24.1	24.1	12.1	39.7	2.33	1.234	8
11	I post announcements via LMS	63.8	20.7	5.2	10.3	3.38	0.988	2

It is claimed by [27] that LMS includes several administrative, collaborative, and pedagogical elements that support and promote the learning process and aid in distributing online learning material. Results presented in Table III demonstrate that the utilization of LMS functions and tools varies according to the purpose of use. Administrative delivery functions are generally used, such as files, announcements, assignments, and folders, while interactive tools such as developing interactive books, chatrooms, and discussions are rarely used. This finding is consistent with [22], that LMS is widely used to focus on the delivery of learning materials rather than the creation and development of interactive practices. The study of [27, 28] documented the less use of interactive features of LMS. Having pointed this out, [6] emphasized that LMS is not only a platform for distributing learning materials but must be used appropriately to create an excellent venue for interactive and collaborative learning activities.

Previous work of [14] identified Moodle's actual use, a GUST-based learning management system, with 3600 students and 179 professors involved in this study. As shown in Fig. 1, the results showed low use of LMS interactive learning functions, such as interactive books and chat rooms, and moderate LMS administrative and management functions such as files and assignments.

C. Barriers to LMS Adoption

This section presents the results of instructors' perceptions about barriers to LMS adoption. Data were analyzed using percentage, mean, and standard deviation. The mean values, which are less than 3 in the ten items listed in Table IV, indicate that the instructors do not see the barriers as a fundamental element that hinders LMS use at GUST. Question 4 "The use of LMS via mobile devices is complicated," ranked first with a mean 2.88. The second item, which investigates students' active participation in LMS tools, got the second rank with a mean of 2.69. Comes third question 3 "LMS Interfaces confuses me" with a mean 2.53. Also, Question 10 "I did not get proper training about LMS" ranked 4, with a mean value of 2.47.

As for LMS usage via mobile devices, instructors are not sure to use LMS with mobile devices, which is consistent with a recent study by [14]. Regarding students being active in using LMS tools and functions depend heavily on instructors' attitudes toward technology. As reported by [34], some instructors do not consider LMSs' effective tools in teaching; instead, they utilize traditional strategies. For example, instead of encouraging the students to use LMS to enhance their knowledge, they undermine or avoid supporting them. Considering providing training programs, as in item 10 and the university's encouragement on the use of LMS as in item 9, revealed that instructors are not very much satisfied with training and management support. The motivation was identified as a critical factor in developing and sustaining community sense and success and achievement in an online learning environment [35].

Furthermore, it is stressed by [36, 4] that instructors should be prepared to teach, deliver, collaborate online digitized and provide learning resources, and evaluate students online. Besides, [4] concluded that preparing instructors for online teaching is a real challenge. Similarly, [37] claimed that the significant challenges of LMSs in Saudi Arabian institutions are a lack of or insufficient training and support, and infrastructure weakness in the institutions, and a lack of proper technical support.

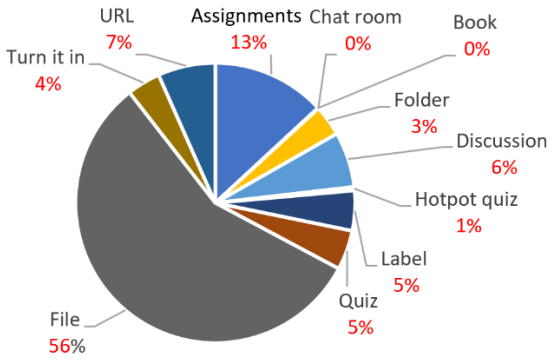

Fig. 1. LMS Functions Created by GUST Instructors [14].

TABLE IV. BARRIERS OF LMS ADOPTION

No	Item	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean	SD	Rank
1	I do not have enough experience to use LMS	3.4	5.2	17.2	43.1	31.0	2.07	1.006	9
2	Students are not active in using LMS tools	3.4	19.0	31.0	36.2	10.3	2.69	1.012	2
3	LMS Interfaces confuses me	3.4	13.8	31.0	36.2	15.5	2.53	1.030	3
4	The use of LMS via mobile devices is complicated	3.4	20.7	44.8	22.4	8.6	2.88	0.957	1
5	Limited Internet access restraint me from using LMS	1.7	20.7	12.1	36.2	29.3	2.29	1.155	6
6	Limited computer facilities restraint me from using LMS	1.7	13.8	10.3	44.8	29.3	2.14	1.050	8
7	Limited technical support restraint me from using LMS	5.2	6.9	15.5	50.0	22.4	2.22	1.044	7
8	There is a lack of security and privacy in using LMS	3.4	6.9	32.8	37.9	19.0	2.38	0.988	5
9	The University did not encourage me to use LMS	0.0	1.7	13.8	34.5	50.0	1.67	0.781	10
10	I did not get proper training about LMS	1.7	12.1	34.5	34.5	17.2	2.47	0.977	4

Other factors influencing the use of LMS resources, which was considered a barrier to implementation, as displayed in items 5 and 6 of Table IV, was the level of university support for internet access and the availability of computer facilities. Most instructors reported moderate and reasonable levels of internet access and computer facilities. The research findings also indicated that the university's level of technical support, security, and privacy, as shown in items 7 and 8 are not a barrier to adopting LMSs. As for other LMS implementation barriers, the study of [27] listed some challenges LMS implementations such as instructor commitment and lack of students and instructors' feedback. Moreover, [38] listed some technological barriers: infrastructure, network maintenance, and low bandwidth, which will impact the learning process with restricted access. Fear of usage was also reported as a barrier to LMS usage [17].

V. Conclusion and Future Directions

Many educational institutions use learning management system platforms are widely used by many educational institutions for administering and manage online courses creating a collaborative learning environment. Institutions should identify their needs and understand LMSs' functionality before investing in them. Barriers overcoming the implementation of LMS should be studied to ensure that all institutions will adopt a system to improve the learning process and academic performance. This research aims to examine current practices, opinions, and challenges that help academicians and system developers contribute to better learning practices and academic achievement. The study aims to gain instructors' perspective of LMS, investigate the use of its functions, and identify the barriers that may influence LMS utilization at the Gulf University for Science and Technology (GUST). A quantitative method that included a sample of 58 faculty members from GUST was used. Findings obtained from the questionnaire indicated that instructors were generally comfortable and had positive perceptions about Moodle, a GUST learning management system. The results revealed that LMS's administrative functions, such as files and announcements, are widely used compared to the advanced interactive learning activities such as interactive books and chatting. Besides, LMS's use on mobile devices is infrequent, and more emphasis must be placed on using LMS friendly user interfaces that can enable all tools and functions to use LMS. Besides, the proper adoption of LMS requires substantial technical training and encouragement by management.

Universities should encourage LMS use and focus on learning strategies through their rich tools and functions to achieve pedagogical objectives. LMS itself is not the optimal solution for student engagement in teaching and learning [39], stressing that instructors play an important part in inspiring learners to take advantage of LMS features. LMS demands a great deal of responsibility and requires instructors' technical skill due to its technical nature [38, 26]. Accordingly, universities should provide students and professors with appropriate training and guidance to use LMS tools and functions.

This study identified some minor barriers that can affect e-learning adoption, including student interaction with the system, complexity of the LMS interface, instructors' and students' readiness. There are also personal, technological, and institutional limitations. Personal includes confidence and awareness of LMS's potential and the functionality of tools and resources that enrich the teaching and learning process. Technological has the infrastructure, technical support, network bandwidth, and communication and collaboration tools to impact teaching and learning. Institutional barriers include strategic planning, management support, encouragement, motivation, and training programs to use, deliver, and develop e-learning courses.

Moreover, potential issues are cultural and social that play an essential role in accepting and adopting LMS. Instructors who have been resistant to using technology in teaching will be more likely to receive their newer teaching practices over time. Having pointed this out, educational institutions should help to teach staff to encourage the use of online instruction to be successful in their courses.

References

[1] K. H. M. Albasayna , Factors Influencing the Use of E-Learning in Schools in Crises Areas: Syrian Teachers' Perspectives, Tallinn University of Technology, Estonia, 2016.

[2] J. Zhang, D. Burgos and S. Dawson, "Advancing open, flexible and distance learning through learning analytics,," Distance Education, 40:3, DOI: 10.1080/01587919.2019.1656151, pp. 303-308, 2019.

[3] A. Aldiab, H. Chowdhury, A. Kootsookos, F. Alam and H. Allhibi, "Utilization of Learning Management Systems (LMSs) in higher education system: A case review for Saudi Arabia,"," Energy Procedia, vol. 160, pp. 731-737, 2019.

[4] A. Alenezi, "Barriers to Participation in Learning Management Systems in Saudi Arabian Universities," Education Research International. ID: 9085914. Hindawi. Accessed https://doi.org/10.1155/2018/9085914, 2018.

[5] N. Sayfouri, "Evaluation of the learning management system using students' perceptions," Medical Journal of the Islamic Republic of Iran, vol. 30, 2016.

[6] C. Chung, "Web-based Learning Management System Considerations for Higher Education.," Learning and Performance Quarterly, 1(4), p. 24–37, 2013.

[7] M. Azlim, K. Husain, B. Hussin and M. Zulisman, "Utilization Of Learning Management System In Higher Education Institution In Enhancing Teaching and Learning Process," Journal of Human Capital Developmen. Vol. 7 No. 1 January - June 2014, 2014.

[8] E. Dahlstrom, D. Brooks and J. Bichsel, "The Current Ecosystem of Learning Management Systems in Higher Education: Student, Faculty, and IT Perspectives," ECAR, September 2014. Research report: Available from http://www.educause.edu/ecar, Louisville, CO, 2014.

[9] Edutechnica, "4th Annual LMS Data Update," Edutechnica: Retrieved Dec. 2017 from: http://edutechnica.com/2016/10/03/4th-annual-lms-data-update/, 2016.

[10] C. Cigdem and G. Tirkes, "Cigdem, Cansu & Tirkes, Guzin. (2010). Open Source Learning Management Systems in Distance Learning," Turkish Online Journal of Educational Technology. volume 9 Issue 2, pp. 175-184, 2010.

[11] A. Lopes, "Learning Management Systems in Higher Education," in Proceedings of EDULEARN14 Conference 7th-9th July 2014, Barcelona, Spain, 2014.

[12] T. Scott, "8 Important LMS Features for Your E-Learning Program," 4 January 2017. [Online]. Available: https://technologyadvice.com/blog/human-resources/8-important-lms-features/.

[13] Y. Kats, , Learning Management System Technologies and Software Solutions for Online Teaching: Tools and Applications, Hershey, PA, USA: Information Science Reference, 2010.

[14] S. Al-Sharhan, A. Al-Hunaiyyan, R. Alhajri and N. Al-Huwail, "Utilization of Learning Management System (LMS) Among Instructors and Students," in Advances in Electronics Engineering, Lecture Notes in Electrical Engineering, vol 619, Singapore, Springer, 2020.

[15] J. Uziak, T. Oladiran, E. Lorencowicz and K. Becker, "2018. Students' and Instructor's Perspective on the use of Blackboard Platform for Delivering an Engineering Course.," The Electronic Journal of e-Learning, 16(1), pp., pp. 1-15, 2018.

[16] V. Singh and A. Thurman, "How Many Ways Can We Define Online Learning? A Systematic Literature Review of Definitions of Online Learning (1988-2018)," American Journal of Distance Education. Volume 33, Issue 4, pp. 289-306. https://doi.org/10.1080/08923647.2019.1663082, 2019.

[17] S. Alghamdi and A. Bayaga, "Use and attitude towards Learning Management Systems (LMS) in Saudi Arabian universities," Eurasia Journal of Mathematics, Science & Technology Education, 2016, 12(9), pp. 2309-2330, 2016.

[18] N. Emelyanova and E. Voronina, "Introducing a Learning Management System at a Russian University : Students' and Teachers' Perceptions," The International Review of Research in Open and Distance Learning, 15(1), p. 272–289., 2014.

[19] C. Pappas, "The Top 8 Benefits Of Using Learning Management Systems," 7 January 2016. [Online]. Available: https://elearningindustry.com/top-8-benefits-of-using-learning-management-systems. [Accessed 7 January 2020].

[20] L. Bacow, W. Bowen, K. Guthrie, K. Lack and M. Long, "Barriers to Adoption of Online Learning Systems in US Higher Education," Ithaka S+ R. Retrived 10 Dec. 2017 from: http://www.sr.ithaka.org/publications/barriers-to-adoption-of-online-learning-systems-in-u-s-higher-education/, New York, 2012.

[21] P. Venter, M. Rensburg and A. Davis, "Drivers of Learning Management System Use in a South African Open and Distance Learning Institution," Australasian Journal of Educational Technology. 28(2), pp. 183-198, 2012.

[22] M. Christie and R. Jurado, "Barriers to Innovation in Online Pedagogy," European Journal of Engineering Education, 34 (3), pp. 273-279, 2009.

[23] M. Hariri , "Students' Perceptions of the Utilization of Learning Management System (LMS) Features: A Case Study of a Geology Course at KFUPM, Saudi Arabia," International Journal of Technology Diffusion (IJTD), 5(4), 2014.

[24] R. Kraleva, M. Sabani and V. Kralev, "An Analysis of Some Learning Management Systems," International Journal on Advanced Science, Engineering and Information Technology, Vol.9 (2019) No. 4 ISSN: 2088-5334, 2019.

[25] N. Manochehr, "The Influence of Learning Styles on Learners in E-Learning Environments: An Empirical Study," Computers in Higher Education Economics Review (CHEER), V 18, pp. 10-14, 2008.

[26] E. Kanninen, Learning Style and E-Learning, Tampere University of Technology, 2008.

[27] A. Almarashdeh, N. Sahari, N. Zin and M. Alsmadi, "The success of Learning Management System among distance learners in Malaysian universities," Journal of Theoretical and Applied Information Technology, pp. 80-91, 2010.

[28] N. Adzharuddin and L. Ling, "Learning Management System (LMS) among University Students: Does It Work?," International Journal of e-Education, e-Business, e-Management and e-Learning, Vol. 3, No. 3, June 2013, 2013.

[29] D. Surry, D. Ensminger and M. Haab, "A model for integrating instructional technology into higher education," British Journal of Educational Technology, vol. 36, no. 2, p. 327–329, 2005.

[30] S. Al-Sharhan, A. Al-Hunaiyyan and H. Al-Sharrah, "New Efficient Blended E-Learning Model and Framework for K12 and Higher Education: Design and Implementation Success Factors," in Proceedings of the IEEE Fifth International Conference on Digital Information Management. (ICDIM 2010), July 05-08, 2010, Thunder Bay, Canada, 2010.

[31] S. Al-Sharhan and A. Al-Hunaiyyan, "Towards an Effective Integrated E-Learning System: Implementation, Quality Assurance and Competency Models," in Proceedings of The Seventh International Conference on Digital Information Management (ICDIM 2012) 22-24 August 2012, Macau, 2012.

[32] A. Al-Hunaiyyan, A. Al-Sharhan and R. Alhajri, "A New Mobile Learning Model in the Context of the Smart Classrooms Environment: A Holistic Approach," International Journal of Interactive Mobile Technologies (iJIM). Vol.11_No.3(2017), pp. 39-56, 2017.

[33] A. Kumar, "Make Your LMS Mobile Compatible in 4 Easy Ways," 2017. [Online]. Available: https://blog.commlabindia.com/elearning-design/4-ways-to-make-lms-mobile-compatible.

[34] L. Kyei-Blankson, E. Ntuli and H. Donnelly, ""Establishing the importance of interaction and presence to student learning in online environments," World Journal of Educational Research, vol. 3, no. 1, p. 48–65, 2016.

[35] M. Hartnett, "The Importance of Motivation in Online Learning," in Motivation in Online Education, Singapore, Springer, 2016.

[36] CoSN, "COVID-19 Response: Preparing to Take School Online," 1 March 2020. [Online]. Available: https://www.cosn.org/sites/default/files/COVID-19%20Member%20Exclusive_0.pdf. [Accessed 15 April 2020].

[37] L. Smith and A. Abouammoh, Higher Education in Saudi Arabia: Achievements, Challenges, and Opportunities, Dordrecht, Netherlands: Springer, 2013.

[38] M. AlKharang, Factors that Influence the Adoption of e-Learning An Empirical Study in Kuwait. Phd. Thesis, London: Brunel University London, 2014.

[39] J. Daniels, M. Jacobsen, S. Varnhagen and S. Friesen, "Barriers to Systemetic, Effective, and Sustainable Technology Use in High School Classroom," Canadian Journal of Learning and Technology, 39(4), 2013.