



## LEARNING MANAGEMENT SYSTEM USABILITY TOWARDS ONLINE LEARNING: A LITERATURE REVIEW

Bostley Muyembe Asenahabi<sup>\*1,2</sup>, Peters Anselemo Ikoha<sup>2</sup> and Alice Wechuli Nambiro<sup>2</sup>

<sup>1</sup>School of Science, Technology and Engineering, Alupe University College, Kenya.

<sup>2</sup>School of Computing and Informatics, Kibabii University, Kenya.

Article Received on 25/04/2022

Article Revised on 17/05/2022

Article Accepted on 06/06/2022

### \*Corresponding Author

**Bostley Muyembe**

**Asenahabi**

School of Science,

Technology and

Engineering, Alupe

University College, Kenya.

### ABSTRACT

Technological advances have revolutionized education. COVID-19 played a pivotal role as a catalyst for embracing technology enhanced learning. Without considering usability of the Learning Management Systems before their adoption may have a negative impact on the learning experience and lecturers may abandon the systems and opt for alternative online learning tools. This review paper highlights the

definition, categories, capabilities, usability attributes and research gap with respect to Learning Management Systems. This paper will be essential for university management as they gradually embrace Learning Management Systems for online learning.

**KEYWORDS:** Learning Management System, course management system, usability, online learning, distance learning,

### INTRODUCTION

When online and distance learning emerged, a lot of institutions of higher learning held back their urge to adapt this technology. However, as time went by, some top-notch institutions of higher learning globally began offering courses, professional certificates, and degrees online through the electronic Learning platform (Ohliati and Abbas, 2019). Institutions of higher learning have gradually increased the utilization of online learning platforms with a view of offering the best education delivery services to learners in the online environment (Ortiz and Green, 2019) despite not being used to its full potential by many lecturers.

The online learning environments provide flexibility for learners regarding time and place as well as a self-paced learning (Virvou & Alepis, 2013). Different systems have been developed for e-Learning. The systems that seem to provide a better solution to higher educational institutions are the learning management systems (LMSs). The main characteristics of these systems are that they are not static, are easily reusable and, therefore, can successfully address the needs of a higher educational institution such as a university that offers a variety of courses. LMSs provide the instructors the capability of designing and administrating their courses as they want.

The COVID-19 pandemic led to a rapid uptake of LMSs in most institutions of higher learning thus changing the learning experience of learners. Learners were tasked with self-study and exploring the learning content virtually. In today's ubiquitous digital environment, LMSs play an important role in enhancing and facilitating teaching and learning. Learning Management System is one of the best online learning platforms which not only enable the delivery of instructions and electronic resources to improve and augment student learning in a collaborative environment, but also allow instructors to focus on designing meaningful pedagogical activities (Turnbull, Chugh, and Luck, 2021).

There are several Learning Management Systems used for learning in institutions of higher learning like Moodle, Blackboard, Sakai, Canvas, Atutor and Google Classroom. Most of them offer similar capabilities like: content management where users can post text, links and either upload or download files; user account management where access to courses and learning content is controlled and record of activities are kept; communication through discussion forums, chats, private messaging, and e-mailing and evaluation through quizzes, assignments and grade book (Kaewsaiha, 2019). The main methods that have been deployed for analyzing LMSs are learning skills tools, productivity tools and communication tools (Kraleva, Sabani & Kraleev, 2019). Learning can take place on different devices like laptops, desktops, tablets and smart phones which increases the flexibility of the learning process.

Technology and tools which support online learning have evolved over time since the advent of online learning in the mid-1990s. Computer application designers have come up with several strategies of using different applications to enable the computer system to be used as an educational resource with multiple vocabularies used to relate to the computer use (Kehrwald and Parker, 2019). LMSs have been referred to using different terminologies like 'computer-based instruction (CBI)', 'computer-assisted instruction (CAI)', and 'computer-

assisted learning (CAL)', as general terms, to describe computer adoption throughout history. These terms apply to computer application programs, teaching, and design preparation, monitoring, giving approval, and disseminating learning content (Bradley, 2021).

There are many terms associated with LMSs and the technologies that have evolved to support it. One persistent area of confusion is in the definition of the acronyms: CMS and LMS. The term CMS is often associated with "course management systems". Course Management System is an application that stores learning content online, associate learners with the course, track performance of the learners, store content submitted by the learners and mediates communication between the learners and lecturers. Course Management Systems is a term that has been used inter-changeably with LMSs in a study by Kabassi, Dragonas, Ntouzevits, Pomonis, and Papastathopoulos, (2016).

LMSs have different online operations and work as a framework to capture numerous layers of progressive learning (Jung and Huh, 2019); behaves as a platform to distribute learning content and promotes specially designed information for capturing learner progress. This platform enables learners to engage with each other, register for lectures, track their grades, and check updates and course announcements (Al-Fraihat et al., 2020). The learners gain access to learning content and information disseminated by the instructor (Jung and Huh, 2019).

### **Learning Management Systems Categories**

The earliest manifestations of LMSs were little more than a platform for the dissemination of learning materials online. These systems could broadly be categorized as belonging to one of two groups: proprietary and open source. One of the earliest proprietary systems was WebCT, developed at the University of British Columbia in 1995. Other proprietary LMSs are Desire2Learn which was invented in 1999, Pearson's eCollege (2007), Edvance360, Jenzabar e-Racer (2009) and SharePoint LMS (Onacan and Erturk, 2016).

Open-source systems by contrast, were developed collaboratively by software specialists with a view to making the source code readily available to organizations and individuals free of charge. They were initially popular with universities and colleges who could readily download the source code, adapt it to their own circumstances, and build their own tailored Learning Management System solutions. A prominent example of an open-source system in operation globally today is Moodle, developed by Martin Dougiamas with the first version

released in 2002 (Susana, Juanjo, Eva, and Ana, 2015). The acronym Moodle stands for “Modular Object-Oriented Dynamic Learning Environment.” Moodle is arguably the most popular open-source Learning Management System in use today (Turnbull, Chugh, and Luck, 2019). Other open-source tools include Sakai which was invented in 2004, Canvas (2008), LoudCloud (2010), OLAT (1999) and Claroline (2001).

### **Learning Management System Capabilities**

Course management is one of the capabilities of a Learning Management System. It is the capacity to deliver relevant learning content to enrolled learners in a timely manner. It involves content management and control, class scheduling, and content-audit capabilities. The capacity for users to contribute to content creation in their own personal space could also come under this domain (Alturki and Aldraiweesh, 2016). They possess different functionalities like creation and management of course content, collaborative learning, text-authoring, institution resources management systems and virtual classroom management systems (Kumari, 2016).

Assessment is a critical function of Learning Management System. It should support the collection and storage of assignments, tests, projects, and portfolio evidence provided by the learner, along with the assignment of grades and feedback for each learner. Learning Management System should be capable of providing learners with real-time information on their progress in a course along with relevant feedback generated by the instructor (Nasser, Cherif, and Romanowski, 2011). This is in line with Al-Fraihat, Joy, Masa’deh, and Sinclair, (2020) who elaborates that the learning process is made sustainable as the online users monitor their learning progress as they study online. An optimum use of learning management system enables lecturers to come up with a constructivist strategy where learners contribute to their learning (Kitchen and Berk, 2016), the learners can collaborate through group-chats, monitor their grades and progress, participate in online discussions, and take assessments.

Tracking a learners’ progress is essential. Learners’ inability to clear their studies is an issue of great concern to institutions of higher learning. In an online environment, learners are at a greater risk of discontinuing their studies because of the lack of face-to-face contact. This makes the ability to track learner engagement in a course an essential feature. Learner tracking analytics can include log-on frequency, time spent in different sections of a course, communication interactions, and the number of resources downloaded. With appropriate

reporting functions, lecturers are able to detect possible learner performance deficits and intervene before course withdrawal or termination becomes likely (Turnbull, Chugh, and Luck, 2019).

Gradebook functions include all Learning Management System capabilities that facilitate the dissemination of assessment information to learners (Kumari, 2016). Such functions include individual scores of assessments, instructor feedback, and student attendance. The ability to generate aggregate reporting information such as class grades, item score analysis, and at-risk student information is included in this category.

Communication tools within Learning Management System can be broadly classified as synchronous or asynchronous. Asynchronous tools support one-way communications such as e-mail, discussion boards, or Wikis (Dias and Dinis, 2014). The lecturers can publish lecture content and learners work on it latter. Rathnayaka, Silva, and Senavirathne, (2020) explain that asynchronous online learning platforms were designed to facilitate online learning. This has made instructors embrace and appreciate knowledge sharing in the classroom by teaching and getting learners ready to complete their higher education irrespective of their physical location. Asynchronous mode of online learning is generally used to prepare contents for students and to facilitate and determine their learning levels (Chhanda, 2019). Synchronous tools, on the other hand, are two-way communication tools supporting real-time information interchange for instance chats which mirrors traditional classroom-based communications, thereby fostering a sense of community among online learners. Instructors and learners can share their content either synchronously or asynchronously through the aid of these tools (Castellano and Rabe-Hesketh, 2014). LMSs are greatly criticized for lack of inherent community. However, they possess some features like discussion forums and live chats which replicate the social environment (Dias and Dinis, 2014).

Security and privacy are of paramount importance to the success of an online course. Important security features in LMSs include user authentication, access verification, password integrity controls, and intruder detection. Privacy controls are also important to ensure that sensitive information is made available to the intended recipient only (Turnbull, Chugh, and Luck, 2019).

According to Onacan and Erturk, (2016), LMSs are critical instructional technologies which facilitate an automated dissemination of knowledge to learners. LMSs are formed by

integrating networked tools which enable distance learning. Thuseethan, Achchuthan, and Kuhanesan, (2014) explain that LMSs provides a learning environment which has neither time nor distance restrictions. They are designed to support the management of learning for conventional face-to-face education through blended learning using the online learning platforms.

Al-Fraihat and colleagues, (2020) pointed out that LMSs support media use and integration of online learning content. This enhances the capability of learners gaining more as relevant audio-visual clips and recorded lectures can be attached alongside the lecture notes. They are instructive systems that possess a platform for web-learning and allow for different functionalities to take place including information presentation, learning material presentation, submission and evaluation of assignments, interaction between instructors and peers, social networking sites and access to learning material. This is echoed by Alturki and Aldraiweesh, (2016) who postulate that they are fundamental platforms used for knowledge delivery in most course related activities for instance managing instructional content, discussions, making presentations and administering quizzes. All this, according to Kehrwald and Parker, (2019) is made possible by the composition of a learning management system which includes a variety of communication tools and media to promote learner choice.

Based on the reviewed literature, a generic learning management system should possess fundamental capabilities like lecture scheduling, disseminate knowledge, assessment of learner competency, recording of learner attainment, support for online social communities, communication tools, learner tracking and system security.

### **Learning Management System Usability Attributes**

LMSs have greatly influenced the efficiencies and effectiveness of the way students learn in institutions of higher learning. Naveh *et al.*, (2010) postulate that the significant increase in online enrolment and learning being experienced is an indicator that there is an urgent need of adopting and implementing a usable and autonomous learning management system.

LMSs have tremendously influenced the self-directed learning process which makes it accessible for students to learn from virtually anywhere in the world (Findık-Coşkunçay, Alkış, and Özkan-Yıldırım, 2018). Using LMSs for learning inculcates independence among learners (Nasser *et al.*, 2011). As learners gradually generate a pool of knowledge through discussion forums, they develop academic independence (Al-Fraihat, Joy, Masa'deh, and

Sinclair, 2020). By nurturing independence, the learners can autonomously perform tasks without fully relying on the lecturers (Shukla and Velma, 2019). Kumari, (2016) postulates that these platforms have the capability to store learning content such that learners can study independently, perform assignments and submit for evaluation.

Murcia, (2016) elaborates that constructivist mode of learning enables the learners to construct awareness by actively participating and assigns value to the learners' autonomy. The lecturers create an environment where learners can ask questions and use their inculcated knowledge to come up with new concepts. The learners have the opportunity to retain their independence, enthusiasm and motivation to learn.

It is essential to use the right learning management system and to improve it in accordance with the needs of the end-users as the effectiveness of learning management system affects the effectiveness of education processes. As an attribute of "acceptance" of the software usability, a metric to achieve quantified objectives possesses different attributes like effectiveness, efficiency, and satisfaction in a quantified context of use (Onacan and Erturk, 2016).

A study by Ziraba, Akwene, Nkea, and Lwanga, (2020) reveals that factors which determine the rate of adoption of LMSs in both developed and developing countries are: level of technological skills, internet access, availability of incentives and time management, attitudes towards use, self-efficacy, perceived usefulness. LMSs are unique and have specific functionalities which are not common to other websites. Online learning platforms enables learners to undergo their studies regardless of their geographical location.

You, (2016) conducted a study using a learning management system to find observable approaches to course learning attainment. The study included specifications for gathering information on self-controlled knowledge with learning management system specifications and learner attainment. The sample size was five hundred and thirty (530) learners taking an online course. This study required the instructors to use learning management system essential resources including assignments, syllabi, schedules, tips, discussion forums, relevant links, and support from the instructor. The study showed learners' rates of universal application, login sessions, delay, frequency, and checklists to make sure students were reading and reviewing information packets. The results also help predict learner course attainment. The results reveal the benefits of self-attained knowledge and the ability to front-

load specifications to support student attainment. Although data logged by a learning management system could support a progression of indicators, there is no guarantee it could increase the probability of the learner's achievement.

According to Reid, (2019) instructors can set up questions, examinations and other assignments with ease while students can work on them and upload their tasks and later receive feedback from the instructor. This is in tandem with Alturki and Aldraiweesh, (2016) who elaborate that Blackboard learning management system has been adopted at King Saud University. It affords lecturers a user-friendly set of end-user tools for teaching like the opportunity to post and access course material anywhere and anytime, easy access of the system to post lecture material, links of essential learning material, examinations and discussion board.

According to Schultz, (2012) Moodle offers the capability to create, edit and review training material. It affords the instructors and lecturers the use of graphics, databases, quizzes, survey, forums, wikis, chats, video transmission, web pages, Active X and Java technologies to enrich the lessons.

A study by Wang, Chen, and Khan, (2014) points out that Moodle is advancing online learning to a whole new level through the integration of cloud computing technology and mobile learning. A different study by Wang, (2012) points out that Moodle is interactive as it enhances students discussions on the platform. It has easily customizable options, easy to navigate through different sections, attractive to use, satisfies user needs, allows for the management of documents, graphics and web pages, communication with the learners through discussion forums and students' assesment as they progresss with their studies (Susana *et al.*, 2015). Issues explaining the factors that determine the rate of adoption and actual use of Moodle platform range from student perceptions, Perceived ease of use, perceived usefulness, attitude towards the use of Moodle and level of computer skills (Bhardwaj, Nagandla, Swe, and Abas, 2015).

Moodle has majorly been used in universities as a repository of learning content, assignments and essays which can be accessed by authorised users at any time (Medina, Martinez, Briones, and Hernandez, 2014). A research study carried out by Nunez *et al.*, (2011) points out that students who use Moodle in their studies perform better in their studies as their attention is always captured which enhances the learning experience. Learning content is

uploaded in thematic units which saves time for both the learner and lecturer while using this tool.

Wichadee, (2015) performed a study in Thailand and explained that LMSs, Moodle in particular, enables instructors to organize their lecture content. He further elaborates that Moodle offer an effective classroom management; it is user-friendly besides enhancing student performance. This is in agreement with a study performed by Islam, (2015) at a Finnish University about Moodle which pointed out that the students found it to be user friendly and easy to navigate through with negligible difficulty in making use of the platform to study and perform their assignments.

A study by Ziraba et al., (2020) points out that Moodle is a free and user-friendly Learning Management System which greatly enables instructors manage and edit their teaching content. Despite these, there are challenges which hinder the adoption of Moodle like lack of technological skills and attitude towards the use of Moodle platform. Different researchers revealed that some of the factors which determine the adoption of e-learning systems and Moodle in both developed and developing countries are: lack of technological skills, internet access, lack of incentives and time management, attitudes towards use, self-efficacy, perceived usefulness (Hanif, Jamal, and Imran, 2018; Ansong, Boateng, Boateng, and Effah, 2016).

In developed countries, studies by Kasim and Khalid, (2016) and Bhardwa, Nagandla, Swe, and Abas, (2015) revealed that factors that determine the adoption and actual use of Moodle platform range from student perceptions, Perceived ease of use, perceived usefulness, attitude towards the use of Moodle, level of computer skills. However, some of the challenges faced are lack of technological skills and attitude towards the use of Moodle platform.

Different researchers have investigated the use of Moodle learning platform from different perspectives like technological factors; human factors; social factors and reinforcement factors. Boateng, Mbrokoh, Boateng, Senyo, and Ansong, (2016) point out that information technologies have been adopted by institutions of higher learning as mediators in teaching and learning, a paradigm shift which empasizes on the use of LMSs to facilitate the learning process. E-learning systems have activities which allow leaners to actively participate in the online studies. If e-learning platforms and services are provided by academic institutions for studies, they need to be used and adopted by the learners and lecturers. Some of the factors

which may lead to faster adoption of the e-learning systems are ease of use and user friendliness. In most developing countries which are still in the e-learning adoption phase, it is essential to investigate the technology facilitating constructs such as Perceived Ease of use, Perceived Usefulness, Attitude, Behavioural intentions and actual use (Boateng *et al.*, 2016). Besides, Abdullah, (2017) insinuates that Technical readiness and Technical Support are the additional constructs/ factors, which influence attitudes and behavioural intentions to use the Moodle platform in higher institutions of learning.

### Research Gap

During the COVID-19 period, institutions of higher learning hurriedly put in place different LMSs by focusing on their cost and technical aspects. There is scarce evidence that they considered the usability of LMSs. This may have a negative impact on the learning experience thus negatively impacting learner performance and lecturers may abandon the systems and opt for alternative online learning tools. This review paper recommends that researchers should focus on LMSs usability as institutions of higher learning hurriedly adopted different LMSs to ensure that they remain afloat and competitive during and after the COVID-19 pandemic.

### CONCLUSION

Learning management system is a special application which enables learning to take place irrespective of the place, time and distance. It possesses fundamental capabilities like lecture scheduling, disseminating knowledge, assessment of learner competency, recording of learner attainment, support for online social communities, communication tools, learner tracking and system security. Some of the learning management system usability constructs are independence in learning, efficiency, effectiveness, urge to learn, Perceived Ease of use, Perceived Usefulness and user-friendly.

### REFERENCE

1. Abdullah, M. S. Analysis of the Factors for the Successful E-Learning Services Adoption from Education Providers' and Students' Perspectives: A case study of Private Universities in Northern Iraq. *EURASIA Journal of Mathematics, Science and Technology Education*, 2017; 143: 1097-1109.
2. Al-Fraihat, D., Joy, M., Masa'deh, R., and Sinclair, J. Evaluating e-learning systems success: An empirical study. *Computers in Human Behavior*, 2020; 102(1): 67-86.

3. Alturki, U. T., and Aldraiweesh, A. Evaluating the Usability and Accessibility of LMS "Blackboard" at King Saud University. *Contemporary Issues in Education Research*, 2016; 9(1): 33-44.
4. Ansong, E., Boateng, S. L., Boateng, R., and Effah, J. Determinants of E-Learning Adoption in Universities: Evidence from a Developing Country. *49th Hawaii International Conference on System Sciences (HICSS), Koloa, HI*, 2016; (21-30).
5. Bhardwa, A., Nagandla, K., Swe, K., and Abas, A. Academic Staff Perspectives Towards Adoption of E-learning at Melaka Manipal Medical College: Has E-learning Redefined our Teaching Model? *Kathmandu University medical journal*, 2015; 13(1): 12-18.
6. Bhardwaj, A., Nagandla, K., Swe, K., and Abas, A. Academic Staff Perspectives Towards Adoption of E-learning at Melaka Manipal Medical College: Has E-learning Redefined our Teaching Model? *Kathmandu University medical journal*, 2015; 13(1): 12-18.
7. Boateng, R., Mbrokoh, A., Boateng, L., Senyo, P. K., and Ansong, E. Determinants of e-learning adoption among students of developing countries. *The International Journal of Information and Learning Technology*, 2016; 33(4): 248-262.
8. Bradley, V. M. Learning Management System (LMS) use with online instruction. *International Journal of Technology in Education (IJTE)*, 2021; 4(1): 68-92.
9. Castellano, K., and Sophia Rabe-Hesketh, A. S. Composition, Context, and Endogeneity in School and Teacher Comparisons. *Journal of Educational and Behavioral Statistics*, 2014; 39(5): 333-367.
10. Chhanda, I. Using web conferencing tools for preparing reading specialists: The impact of asynchronous and synchronous collaboration on the learning process. *International Journal of Language and Linguistics*, 2019; 6(3): 1-10.
11. Dias, S. B., and Dinis, J. A. Towards an enhanced learning in higher education incorporating distinct learner's profiles. *Educational Technology and Society*, 2014; 17(1): 307-319.
12. Fındık-Coşkunçay, D., Alkış, N., and Özkan-Yıldırım, S. A Structural Model for Students' Adoption of LMSs: An Empirical Investigation in the Higher Education Context. *Journal of Educational Technology and Society*, 2018; 21(2): 13-27.
13. Hanif, A., Jamal, F. Q., and Imran, M. Extending the Technology Acceptance Model for Use of e-Learning Systems by Digital Learners. *IEEE Access*, 2018; 6: 73395-73404.
14. Islam, N. The moderation effect of user-type (educators vs. students) in learning management system continuance. *Behaviour and Information Technology*, 2015; 34(12): 1160-1170.

15. Jung, S., and Huh, J. H. An Efficient LMS Platform and Its Test Bed. . *Electronics*, 2019; 8(2): 154.
16. Kabassi, K., Dragonas, I., Ntouzevits, A., Pomonis, T., and Papastathopoulos, G. Evaluating a learning management system for blended learning in Greek higher education. *Springer Plus*, 2016; 5(101): 1-12.
17. Kaewsaiha, P. (2019). Usability of the Learning Management System and Choices of Alternative. *6th International Conference on Education and Psychological Sciences (ICEPS 2019)*. Tokyo, Japan.
18. Kasim, N., and Khalid, F. Choosing the right learning management system (LMS) for the higher education institution context: a systematic review. *International Journal of Emerging Technologies in Learning (iJET)*, 2016; 11(6): 55-61.
19. Kehrwald, B. A., and Parker, B. Implementing online learning: Stories from the field. *Journal of University Teaching and Learning Practice*, 2019; 16(1): 1.
20. Kitchen, R., and Berk, S. Educational technology: An equity challenge to the common core. . *Journal for Research in Mathematics Education*, 2016; 47(1): 3–16.
21. Kumari, S. Personalised, flexible and blended learning features of moodle-LMS. *Educational Quest*, 2016; 7(1).
22. Medina, M., Martinez, I. J., Briones, A., and Hernandez, E. (2014). Using Moodle virtual platform in teacher training for secondary school teachers that have little knowledge of ICT through a wrking group offered by the education administrator. . *8th International Technology, Education and Development Conference*. Valencia, Spain.
23. Murcia, J. A. Supported teaching autonomy support. *RICYDE. Revista Internacional de Ciencias del Deporte*, 2016; 12(43): 2-4.
24. Nasser, R., Cherif, M., and Romanowski, M. Factors that impact the usage of the learning management system in Qatari schools. . *The International Review of Research in Open and Distance Learning*, 2011; 12(6): 39-62.
25. Naveh, G., Tubin, D., and Pliskin, N. Student LMS use and satisfaction in academic institutions: The organizational perspective. *The Internet and Higher Education*, 2010; 13(3): 127-133.
26. Nunez, J., Cerezo, R., Bernardo, A., Rosario, P., Valle, A., Fernandez, E., and Suarez, N. Implementation of training programs in self-regulated learning strategies in Moodle platform: Results of an experience in higher education. *Psicothema*, 2011; 23(2): 274-281.

27. Ohliati, J., and Abbas, B. S. Measuring Students Satisfaction in Using Learning Management System. *International Journal of Emerging Technologies in Learning (iJET)*, 2019; 14(4): 180.
28. Onacan, M. B., and Erturk, A. Usability evaluation of Learning Management System in a Higher Education Institution: A Scale Development Study. *Journal of Global Strategic Management*, 2016; 10(2): 73-84.
29. Ortiz, S., and Green, M. Trends and Patterns of Mobile Learning: A Study of Mobile Learning Management System Access. *Turkish Online Journal of Distance Education (TOJDE)*, 2019; 20(1): 161-176.
30. R. Kraveva, M. S., and Kravev, V. An Analysis of Some Learning Management Systems. *International Journal on Advanced Science, Engineering and Information Technology*, 2019; 9(4): 1190.
31. Rathnayaka, T., Silva, I. D., and Senavirathne, B. (2020). Feasibility Study of Hologram Gamification in Sri Lankan Higher Education Distance Learning. *General Sir John Kotelawala Defence University, 13th International Research Conference*.
32. Reid, L. Learning Management Systems: The Game Changer for Traditional Teaching and Learning at Adult and Higher Education Institutions. *Global Journal of Human-Social Science: G Linguistics and Education*, 2019; 19(6): 1-15.
33. Shukla, V. K., and Velma, A. Enhancing LMS experience through AIML base and retrieval base chatbot using R language. In *2019 International Conference on Automation, Computational and Technology Management (ICACTM)*, 2019; (561-567). IEEE.
34. Susana, O., Juanjo, M., Eva, T., and Ana, I. Improving graduate students' learning through the use of Moodle. *Academic Journals*, 2015; 10(5): 604-614.
35. Thuseethan, S., Achchuthan, S., and Kuhanesan, S. (2014). *Usability Evaluation of Learning Management Systems in Sri Lankan Universities*. arxiv. Retrieved 2020.
36. Turnbull, D., Chugh, R., and Luck, J. (2019). Learning Management Systems: An Overview. In A. Tatnall, *Encyclopedia of Education and Information Technologies*.
37. Turnbull, D., Chugh, R., and Luck, J. Learning management systems: a review of the research methodology literature in Australia and China., 2021; 44(2): 164-178.
38. Wang, C. V. *Technology and its impact on educational leadership: Innovation and Change*. Florida, USA: IGI Global, 2012.

39. Wang, M., Chen, Y., and Khan, M. Mobile Cloud Learning for Higher Education A case study of Moodle in the Cloud. *International Review of Research in Open and Distance Learning*, 2014; 15(2): 141-149.
40. Wichadee, S. Factors Related to Faculty Members' Attitude and Adoption of a Learning Management System. *TOJET: The Turkish Online Journal of Educational Technology*, 2015; 14(4): 53-61.
41. You, J. Identifying significant indicators using LMS data to predict course achievement in online learning. *Internet and Higher Education*, 2016; 29(1): 23-30.
42. Ziraba, A., Akwene, G. C., Nkea, A. n., and Lwanga, S. C. The Adoption and use of Moodle Learning Management System in Higher Institutions of Learning: A Systematic Literature Review. *American Journal of Online and Distance Learning*, 2020; 2(1): 1-21.