**CHAPTER II**

**REVIEW OF RELATED LITERATURE**

**Definition of a Learning Management System**

The definition of a Learning Management System (LMS) has varied from time to time, and Altınpulluk, H., & Kesım, M. (2021) states that has changed in parallel to the developments of Information and Communication Technology (ICT). [Nguyen, N (2021)](https://www.sciencedirect.com/science/article/pii/S1029313221000336) states that a Learning Management System (LMS) can be considered as an important means of knowledge acquisition and learning management in the digital era. A Learning Management System is also defined as a software application or website that is designed to deliver courses, acquire knowledge and control learning ([Nguyen, N 2021](https://www.sciencedirect.com/science/article/pii/S1029313221000336)).

According to Albert et.al. (2021), Learning Management Systems promote the distribution of instructional resources to students by educational institutions. Though there are various definitions for Learning Management Systems (LMS), they all ultimately come to the same conclusion—that Learning Management Systems (LMS) are technological instruments that provide support in education.

**E-Learning and its prominence in modern era**

Distance-learning, online learning, and virtual learning are all different terminologies of E-learning which is short for Electronic Learning. It is defined as learning which is supported by technology. According to Muhammad, A. et.al. (2016) E-learning is defined as "the use of various technological tools that are web-based, web distributed, or web capable

for education" and E-learning materials as the wide set of applications and processes that use available electronic media and tools to deliver education and training. The materials that

fall under this category are E-books, Educational Videos, Learning Management Systems (LMS), Online Courses and reviewers.

The popularity and usage of E-learning materials have been growing year after as effect of the advantages it provides, such as flexibility, internet accessibility, and cost-effectiveness (Naveed, Q.N. et.al. 2017). This growth is also driven by the increasing availability of digital devices and the expansion of high-speed internet, which facilitates easier access to online learning platforms.

Rabiman, R. et.al. (2020) state that E-Learning shifts the role of traditional learning to be improved more effectively by taking advantage of students’ current habits and that E-Learning can improve teaching and learning activities to be more efficient. They also state that the development of E-learning technology is very rapid and that it is one of the reasons why it is important to be implemented and developed.

The study of Alqahtani AY and Rajkhan AA. (2020) concluded that the educational process worldwide has been interrupted due to the COVID-19 pandemic. E-learning is becoming much more necessary and is very important in education. They also found that educational institutions during COVID-19 faced the unique challenges of smoothly maintaining the process of learning. Therefore, a need for educational institutions to implement such things.

**Usage of LMS and its potential from perception**

Prestoza, M. J. (2024) has found that public school teachers in the Isabela Province of the Philippines frequently use cloud-based Learning Management Systems such as Google Classroom to integrate with their teaching. It is shown that public school teachers blended Google Classroom in their teaching methods and most of the time it is used for transferring their lessons, distributing assignments, facilitating class discussions, class announcements and posting reminders. This widespread adoption of Google Classroom demonstrates how technology can streamline administrative tasks and enhance the learning experience. By utilizing such platforms, teachers are able to provide more immediate feedback, support diverse learning styles, and create a more organized and interactive educational environment.

It is found that the acknowledgement of the importance of technologically-enhanced or Information and Communication Technology (ICT) based learning media are widely accepted by students (Wiratomo, Y. & Mulyatna, F. 2020). This acceptance highlights a growing recognition of the role that digital tools play in enhancing educational experiences and outcomes. The integration of Information and Communication Technology (ICT) in learning environments also prepares students for a digitalized world by developing their technological competencies.

According to research by Panergayo (2021), students’ perceptions regarding the usefulness and ease of use of Learning Management Systems could predict their intentions to use them. When students find Learning Management Systems to be both beneficial and user-friendly, they are more likely to integrate these tools into their learning practices.

According to the study by Garcia, M.B (2017), it is revealed that internet connectivity experience has a positive relationship with perceived ease of use to Learning Management

Systems (LMS) and E-Learning as a whole. Additionally, students are more likely to adopt and use the system given the high-speed internet.

**School Implementation of a Learning Management System**

**A. Challenges in Implementation**

In accordance with the studies of Al-Hunaiyyan, A. et, al. (2020), Instructors and students often do not use the more advanced features of Learning Management Systems (LMS). They find that the elements that foster interaction, cooperation, and engagement are the most effective at encouraging user involvement. With the rise in the use of mobile devices, it is important for learning environments to be mobile-friendly. This means LMS platforms should support mobile access to course materials and collaboration. To encourage users to take full advantage of all LMS features, it's crucial to pay more attention to mobile user interface design.

Additionally, the COVID-19 pandemic brought exceptional challenges to Afghan universities, especially with the accommodation of Learning Management Systems (LMS) like Higher Education Learning Management Systems (HELMS) occurring for the first time. As organizations shifted to distance learning, they faced major challenges across faculty, students, and administration. This novel fulfillment of Higher Education Learning Management Systems (HELMS) highlighted a crucial gap: the lack of prior research on its effectiveness and challenges in the Afghan context. Previous investigations on Learning

Management Systems (LMS) usage in Afghanistan (Mohammad, M. et.al. 2021), when anything too general or exclusively targeted, fails to address its own specific problems and their causes that are related with Higher Education Learning Management Systems

(HELMS) during the pandemic. Thus, there is a pressing need for directed research to understand and improve the use of Higher Education Learning Management Systems

(HELMS) in Afghan universities, ensuring better support and adaption for all stakeholders involved.

The findings of Dlalisa, S. and Govender, D. W. (2020) reveal a significant gap between the intended and actual use of the Blackboard LMS by academics. Although there is a clear intention among academics to use the authorized LMS, the actual utilization is minimal, especially in student-centered educational activities. This discrepancy is largely attributed to varying levels of computer proficiency and limited expertise with the LMS among academics. The results suggest a need for more comprehensive training and upskilling for all educators responsible for teaching. By enhancing their skills in using LMS systems, academics would be better equipped to integrate these tools effectively into their teaching practices, thereby improving both acceptance and usage of the technology.

Moreover, as stated by Fahad, T. et.al. (2024), Learning Management Systems (LMS) are designed to facilitate effective course setup and administration, offering clear benefits for teaching. Despite these advantages, many faculty members and university staff remain reluctant to fully embrace LMSs in their teaching practices. The underuse of LMS technology in higher education settings is influenced by various factors, including teachers' self-efficacy, instructional goals, and perceptions of the system. Additionally, the availability of time, support services, and resources plays a significant role. Educators are pivotal in integrating new technologies into the classroom, making it crucial to identify and

address the factors that motivate and drive them. Understanding these elements is essential for fostering an environment where technology is effectively encouraged and utilized to enhance student learning.

**B. Benefits in Implementation**

Learning Management Systems (LMS) play a crucial role in enhancing the efficiency and accessibility of education by streamlining processes and making educational resources more accessible. To fully realize their potential in the evolving field of E-Learning Software Development Services in 2024, LMS platforms need to adapt to new technologies, implement a well-rounded strategy, and address various technical issues (Saranya Kannan 2024). This means integrating advanced technologies to keep pace with innovation, ensuring a comprehensive approach that balances various needs and challenges, and resolving technical problems to provide a seamless and effective learning experience.

**Start Here**

The convenience of LMS extends to tutor training programs, where tutors can access training materials on their cell phones or other electronic devices, both during in-person sessions and remotely. This flexibility allows them to engage with the content, ask questions, and participate in discussions from virtually anywhere, making learning more accessible and interactive.

Younger students are still developing basic skills, using an LMS can be more challenging for them, requiring extra time to teach navigation and digital literacy. Because of their enhanced interactivity and adaptability, learning management systems (LMSs) are particularly useful for improving students' academic experiences in upper grades.

The findings of the research line up with those of Thouraya, who listed a number of benefits of learning management systems (LMS), such as the simplicity of creating and delivering online courses, the ease of carrying out exams online, and the accessibility of course materials. This study also highlights the ways in which LMS systems can improve interaction and communication in the classroom while saving plenty of time and money for teachers and students. Collectively, these studies highlight the many advantages of LMS in modern education.

The study reveals significant differences in how different academic fields use learning management systems (LMS). Individuals noted that LMS platforms are commonly used to assist educational activities in fields such as science, engineering, and medicine, where they are strongly connected. On the other hand, LMS use is more irregular and less common in the humanities and arts.Individuals highlighted the main advantages of learning management systems (LMS) in the UAE educational system, highlighting how simple it is to set up, deliver, and grade online courses. Additionally, learning materials are more readily available and accessible thanks to LMS systems, which improves resource access for both teachers and students. For both students and teachers, this better accessibility leads in significant time and money savings.

All training materials, resources, and data are securely maintained via Learning Management Systems (LMS), which provide a cloud-based platform that improves accessibility by enabling remote logins. This convenience reduces the need to travel in order to attend classes, saving time. It also eliminates the need for physical presence. By encouraging learners to actively participate in tasks like answering questions, having group conversations, and participating in competitive exercises, the interactivity included in eLearning through LMS improves engagement. By using a learner-centered approach, the course results are enhanced and the learning process is made more interesting. Furthermore, LMS reduces the reliance on actual instructors by doing away with the requirement for traditional physical resources like printed materials, classroom settings, and equipment rentals. The only resources needed for online training through an LMS are the learners' focus and an internet connection; they can finish courses without having to spend time and money on lodging in hotels or going to training locations.

**C. Security of Implementations**

There are many security issues like as authentication, availability, confidentiality and integrity attacks is investigated under this work and specially an authentication attack from the above issues is carried out throughout the paper. Further, in authentication the session attack and design attack problems are rectified by using SSL (secure socket layer) and login with Captcha implementation respectively.

SSL (Secure Sockets Layer) is the solution to avoid session hijacking problem. SSL is the standard security technology for establishing an encrypted link between a web server and a browser. Moodle already has a choice for using SSL over certain critical actions. However such method cannot avoid session hijacking and user name prediction. In order to avoid such attacks, the entire site must create SSL connections with its clients.SSL (Secure Sockets Layer)link ensures that all data passed between the web server and browsers remain private and integral.

The cloud-based elearning is a step forward for traditional LMSs since it uses cloud computing infrastructure. The services provided by these companies can affect the educational system thanks to new technology advances such as smart phones, expert systems, and cloud computing. This proposed paradigm offers a feasible solution to the efciency and security issues. Confidentiality and security integrity are two of the most basic cloud concerns. The amount of the data sent concerns the user’s personal information. Cloud storage issues are addressed using cryptography and steganography techniques. Cryptography is one of the most extensively used and well-known methods for information security on a network. Additionally, the minimal cost of installation and the adaptability with which it can be altered to meet changing needs are two of the most compelling arguments for using cryptography for security.

The recommended security technique achieves data security, enhanced security, low delay, verifcation, and secrecy criteria.

The current study found that students with high participation had both high engagement and high performance. It can, therefore, be put forward that high levels of student participation can lead to effective learning. Designing online learning environments to help students interact (i.e. creating digital interactive tutorial videos) can enhance student participation and foster effective learning (Zhang, Zhou, Briggs, & Nunamaker, 2006). Technology and interface characteristics influence student interaction and participation (Vonderwell & Zachariah, 2005). Venugopal and Jain (2015) suggested providing a supportive technologybased learning environment by utilising various features available on most LMSs, which in turn positively impacts student engagement in the online learning scenario. Within the scope of the current study, asynchronous LMS activities such as interactive quizzes and digital instructional videos were included for the purpose of facilitating student interaction. These tools enable students to participate in their courses in different ways. Accordingly, it is of crucial importance to use online learning environment designs that foster student participation and interaction. Such designs enhance student interaction within the LMS system, which also promotes student engagement. Students with high levels of engagement are more likely to achieve high levels of learning. Closely monitoring student participation and participation patterns can help instructors to determine students’ needs and then to support their learning accordingly.

**Somehow related to perceptions:**

The assessment of Learning Management Systems (LMS) interprets that evaluating these systems is crucial for the effective implementation of distance learning courses. This data indicates that the important factors impacting distance learners' satisfaction include four independent variables: information quality, service quality, perceived usefulness, and system quality, along with two dependent variables: net benefit and user satisfaction.

In particular, system quality has the greatest impact on student LMS quality satisfaction.

System quality is user-system interaction effectiveness. System quality includes perceived usability, help options, speed, user-friendliness, security, and responsiveness. This study found that system quality explains 18.8% of student LMS adoption. Students adopted their LMS because it met their quality expectations.  
  
Information quality impacts LMS usability. If the LMS provides clear, accurate, and complete information, learners will find it easier to use. High information quality satisfaction influenced the study's respondents' LMS adoption. Survey respondents rated information quality the highest of the three LMS characteristics and explained