REVIEW OF PREVAILING TRENDS, BARRIERS AND FUTURE PERSPECTIVES OF LEARNING MANAGEMENT SYSTEMS (LMSS) IN HIGHER INSTITUTIONS

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ABSTRACT
Online learning is growing in popularity as education continues to revolutionise with existing and evolving technologies. Institutions and organisations alike are utilising online learning to respond to the demands of learners for a more convenient and adaptable Technology Enhanced Learning (TEL) system to sustain a progressive pedagogy. This is shown during the novel coronavirus (Covid-19) epidemic that has impacted educational institutions worldwide. Also, an online portal provides a platform for students to effectively study various courses with self-assurance; supported by various institutions to ensure the accuracy of information available. This review aims to provide an informed overview of e-learning platforms and review different features of Learning Management Systems (LMS), while exploring its implications, general issues and challenges. Additionally, the study approaches the e-learning pedagogical perspective in Azerbaijan. Furthermore, the review adopted the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist for the standard reporting.
Keywords: Learning Management System, internet-based learning, higher education, open source and proprietary e-learning, virtual classroom.

INTRODUCTION

The use of technology in the field of education has rapidly expanded, revolutionised learning approaches and improved the quality of learning. Information and Communication Technology (ICT) has facilitated an increase in the rate of user adoption of e-learning, improved access to quality education and communication between learners and educators (Al-Fraihat et al., 2017; Holmes & Prieto-Rodriguez, 2018). Many scholars have defined e-learning in various ways in extant literature (Rosenberg 2001; Longmire et al., 2002; Riahi, 2015; Rodrigues et al., 2019). Although, this study adopts the definition of Riahi (2015) who defined e-learning as an internet-based learning method that increases efficiency in education. Notably, ICT has altered the learning process. As a result, students are afforded the opportunity of transitioning from the traditional classroom-based system to an ICT-based virtual environment by utilizing existing and novel internet technologies for effective learning. Similarly, educational platforms provide support to learning institutions to effectively develop and administer online classes while evaluating and monitoring student performances. The novel coronavirus (Covid-19) pandemic has compelled universities to re-evaluate their course delivery methods. Many universities have adopted a blended learning approach which combines conventional face-to-face teaching methods and online classes.

Online learning is at times considered similar to distance education that is applied in several institutions. Distance education involves the use of programmes or software applications to facilitate a learning process and communication between learners and instructors in various locations (Keegan, 1986). This can be remotely done in many ways. Online learning is employed in open universities to enable off-campus students to interact with educators and other learners via an asynchronous approach. Namely, an asynchronous learning approach is implemented through online channels without the need for real-time interaction whereas synchronous learning occurs in real time (Kasim & Khalid, 2016). Moreover, four major types of e-learning system are categorized into: Learning Management System (LMS), Learning Content Management System (LCMS), Learning Design System (LDS), and Learning Support System (LSS) (Adams et al., 2005). According to Pange & Pange (2011), e-learning system are based on the underlining principles of four learning theories: Active Learning, Behaviourism, Cognitivism and Constructivism. Particularly, institutions and managers require online learning strategies that consider their specific institutional or organizational requirements. In addition, the functionality of online learning systems prior to its adoption by institutions ought to be considered. Therefore, this review document will examine more carefully, Learning Management System (LMS), its significance, issues and challenges.

The rest of this paper is organised as follows: Section 2 examines LMS and various types of LMS commonly used. Section 3 examines the benefits and limitations of online learning. Section 4 discusses open source and commercial LMSs. Section 5 reviews e-learning in Azerbaijan. Section 6 concludes the article and provides

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potential future research directions for online learning in Azerbaijan.

METHOD

The review was carried out in three (3) phases. First, we identified the inclusion and exclusion criteria. Next, we selected data from the sources using search strategies. Last, we then summarised the results. Additionally, the review applied the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist to report this review uniformly (Moher et al., 2009). Specifically, a total of 101 records were identified through database search while 15 additional records were from other sources. The databases include Google Scholar, Science Direct, CiteSeer, DOAJ and Web of Science. After, 53 records were screened with 30 studies identified and maintained for the review. Finally, the review included a total of 30 articles that were published from April 2005 to September 2019. The PRISMA model adopted for this study is shown in Figure 1.

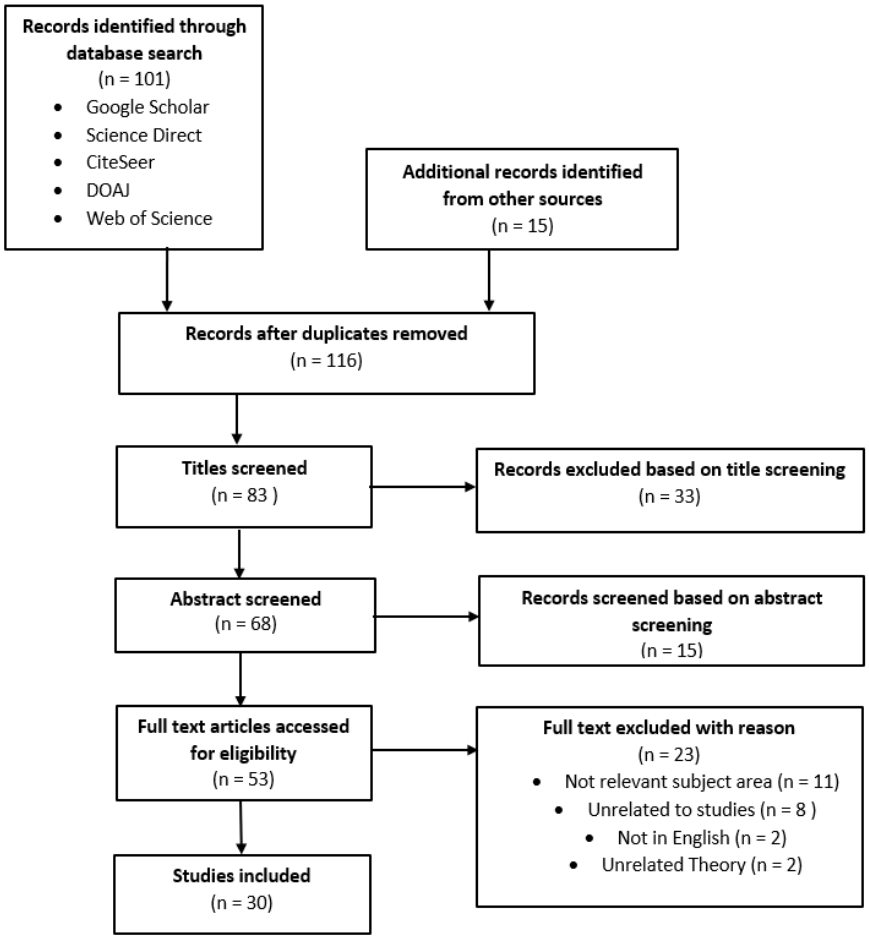

Figure 1: PRISMA flowchart employed for selection criteria (Moher et al., 2009; Barteit et al., 2020)

LEARNING MANAGEMENT SYSTEMS (LMS)

Learning Management System (LMS) is a wider concept used to characterize a variety of systems that provides online educational services to learners, educators, and administrators (Aldiab et al., 2019). The system manages and administers online learning content and resources on a diverse range of topics to learners. Moreover, LMS has gained widespread acceptance by several institutions across the world to support teaching and learning. According to Technavio (2020), organisations are considering upgrading their existing LMS with state-of-the-art systems to address the demands and challenges because of the Covid-19 pandemic. The LMS market share is projected to grow by12.48 billion USD from 2020 to 2024 (Technavio, 2020). The literature shows that LMS is an invaluable web-based technology developed to deliver, track, report, assess and manage online training (Aldiab et al., 2019; Cavus & Alhih, 2014). Over the past years, the educator enabler has evolved and presently offers diverse forms of learning such as classroom learning; online training programs and hybrid forms like blended pedagogy and flipped classrooms.

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The various LMSs draw on theories in psychology, sociology, philosophy and cognitive science (Mohammed et al., 2018). Essentially, early educational systems were based on the Behaviourist Learning Theory (Pange & Pange, 2011). According to Behaviourist Learning Theory behaviour is determined by the environment through either association or reinforcement (Pange & Pange, 2011). Incidentally, two theories employed in e-learning include Social Learning Theory (Bandura, 1977; Pinho et al., 2019), Cognitive Learning Theory (Prestine & LeGrand, 1991) in addition to other theories. Besides, these theories have enabled LMS to be enhanced and transformed into a robust classroom application to manage curriculum, provide rich-content courseware, assess and evaluate learners and collaboration due to major innovations (Mershad & Pilar, 2018). Next, several institutions have implemented different modes of LMS such as Virtual Learning Environment (VLE) or Course Management System (CMS) that exclusively grants access to users with valid login credentials (Adharuddin, 2013). Particularly, *gated* portals provide learners with online or blended learning approaches (Adams et al., 2005). The blended learning approach combines traditional face-to-face learning with an online course delivery method. Furthermore, LMS supports robust learning by enabling the storage and retrieval of training resources in structured formats.

Typical features of LMS and Common LMS Systems

LMS is a regarded as a highly beneficial content distribution system that helps educators to share course content and interact with students regardless of their geographical location (Mershad & Pilar, 2018). The concept of LMS is an essential communication and interaction tool that is valuable to students and educators in an online learning environment. Thus, the system is viewed as a next-level internet-based technological system for organising, distributing and handling several educational activities in a group (Mershad & Pilar, 2018). This is achieved through virtual classrooms and instructor-led classes that assess special educational needs. Additionally, LMS is envisaged to provide continued support to educators in delivering online training resources with interactive features such as online forums, thread discussions and file sharing. Equally, it provides support to various administrative task including delivery and tracking, planning examination, live virtual classes, digital collaboration and statistical analyses (Radwan et al., 2014; Chang et al., 2017).

The majority of LMS are tailored to organization needs (bespoke), yet, they may all provide similar basic features (Adharuddin, 2013). The basic features include creating and managing existing courses, user registration, developing self-marking quizzes and tests, automated grading and scoring, students' marks allocation system, reports generation and student data records (Radwan et al., 2014). Prior to the inception of LMS, internal email systems were typically used as the primary form of communication between educators and learners in various institutions. However, the LMS integrated messaging system is rapidly replacing the existing internal emailing systems. Moreover, LMS have become more viable technologically, operationally and economically (Palvia et al., 2018). In Europe, Moodle is commonly used (65%) by institutions, while Blackboard is used by 89% of public universities in the Kingdom of Saudi Arabia (Aldiab et al., 2019; Kuran et al., 2017). Table 1 shows the most frequently adopted LMSs.

Table 1: Commonly used LMSs (October, 2019)

Learning Management System (LMS)	Number of Users (Approx.)
Moodle LMS	78,000,000
Edmodo LMS	72,000,000
Quizlet	50,000,000
Google Classroom	40,000,000
Absorb LMS	9,613,198
Instructure Canvas LMS	30,000,000
Schoology LMS	20,000,000
Blackboard Learn LMS	4,000,000

As can be seen in Table 1, Moodle has about 78 million active users followed by Edmodo 72 million, Quizlet 50 million, Google Classroom 40 million, Absorb LMS about 9.6 million, Instructure Canvas 30 million, Schoology 20 million and Blackboard Learn 4 million users.

BENEFITS AND LIMITATIONS OF ONLINE LEARNING SYSTEMS

Benefits of Online Learning Systems

In the digital era where social, educational, economic and political activities continue to depend on ICT, many institutions have started to leverage ICT to enhance teaching and learning experiences. ICT usage in education has presented greater learning experiences and perceived benefits. Some beneficial impacts of e-learning are:

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- E-learning facilitates internet-based learning to promote independent and dynamic learning.
- An LMS enables several resources to be linked in different formats.
- It helps to effectively deliver course content online and offers fewer restrictions on course completion time due to its availability and adaptability to specific learning styles.
- Online learning is viewed as a more efficient and cost-effective learning approach.
- Course resources are readily available and accessible to facilitate dynamic learning for non-traditional students in full time employment.
- E-learning integrates online based discussion boards and messaging services for learners and educators to interact with each other on various subjects and topics.
- Online learning audio and video recordings can be shared and reused by both learners and educators to reinforce learning.

Limitations of Online Learning Systems

As technology is changing the educational experience, online learning offers interesting prospects to both educators and learners. Despite this, online learning is faced with a number of challenges, for instance, student's resistance to migrate from traditional classrooms to virtual online-based classrooms. Noteworthy, many institutions are still lacking efficient ICT infrastructure and effective internet access to facilitate online learning. Furthermore, other challenges of online learning are discussed in the subsequent sub-sections.

Motivation: The majority of learners with low motivation may not achieve their student learning goals as their progression is not monitored physically. The flexibility of the course delivery method may lead to learners with low levels of motivation to become lazy and exhibit indolent behaviour. Moreover, the absence of a fixed schedule and deadlines may lead to less motivated students and subsequently, high rates of online course dropouts.

Cost: To enhance and maintain security of online learning platforms, organisations may be required to purchase additional capital intensive specialised software and hardware. This additional cost may discourage some organisations from adopting online learning platforms.

Feedback and Assessment: Computer marked assessments are generally knowledge-based as compared to practical-based, and this may be insufficient to judge the depth of a student's knowledge. Occasionally, face-to-face study materials are more effective than online learning which does not always offer two-way communication. Thus, the lack of personal feedback may deter users of the system and in turn affect its usage and adherence.

Authentication: It is easier to authenticate assessments in traditional physical classrooms as compared to online-based classrooms that involve some level of digital literacy. This may affect the reliability of the assessments in online-based classrooms.

Compatibility: In some countries, issues of compatibility and restrictions is an impediment to the adoption and utilization of e-learning system which may impact acceptance by its citizens.

LMS STANDARDS

Presently, there are several LMSs available to institutions and organization for online courseware management and delivery. LMS operates on three common platforms: open source, commercial and cloud-based or Software as a Service (SaaS) platforms (Adharuddin, 2013), however, the focus here is on open source and commercial software.

Open Source LMS

Open source LMS platforms are developed under a GNU General Public License (GPL) and operate without a licensing fee that allow users to download the source code (Radwan et al., 2014). Additionally, open source platforms permit users to modify the program source code based on individual requirements and specifications. In that way, users are allowed to fully utilise and adapt the software to their specific requirements. Likewise, institutions can seamlessly switch or upgrade their services in the future. A limitation with this platform is that the installation process is time-consuming. Furthermore, the platform requires hosting services, and regular updates and maintenance for continued effectiveness. Open source platforms include Moodle, Sakai, ATutor, Claroline, MyGuru2, and MyLMS (Dobre, 2015; Cavus & Zabadi, 2014; Kaya, 2012). Bayramova & Aliyev (2019), noted that MOODLE is among the most extensively used LMSs in tertiary education institutions; employed as a teaching and learning tool.

Moodle, Sakai, ATutor, and Blackboard supports synchronous and asynchronous interactions (Kasim & Khalid, 2016). Moreover, Moodle and Sakai offer private area for writing of drafts, journaling, and management of private data (Mershad & Pilar, 2018; Cavus & Zabadi, 2014). Furthermore, both platforms allow users to view

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other course participants that are online. Especially, users of Moodle, Sakai, ATutor and SuccessFactors can exchange private messages (Mershad & Pilar, 2018; Cavus & Zabadi, 2014).

Generally, all platforms share common usability features such as user-friendly, ease of use, accessibility and flexibility (concurrently), while two platforms: Sakai and SumTotal provide support for integration with other systems. Beyond that, only ATutor enables collaboration between educators and learners. In addition, it provides distributed file storage to share and store course content in various formats (Cavus & Zabadi, 2014). Then, Moodle is a commonly used open source e-learning platform that focuses on course content delivery for personalised learning environments (Kaya, 2012). As well, SuccessFactors enables system administrators' control over system user level access and privileges. Finally, SumTotal provides context learning, aptitude assessments, and diverse tools to improve workforce performance management.

Commercial LMS

These systems are known as commercial or proprietary and require license under exclusivity of the legal protection that belongs to the owner of the copyright (Dobre, 2015). In contrast with open source platforms, they are restricted from user distribution and customisation. Commercial platforms include Blackboard, SuccessFactors, SumTotal, Litmos, Angle Learning, Geo Learning, Cornerstone and Connect Edu Moodle (Dobre, 2015; Cavus & Zabadi, 2014). Table 2 shows comparisons of open source and commercial LMSs.

Subsequently, commercial LMS require an annual subscription license inclusive of maintenance fee to guarantee regular service updates (Dobre, 2015). Moreover, commercial LMS require developed infrastructure equipped with labs, networks and computers among others. Furthermore, servers and computer systems are required for installation. Incidentally, one of the main barriers to institutional adoption and usage of specific commercial platforms is that administrators are not permitted to constantly modify the system to better fit the user's requirements. Thus, this may have an effect on the adoption and usage of commercial LMS by educators, learners and organisations. However, institutions expect to continuously adapt system features based on institutional needs and user experience for effective delivery of training that is in tandem with learners targeted goals.

Table 2. Comparison of Open Source and Commercial LMS (Alsabawy et al., 2016; Ulker & Yilmaz, 2016; eLearning Chef, 2014)

Open Source LMS	Commercial LMS
The majority are free to use and distribute without any license fee.	Requires a license for its usage and distribution.
Requires advanced technical skills for installation and support.	Technical support is offered within the paid service agreement.
Data protection is the user's responsibility.	System Security guaranteed by the supplier.
Their security vulnerabilities can be detected quickly while updates for the system are distributed among the user community.	System security and updates are provided by the vendors.
Open source platforms are flexible and scalable and can be easily adapted and integrated with other systems.	System integration dependent on supplier.
Freely accessible software	Proprietary software

E-LEARNING IN AZERBAIJAN

In regard to e-learning in Azerbaijan, the Ministry of Education of Azerbaijan implemented two national programmes on e-learning in separate phases. The first, *Provision of ICT for Education* ran from 2005 to 2007 and subsequently, *Informatization of the Educational System* from 2008 to 2012 (Chang et al., 2017). Notably, the National eLearning Network supports the advancement and usage of e-Learning at higher institutions and education training centers nationwide. Alsabawy et al. (2016), maintained that e-learning represents a considerable investment in infrastructure for higher institutions. Indeed, there exists a considerable body of literature on studies on education in Azerbaijan, however, literature related to e-learning remains limited (Muradkhanli, 2011; Muradkhanli & Atabeyli, 2012; Chang et al., 2017; Ng & Tan, 2018; Bayramova & Aliyev, 2019). According to Muradkhanli & Atabeyli (2012), eResources have been successfully integrated into classrooms while eLearning centers were established in numerous higher institutions in Azerbaijan to support learners. Three higher institutions, Khazar University, Azerbaijan Tourism University and the defunct Qafqaz University launched e-learning initiatives and centers (Chang et al., 2017; Muradkhanli & Atabeyli, 2012;

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Muradkhanli, 2011). To this end, they constituted e-learning teams and developed institutional frameworks to implement e-learning pilot projects (Muradkhanli & Atabeyli, 2012).

The successes of these projects facilitated the establishment of Azerbaijan eLearning Network to promote the growth and development of e-learning at educational and training institutions in Azerbaijan (Ng & Tan, 2018; Chang et al., 2017; Muradkhanli & Atabeyli, 2012). Numerous universities in Azerbaijan such as Khazar University have adopted a blended learning approach to facilitate a more effective pedagogy (Muradkhanli & Atabeyli, 2012). Other higher learning institutions that have also adopted e-learning include Azerbaijan State Pedagogical University, Azerbaijan University of Languages, Baku Slavic University, Ganja State University, Nakhchivan State University and Sumgayit State University (Bayramova & Aliyev, 2019). A recent study by Kireev et al. (2019) on two universities in Kazakhstan and Russia observed that the use of blended learning for studying various bachelor's degree technical courses had a positive impact on students' results.

A case study on the use of online education in various Azerbaijani higher institutions reveal that despite a number of positive indicators, e-learning adoption has not received due consideration in the Azerbaijan educational sector (Aliyeva & Rzayeva, 2019). This is because the mechanisms for the implementation of e-learning in institutions of higher education have not been fully developed. Additionally, their study identified the need to theoretical knowledge about the organization and management of technology (Aliyeva & Rzayeva, 2019). While Chang et al. (2017), performed a study on students' behavioural intention to use e-learning in Azerbaijan and suggested that e-learning system developers ought to make the system more user-friendly and practical. In turn, a more user-friendly and practical system will increase the usefulness of the system, its adoption and usage. Furthermore, it is essential to increase awareness on online education and create more favourable attitudes towards e-learning technology adoption and diffusion (Chang et al., 2017). By contrast, it has been found that there is a significant relationship between the degree to which technology assists students in performing their task, facilitating conditions and user intention to adopt LMS (Sharif et al., 2019).

In conclusion, Chang et al. (2017), suggested that government initiatives have an enormous role to play in increasing awareness on the perceived benefits of e-learning in higher institutions for both learners and educators. Accordingly, improving internet penetration will further increase student awareness of novel and disruptive technologies while increasing acceptance and usage of e-learning in Azerbaijan higher educational institutions.

CONCLUSIONS

In recent years, the adoption of e-learning systems has become more prevalent, however, there is still a lack of awareness and understanding about the multitudinous features of LMS and its positive impact on professional and personal career development. Online learning systems have experienced continuous improvement as compared to previous systems and are envisaged to continue evolving going forward (Palvia et al., 2018; Ozkan & Koseler, 2009; Curran, 2011). E-Learning is a major technological and pedagogical advancement that enhances knowledge through a variety of easily accessible and adaptable learning resources. There has been an increase in the number of people currently utilizing distance education from non-profit e-learning institutions or e-learning organisations for self-development. This study presents a review of e-learning management systems and platforms including LMS. Next, the study discusses the various criteria for consideration in the adoption and usage of LMS. Furthermore, it presents literature on e-learning adoption and usage in Azerbaijan.

The concept of open source vs commercial systems has provoked debates among IT professionals and system managers in online discussion platforms and blogs. Likewise, in considering commercial or open-source LMS platforms based on design and support features, it is vital to consider incorporating new innovative and existing technologies such as wearable devices, Internet of Things (IoT), Machine Learning (Machine to Machine Communication) and Cloud Services.

The study also highlights some barriers affecting the effective implementation and acceptance of e-learning in tertiary institutions in Azerbaijan. In addition, the study explores opportunities for the adoption and continued growth of online education systems in Azerbaijan. In particular, the high rate of student-teacher ratio in Azerbaijan presents a huge potential for an effective e-learning implementation (Aliyeva & Rzayeva, 2019). This has become crucial throughout the convid19 pandemic. Therefore, future research is needed to investigate the impact of the existing e-learning system on effective learning in various higher institutions in Azerbaijan during the Convid-19 pandemic from the users' perspective. Notably, learning theories such as the Active Learning Theory (Pardjono, 2016; Dewey, 1933), provide a framework for such research to be undertaken. Furthermore, it is essential for Azerbaijani Institutions planning to adopt LMS to evaluate their project scope and objectives to

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determine the most suitable system for adoption.

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