Review of Prevailing Trends Barriers and Future Perspectives of Learning Management Systems (LMSs) in Higher Education Institutions

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ABSTRACT

Online learning has become increasingly popular as education continues to revolutionise with existing and evolving technologies. Institutions and organisations alike are utilising online learning to meet the demands of learners for a more convenient and adaptable Technology Enhanced Learning (TEL) system to sustain a progressive pedagogy. 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. The aim of this review is to provide an informed overview of e-learning platforms and review different features of Learning Management Systems (LMSs), while exploring its implications, general issues and challenges. It also discusses the e-learning pedagogical perspective in Azerbaijan. The review adopted the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist for the standard reporting.

Keywords: *LMS, online learning system, technology enhanced learning, pedagogy, ICT, Azerbaijan.*

INTRODUCTION

The use of technology in the field of education has grown rapidly and 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 systems, and improved access to quality education and communication between learners and educators (Al-Fraihat et al., 2017; Holmes & Prieto-Rodriguez, 2018). According to Riahi (2015), e-learning is an Internet-based learning method that increases efficiency in education. ICT has altered the learning process. 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. Educational platforms provide support to learning institutions to effectively develop and administer online classes while evaluating and monitoring student performance. Online learning is similar to distance education offered by institutions, among them, Open University, that enables off campus students to interact with educators and other learners using an asynchronous approach. Four major types of e-learning systems include Learning Management System (LMS), Learning Content Management System (LCMS), Learning Design System (LDS), and Learning Support System (LSS) (Adams et al., 2005). They are based on the core principles of four Learning Theories: Behaviourism, Cognitivism, Constructivism and Active Learning (Pange & Pange, 2011). Institutions and managers require online learning strategies that take into consideration their specific institutional or organizational requirements and the functionality of online learning systems prior to its adoption. Therefore, this review document will examine more carefully, Learning Management Systems (LMS), its importance, issues and challenges. The rest

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of this paper is organized as follows: Section 2 examines LMS and types of LMS commonly used. Section 3. reviews the benefits and limitations of online learning. Section 4 discusses open source and commercial LMS. Section 5 discusses e-learning in Azerbaijan. Section 6 concludes the article and provides potential future research directions for online learning in Azerbaijan.

METHOD

The review was undertaken in distinct phases as follows: identify inclusion and exclusion criteria, choose data sources and search strategies, and summarise results. The review applied the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist for the uniform reporting of this review (Moher et al., 2009). A total of 101 records were identified through database search while 15 additional records were found from other sources. After examining the full texts of the 53 screened records, 30 studies were identified and retained for the review. The review included a total of 30 articles published from April 2005 to September 2019.
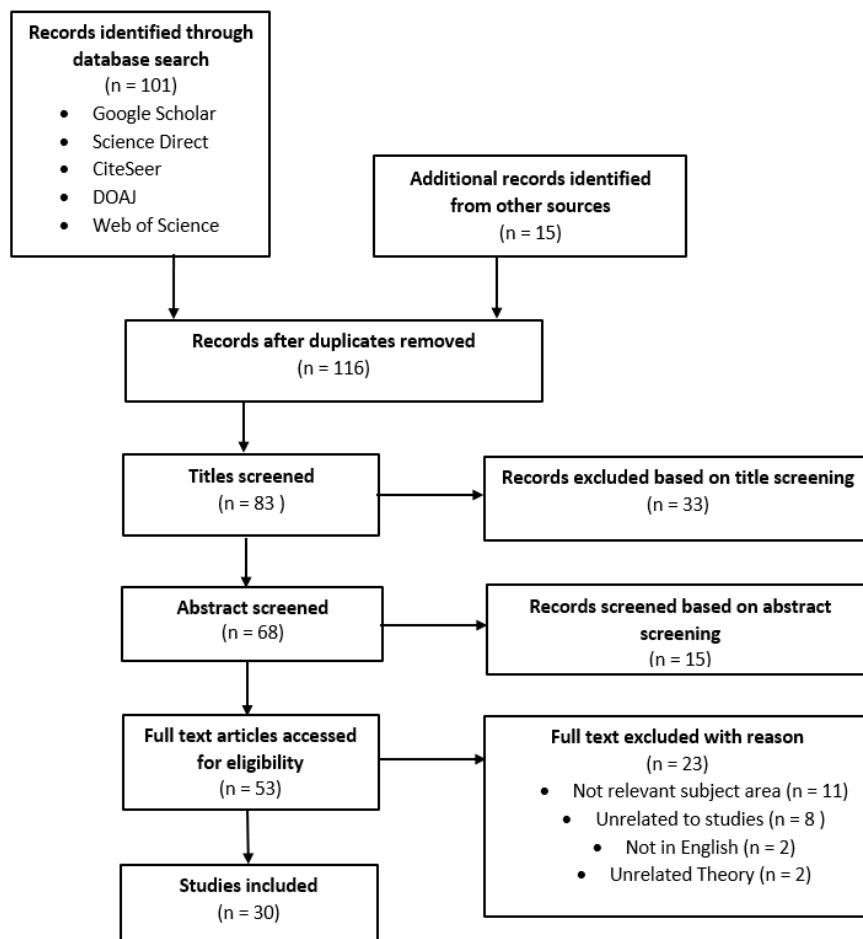
Records identified through database search
(n = 101)
- Google Scholar
- Science Direct
- CiteSeer
- DOAJ
- Web of Science

Additional records identified from other sources
(n = 15)

Records after duplicates removed
(n = 116)

Titles screened
(n = 83)

Records excluded based on title screening
(n = 33)

Abstract screened
(n = 68)

Records screened based on abstract screening
(n = 15)

Full text articles accessed for eligibility
(n = 53)

Full text excluded with reason
(n = 23)
- Not relevant subject area (n = 11)
- Unrelated to studies (n = 8)
- Not in English (n = 2)
- Unrelated Theory (n = 2)

Studies included
(n = 30)

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

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THE LEARNING MANAGEMENT SYSTEM

The concept of a Learning Management System (LMS) is a wider concept used to characterize a variety of systems providing online educational services for learners, educators, and administrators (Aldaibi et al., 2019). The system manages and administers online learning content and resources on a diverse range of topics to learners. It has become widely adopted by several institutions across the world to support teaching and learning. The LMS is an invaluable web-based technology developed to deliver, track, report, assess and manage online training (Aldaibi et al., 2019; Cavus & Alhih, 2014). Over the past years, this educator enabler has evolved and presently provides opportunities for diverse forms of learning such as classroom learning; online training programs and hybrid forms like blended pedagogy and flipped classrooms. The early educational systems were based on the Behaviourist Learning Theory (Pange & Pange, 2011). LMSs have been enhanced and transformed into a robust classroom application to manage curriculum, provide rich-content courseware, assess and evaluate learners and allow for collaboration due to major innovations (Mershad & Pilar, 2018).

Several institutions have implemented different LMS options such as Virtual Learning Environment or Course Management System that exclusively grants access to users with valid login credentials (Adzharuddin, 2013). The 'gated' portals provide learners with online or blended learning approaches to their studies (Adams et al., 2005). The blended learning approach combines the traditional face-to-face learning with the online course delivery method. Further, the LMS supports robust learning by enabling the storage and retrieval of training resources in structured formats.

Typical features of the LMS and Common LMS Systems

The LMS is a highly beneficial content distribution system that helps educators to share course content and interact with students regardless of their geographical location (Mershad & Wakim, 2018). The concept of the LMS is an essential communication and interaction tool that is valuable to students and educators in an online learning environment. The system is viewed as a high-level web-based technology solution for organising, distributing, and managing several learning events within a group (Mershad & Wakim, 2018). This is done with online virtual classroom and instructor-led courses that assess specific learning processes. In addition, the 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 for various administrative tasks including delivery and tracking, planning examinations, live virtual classes, digital collaboration and statistical analyses (Radwan et al., 2014; Chang et al., 2017).

The majority of LMS are tailored to an organization's needs (bespoke), yet they may all provide similar basic features (Adzharuddin, 2013). The basic features include creating and managing existing courses, user registration, developing self-marked quizzes and tests, automated grading and scoring, students' marks allocation system, report generation and student data records (Radwan et al., 2014). Prior to the inception of the LMS, internal email systems were typically used as a primary means of communication between educators and learners in various institutions. However, the LMS integrated messaging system is rapidly replacing the existing internal emailing systems. Moreover, the LMS options available have become more viable technologically, operationally, and economically (Palvia et al., 2018). Table 1 shows the most widely adopted LMSs.

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Table 1: Common LMS (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

BENEFITS AND LIMITATIONS OF ONLINE LEARNING SYSTEMS

Benefits

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

- E-learning facilitates web-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 less 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

Technology is changing the educational experience and online learning offers interesting prospects. Despite this, it faces some challenges, such as students' 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. Further, other challenges that impact online learning include:

- **Motivation:** Many 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 learners with low motivation levels to become lazy and the absence of a fixed schedule and deadlines may lead to less motivated students and subsequently, high rates of online course dropouts.
- **Reliability:** A large percentage of online assessments are largely based on objective questions of a similar nature that makes it difficult to measure system reliability.
- **Cost:** To enhance and maintain the security of online learning platforms organisations may be required to purchase additional capital intensive, specialised software, and hardware.

- **Feedback and Assessment:** Computer marked assessments are generally knowledge-based as compared to practice-based, and this may be insufficient to judge the depth of a students' knowledge. Sometimes, face-to-face study materials are more effective than online learning which does not always offer two-way communication. Thus, it is key for educators to regularly provide learners with personal feedback.
- **Authentication:** It is easier to authenticate assessments in traditional physical classrooms as compared to online-based classrooms that involve some level of digital literacy.
- **Compatibility:** In some countries, issues of compatibility and restrictions is a barrier to citizens' adoption and usage of an e-learning system.

LMS STANDARDS

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

Types of LMS

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. Thereby, 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. Further, the platform requires hosting services, and regular update and maintenance for continued effectiveness. Open source platforms include Moodle, Sakai, ATutor, Claroline, MyGuru2, and MyLMS (Dobre, 2015; Cavus & Zabadi, 2014; Kaya, 2012).

Moodle, Sakai, and ATutor, all support synchronous and asynchronous interactions. Moodle and Sakai offer a private area for writing of drafts, journaling, and management of private data (Mershad & Wakim, 2018; Cavus & Zabadi, 2014). Also, both platforms allow users to view other course participants that are online, while Moodle, Sakai, and ATutor, allow users to exchange private messages (Mershad & Wakim, 2018; Cavus & Zabadi, 2014).

While all platforms share common usability features such as, ease of use, accessibility, and flexibility, at the same time; only certain platforms like Sakai provide support for integration with other systems and thus greater accessibility to e-learning facilities. Beyond that, only ATutor enables collaboration between educators and learners, and it also provides distributed file storage to share and store course content in various formats (Cavus & Zabadi, 2014). On the other hand, Moodle is one of the most widely used open source e-learning platforms that focuses on course content delivery for personalised learning environments (Kaya, 2012).

Commercial LMS

Commercial systems are also known as proprietary systems that require licenses under exclusivity, and the legal rights belong to the copyrights owners (Dobre, 2015). In contrast with open source platforms, they are restricted from user distribution and customisation. Also, a commercial LMS requires an annual subscription license inclusive of a maintenance fee to guarantee regular service updates (Dobre, 2015). Moreover, a commercial LMS requires developed infrastructure equipped

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with labs, networks and computers among others, and servers and computer systems are required for installation. 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 user's requirements. 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. Thus, commercial platforms which include Blackboard, SuccessFactors, SumTotal, Litmos, Angle Learning, Geo Learning, Cornerstone and Connect Edu Moodle present limitations for users. (Dobre, 2015; Cavus & Zabadi, 2014). Despite these limitations, commercial platforms such as SuccessFactors enables system administrators' control over system user level access and privileges; and SumTotal provides context learning, aptitude assessments, and diverse tools to improve workforce performance management.

Table 2 below shows the main comparisons between open source and commercial LMSs.

Table 2: *Comparison of Open Source and Commercial LMS (Ulker & Yilmaz, 2016; eLearning Chef, 2014; Muradkhanli, 2011)*

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

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). The national e-learning network supports the advancement and usage of e-learning at higher institutions and education training centres nationwide. Alsabawy et al. (2016), noted that the e-learning system constitutes a major investment in infrastructure for higher education institutions. There exists a considerable body of literature on studies on education in Azerbaijan, however, literature related to e-learning remains limited. According to Muradkhanli & Atabeyli (2012), eResources have been successfully integrated into classrooms while eLearning centers were established in numerous higher education institutions in Azerbaijan to support learners. Three higher education institutions, Khazar University, Azerbaijan Tourism University and the defunct Qafqaz University launched e-learning initiatives and centers (Chang et al., 2017; Muradkhanli & Atabeyli, 2012; 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 the 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 so as to facilitate a more effective pedagogy (Muradkhanli & Atabeyli, 2012; Chang et al. 2017). They

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have also conducted a study on students' behavioural intention to use e-learning in Azerbaijan which identified that e-learning system developers ought to make the systems more user-friendly and practical. This was expected to increase the usefulness of the systems and improve its adoption and usage. As noted by Chang et al., (2017), it is essential to increase awareness and create more positive attitudes towards e-learning technology adoption and diffusion. In conclusion, Chang et al., (2017), suggested that government initiatives have an immense role to play. Subsequently, improving Internet penetration will increase student awareness on novel and disruptive technologies while increasing acceptance and usage of e-learning systems in Azerbaijan.

CONCLUSION

In recent years, the adoption of e-learning systems have become more prevalent, however, there is still a lack of awareness and understanding about the multitudinous features of LMSs and its positive impact on professional and personal career development. E-Learning is a major technological and pedagogical development that improves the quality of human life through a myriad 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 presented a review of e-learning management systems and platforms including named LMSs and discussed the various criteria for consideration in the adoption and usage of LMS platforms. Considering the literature on e-learning adoption and usage in Azerbaijan, we note that online learning systems have experienced continuous improvement as compared to previous systems and are expected to continue to evolve in the future (Palvia et al., 2018; Ozkan & Koseler, 2009; Curran, 2011).

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. Future research should investigate the impact of the existing e-learning systems on effective learning in various higher education institutions in Azerbaijan from a user perspective. Learning theories such as the Active Learning Theory (Pardjono, 2016; Dewey, 1933), provide a framework for such research to be undertaken. To conclude, it is essential for Azerbaijani institutions planning to adopt this approach to consider their project scope and objectives to determine the most suitable system for adoption.

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