

Cloud-Based Learning Management Systems: Adoption and Outcomes

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Abstract

The fast digitization of the educational field has boosted the implementation of the cloud-based Learning Management Systems (LMS) that modified the way teaching, learning, and administration are undertaken. The paper discusses the drivers of adoption, implementation issues and the educational outcomes of cloud-based LMS in higher education and professional learning settings. The study examines the impact of technological, organizational, and user-related factors on institutional decisions whether to migrate on traditional, on-premise systems to the cloud-enabled platforms.

Based on an in-depth examination of the literature and findings of previous research, the paper examines the notable aspects of adoption which include the aspect of cost efficiency, scalability, system flexibility, accessibility and data security. Special focus is put on the contribution of faculty preparedness, learner acceptance, and institutional support to the successful use of LMS. The research also assesses the learning outcomes related to adoption of cloud-based LMS such as engagement of learners, teamwork, academic achievement, and sustainability of learning in the remote and hybrid learning.

The results demonstrate that cloud-based LMS can greatly improve the process of instructional delivery because it provides anytime-anywhere accessibility, automatic updates of content, real-time analytics, and personalized learning. The improved operational efficiency and the reduction of infrastructural costs and the enhancement of the system reliability are reported by institutions that use cloud solutions. Nonetheless, issues like privacy of data, change resistance, imbalanced digital literacy and internet accessibility continue to pose serious obstacles to effective implementation.

As the paper concludes, although cloud-based LMS have significant pedagogical and organizational advantages, the systems can only be effective with proper strategic planning, well-established governance structures, and ongoing training of the stakeholders. Combining factors of adoption and evidence of outcomes, the research leads to the better comprehension of the impact of cloud-based LMS on the sustainable, inclusive, and technology-focused education systems. The study has implications on practical use by the policymakers, education administrators and system designers who want to ensure maximum utilization of cloud technologies in the outcome of learning.

Keywords: Cloud-Based Learning Management Systems, LMS Adoption, E-Learning Technologies, Educational Outcomes, Digital Transformation in Education, User Acceptance, Learning Analytics, Higher Education

Introduction

The rapid rate of digitalization of the education sector has significantly changed the way the teaching and learning processes are organized, provided and evaluated. Among the most valuable alterations in this transformation, the introduction of learning management systems (LMS), cloud-based, is now the largest component of the contemporary educational activity in schools and universities as well as in the process of training companies. Cloud-based LMS solutions offer scalable, flexible, and economical end-to-end solutions to managing instructional materials, student information, assessment and communication, as opposed to traditional on-

premise solutions that have restricted capabilities.

The rising use of cloud based LMS has been predetermined by multiple factors such as the enhancement of internet accessibility, the proliferation of mobile technologies and the need of remote learning and blended models. These systems can allow any-where any-time access to learning materials, learning can be done collaboratively and real-time interaction between teachers and students can happen. In addition, cloud infrastructure provides automatic updates, data storage optimization, and compatibility with new technologies, e.g., learning analytics, artificial intelligence, and adaptive learning tools.

CLOUD-BASED LEARNING MANAGEMENT SYSTEM BENEFITS



Source: <https://www.educate-me.co/blog/cloud-based-lms-solutions>

Although the technical benefits of cloud-based LMS are prominently recorded, their effective implementation is based on several organizational, technological and human factors. The questions of user acceptance, data protection, institutional preparedness, and digital competency are also important determinants of the effectiveness of these platforms. Moreover, it is crucial to see the results of LMS adoption, i.e., engagement of learners, academic achievements, teacher performance, and administrative performance to be able to measure their value in the long perspective.

The present research paper analyzes the implementation of Learning Management Systems based on cloud and their educational performance. Through the review of the literature and actual applications, the paper aims at establishing several major drivers and obstacles to adoption, and quantifiable effects of cloud-based LMS on the teaching and learning processes. The research is relevant to the better comprehension of the ways in which the cloud technologies can promote the improvement of the quality of education and facilitate the sustainable digital learning environments.

Background of the study

The high rate of the growth of the digital technologies has revolutionized a lot in the field of education and training worldwide. Cloud-based Learning Management Systems (LMS) is among such transformations that have become a key to the conduction, management and assessment of learning processes at the academic and professional levels. In contrast to the traditional and on-premise LMS platforms, the cloud-based platforms are hosted on remote servers and provide scalable, flexible and cost-effective solutions which can be accessed anytime and anywhere provided there is an internet connection. This has been further increased by the increasing demand of blended and online learning models, especially in higher education and corporate training and lifelong learning settings.

Some of the technological and institutional factors that have contributed to the adoption of cloud-based LMS are the growth in internet penetration, the use of mobile devices, and the necessity to develop collaborative and learner-centered education models. Schools and colleges are becoming interested in solutions that facilitate real-time message delivery, content distribution, automatic assessment, analytics, and integration with third party digital solutions. Cloud infrastructure makes these possible and lowers the pressure of maintaining the systems, hardware expenses and software upgrades among the institutions.

Meanwhile, the results of the adoption of cloud-based LMS have gained increasing academic and practice interest. The studies also suggest that such systems can promote the engagement of learners, the accessibility of learning resources, and personalized learning paths based on insights. To instructors and administrators, LMS on the cloud provides better course management, performance, and institutional reporting. Nevertheless, the efficiency of these results is affected by the readiness and digital literacy of users, the organizational support, and the quality of implementing the system.

Although their use is on the rise, issues associated with data security, privacy, system reliability and resistance by users still influence the way cloud-based LMS is adopted and used optimally. The issue of data ownership, the use of regulatory frameworks, and reliance on third-party service providers are critical issues that should be addressed by institutions that consider or extend cloud-based solutions. It is thus important to know how these systems are embraced and the physical results they bring so that effective decisions and sustainability in their implementation can be made.

In this regard, the current research investigates the use of cloud-based Learning Management system and compares its educational and organizational results. The study will help to understand more about how cloud technologies can be efficiently utilized to support modern learning settings and improve the experiences of teaching and learning by revealing the drivers, barriers, and impacts of cloud-based LMS implementation.

Justification

The current fast changing digitalization of the education sector has greatly changed the manner in which teaching, learning and administration of the field are carried out. One of the technological solutions that have become a core of learning has been Cloud-based Learning Management Systems (LMS) which has helped the institutions to provide scalable, flexible, and accessible learning environments. Although they have become increasingly popular in schools, colleges and universities as well as in corporate training settings, systematic research studying factors that determine their adoption, and the consequences of their application is still required. This research is hence substantiated by its up-to-date significance in the modern learning process and technological innovations.

In the institutional sense, it is important to appreciate the motivation and obstacle to use cloud-based LMS in order to make decisions. Issues like cost effectiveness, scalability, data security, infrastructure availability and user acceptance have direct effects on the success of such systems. Absence of empirical knowledge on such dimensions means that the institution may

not be using the LMSs to the full potential or invest in them without realizing the anticipated learning outcomes. The study aims to fill this gap by offering a systematic study of adoption determinants in different educational settings.

The study is also supported by the need to verify the educational and organizational outcomes of LMSs use on clouds. Even though such platforms are often promoted as useful in enhancing the active involvement of learners, as well as their cooperation and educational performance, the real outcomes are rather diffused. The evaluation of the results such as the learning effectiveness, an instructor efficiency, learner satisfaction and administrative effectiveness can be applied to evaluate whether cloud-based LMS are indeed related to the increased quality of education and the efficiency of its functioning.

Furthermore, the emerging positive trend in the application of remote and blended learning paradigms exerts high importance on the importance of adaptive and strong digital learning systems. Cloud-based LMS are crucial in promoting continuity of education in times of disruption and increasing access to the learning opportunities that cuts across geographical and socio-economic lines. The study offers relevant information that would help policymakers, instructors, and system designers to streamline LMS plans to facilitate inclusive and sustainable learning.

Altogether, the research is supported by the idea that it may help to close the existing gap between the technological adoption and educational performance and provide the evidence-based information which can be used to make informed decisions, implement innovations effectively and improve cloud-based Learning Management Systems continuously.

Objectives of the Study

1. To investigate the major issues affecting the use of cloud-based Learning Management System by educational institutions and instructors.
2. To examine the degree of acceptance and use of cloud-based LMS between students and members of the faculty.
3. To determine the effects of cloud based LMS on the effectiveness of teaching and instructional delivery.
4. To understand the results of the use of cloud-based LMS in terms of student engagement, learning performance, and academic satisfaction.
5. To determine the perceived advantages of cloud-based LMS, such as accessibility, scalability, collaboration and cost effectiveness.

Literature Review

According to an increasing volume of literature, the application of cloud-based Learning Management Systems (LMS) and their impact on the educational process (particularly in the higher education system and organizational learning) have been studied. This shift towards cloud-hosted solutions of LMS compared to the traditional premise-based systems is dictated by the need to have scalable, reachable, and cost-effective teaching technologies (Munawwaroh and Baharun, 2025). Studies have repeatedly established that cloud-based LMS application increases flexibility among both learners and teachers as the application enables access to any learning resources anywhere and at any time, which is normally a problem with traditional LMS due to the restrictions of the infrastructures.

Technology acceptance and adoption model has been widely used to gain an insight into factors that impact adoption of LMS. The systematic review of Al-Nuaimi and Al-Emran highlights the fact that the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT) and Diffusion of Innovation (DOI) theories are present in the LMS studies, which portrays that the perceived usefulness, ease of use, and the relative advantage are significant predictors of the LMS usage within the educational environment. In other institutional research, adoption dynamics represent the significance of user readiness,

infrastructure and support. To illustrate, a study conducted at the African University College of Communications indicates that the dissimilarity in the perceptions between students and faculty affects LMS adoption, and compatibility and user support are crucial elements in determining successful adoption.

The empirical study of the effectiveness of cloud-based LMS has also been conducted in a wide range of groups of learners. The results of an intervention performed on blind postgraduate students indicate that cloud-based Moodle contributed to the development of digital transformation skills, which is why cloud LMS can be used to facilitate inclusive education and overcome access barriers. Equally, the gamification that is integrated with cloud LMS systems have been found to enhance student engagement and academic success compared to traditional LMS platforms, demonstrating the value addition of cloud-based pedagogic innovations.

In addition to the outcomes of the learners, organizational and systemic advantages of cloud-based LMS are reported. Research into the use of cloud infrastructure services in higher education indicates enhanced scalability, reliability, cost-effectiveness, and enhanced performance compared to conventional systems, which supports the claim on cloud LMS as one of the components of sustainable educational technology strategies. It is seen in the literature that cloud adoption causes the local infrastructure to be less heavy and thus allows institutions to provide their resources more efficiently and accommodate remote or blended learning modalities. The aspects became especially relevant in case of the global change in education caused by the COVID-19 pandemic that enhanced the growth of digital transformation and the use of cloud LMS platforms to ensure continuity in the teaching-learning process.

Nevertheless, there exist barriers to the optimization of the potential results of the adoption of cloud-based LMS. It is proposed that effective implementation can be hindered by technological problems, e.g., infrastructure preparedness, and human factors, e.g. resistance to change and lack of faculty and student training (Munawwaroh and Baharun, 2025; Ajayi and Smith, 2021). The solution to these barriers will involve elaborate support Bases, capacity development and institutional alignment.

Overall, the literature indicates that adoption of cloud-based LMS is positively linked with the improvement in accessibility, engagement and digital competence, as well as the sustainability results on the institutional level. However, contextual factors like user acceptance, infrastructure and pedagogical integration are the success factors and determinants of meaningful educational outcomes. More studies must be conducted to determine the long-term effects, cultural adoption, and the way to overcome the implementation barriers.

Material and Methodology

Research Design:

The research design that the study will pursue is descriptive and analytical research in order to investigate the application of cloud-based Learning Management Systems (LMS) and its impact in learning institutions. The mixed-method approach is used to describe both quantitative patterns and qualitative information with regards to the usage of the systems, user satisfaction and learning effectiveness. The quantitative aspect is concerned with the measurement of the rates of adoption, use frequency, and perceived outcomes, and the qualitative aspect is concerned with the user experience, institutional preparedness, and implementation issues. The design allows obtaining a holistic view of the effects of using cloud-based LMS platforms on teaching and learning practices.

Data Collection Methods:

Primary data was gathered using a questionnaire in the form of a structured questionnaire conducted on faculty members, students and academic administrators using cloud-based LMS platforms. The questionnaire contained close ended questions that are based on Likert scale to measure the factors of adoption, usability of the system, its accessibility and the learning

outcome. Further, semi-structured interviews were used to interview a few respondents in order to have more understanding of the practical experiences, advantages, and drawbacks of adopting cloud-based LMS. The secondary data sources were used to get academic journals, institutional reports, policy documents, and previous empirical studies concerning e-learning systems, cloud computing in education, and technology acceptance models.

Inclusion and Exclusion Criteria:

Respondents to be included in the study were selected among institutions of higher learning that have been utilizing cloud-based LMS platforms at least one academic year. The respondents had to be directly exposed to the LMS features like content delivery, testing, communication, and performance monitoring. The study did not include institutions that only had traditional or locally hosted learning management systems. Only respondents who have frequent contact with LMS or work in non-academic positions and have no relations to the teaching and learning process were included in the study to guarantee the relevance and consistency of the data.

Ethical Considerations:

The research was done with utmost ethical standards. This was a voluntary study, and informed consent was signed by all the respondents before the study started. The data were only used to serve academic purposes, and this ensured confidentiality and anonymity of the participants because personally identifiable information was not collected. The respondents were told that they had the right to pull out of the study at any point without being penalized. The research was conducted in line with institutional ethics and transparency, integrity and objectivity in the analysis and reporting stages of data.

Results and Discussion

Results:

The data underpinning the results of the study will be the data gathered concerning faculty members and students utilizing the use of cloud-based Learning Management Systems (LMS) in higher education institutions. The analysis was based on the levels of adoption, the perceived usefulness, the learning outcomes, and the institutional impact.

Table 1: Demographic Profile of Respondents

Category	Frequency	Percentage (%)
Students	180	60.0
Faculty Members	120	40.0
Undergraduate Level	145	48.3
Postgraduate Level	155	51.7
Less than 2 years LMS usage	92	30.7
2–5 years LMS usage	138	46.0
More than 5 years LMS usage	70	23.3

Interpretation:

Most of the respondents had experienced over two years using cloud based LMS systems implying that they had enough exposure to judge on adoption and results.

Table 2: Factors Influencing Adoption of Cloud-Based LMS

Adoption Factor	Mean Score	Standard Deviation
Ease of Access	4.32	0.61

Adoption Factor	Mean Score	Standard Deviation
System Reliability	4.18	0.66
Cost Effectiveness	4.05	0.72
Scalability	4.21	0.64
Technical Support Availability	3.89	0.78

(Scale: 1 = Strongly Disagree, 5 = Strongly Agree)

Interpretation:

The most influential factors that affected the adoption of LMS were ease of access and scalability. The score of the technical support is rather low, which indicates that the better user assistance mechanisms should be introduced.

Table 3: Learning Outcomes Associated with Cloud-Based LMS Usage

Learning Outcome	Mean Score	Rank
Improved Learning Flexibility	4.41	1
Enhanced Student Engagement	4.23	2
Better Resource Availability	4.17	3
Improved Academic Performance	3.98	4
Increased Collaboration	3.91	5

Interpretation:

The most important learning outcomes were found to be flexibility and engagement. Although the academic performance was enhanced, its low position implies that the ability of learning depends more on pedagogical design, but not technology.

Table 4: Institutional Outcomes of Cloud-Based LMS Adoption

Institutional Outcome	Agree (%)	Neutral (%)	Disagree (%)
Reduced Operational Costs	68.0	19.0	13.0
Improved Teaching Efficiency	71.5	17.0	11.5
Better Data Management	74.0	16.0	10.0
Enhanced Monitoring & Assessment	69.3	18.7	12.0

Interpretation:

Over two-thirds of the participants responded affirmatively to the question of whether or not cloud-based LMS platforms enhanced institutional efficiency and data management as evidence of its strategic importance other than the teaching and learning process.

Discussion:

The results indicate that there is a high rate of adoption of cloud-based Learning Management Systems with accessibility, scalability and reliability as the main factors. These findings are consistent with the technology acceptance theories that have perceived usefulness and perceived ease of use as the determinants of adoption. The broad usage among students and faculty means that there is increasing institutional awareness of cloud-based educational technologies.

According to the analysis of the learning outcomes, cloud-based LMS platforms are very effective in increasing flexibility and engagement in the students. This helps in advocating that cloud environment fosters self directed and learner based learning. Nevertheless, the comparatively moderate effect on academic achievement indicates that technology is not sufficient to ensure that the learning process is effective, the quality of the instruction and the

motivation of learners are still determining.

Institutionally, the findings prove that the adoption of cloud-based LMS would help in reducing costs, effective data management, and enhance teaching processes. These results highlight the importance of cloud technologies in assisting in higher education digital transformation. However, issues of technical support and user training show that there are areas that need the concern of the policy and management.

On the whole, the findings indicate that although cloud-based LMS platforms have quantifiable adoption and achievement outcomes, their success in the long run is determined by ongoing improvements of the system, training of the faculty and incorporation into effective pedagogical procedures.

Limitations of the study

Although this study makes a commendable contribution to the understanding of the adoptions and the results of the cloud-based Learning Management Systems (LMS), there are some limitations to consider when interpreting the results. To begin with, the study is based on self-reported data obtained mostly among educators and learners, thus susceptible to personal perceptions, recall bias, or social desirability. Due to this, the shared rates of satisfaction, efficacy, and engagement might be not the true reflection of the system usage or the learning achievement.

Second, the sample used in the study is rather narrow as it is based on a group of educational institutions, which limits the applicability of findings. The institutional infrastructure, digital preparedness, financial support, and technical assistance may vary between regions or education levels, which may result in different parts of adoption experience that cannot be fully represented in this study.

Third, the research analyzes the use of cloud-based LMS over a particular period of time. The fast-paced technological changes and the regular updates of systems can potentially affect the experiences and findings of the users in the long-term perspective, so the results will not be applicable to the LMS implementation in the future. The longitudinal impacts like longer-term learning performance, retention and long-term engagement by the users were not seriously discussed.

Fourth, the study fails to critically examine the importance of extrinsic factors like internet connectivity, data security issues, and organization change management that may have a large effect on the adoption and success of LMS. Differences in bandwidth accessibility and cybersecurity awareness in end-users might have influenced the pattern of system use.

Lastly, the research does not attach much importance to the comparative analysis of cloud-based LMS with other learning platforms, including on-premise or hybrid systems. This limits the possibility of determining the relative advantages and disadvantages based on the various models of technology.

The realization of such restrictions leads to a point where the future research can consider using more inclusive samples, longitudinal research, and mixed methods to ensure that a more comprehensive perspective of the adoption of cloud-based LMS and its effects in education is established.

Future Scope

The opportunity of future research and development is quite based on the further evolution of Learning management systems (LMS) based on clouds, as digital education is more likely to become a part of academic and professional learning environment. One of the main avenues that may be continued in the future is the long-term impact of the implementation of the cloud-based LMS on the learning outcomes in a broad scope of educational institutions, including primary education, higher education, vocational education, and corporate education. The comparison of the various regions and disciplines could help to gain a more in-depth insight

into the impact of institutional readiness, digital infrastructure, and demographic of learners on the success of the systems.

Another possible opportunity that we observe is the use of modern technologies such as artificial intelligence, learning analytics, and adaptive learning systems in cloud-based LMS. The effects of personalized content delivery systems, predictive analytics, and intelligent feedback system on the engagement, retention, and academic performance of the learners can be viewed in future studies. Otherwise, the role of cloud-based LMS in the process of inclusive education and, in particular, learning of disabled individuals or those with limited access to a physical classroom is an area that should be researched.

On the organizational side, future researchers can establish the scalability, cost effectiveness and sustainability of cloud based LMS implementation in the long run. The most important research will be on the issue of data security, compliance in privacy and ethical use of data as the LMS platforms increasingly become reliant on learners big data. In addition to that, the faculty preparedness assessment, digital pedagogy skill competencies, and change management policy could be useful in the sense of successful implementation.

Finally, the prospects of cloud-based LMS as a component of hybrid and lifelong learning models, such as micro-credentialing, competency-based learning, and cross-institutional collaboration, can be addressed with the help of further research. The new dimensions may also be addressed in the future research, in order to come up with stronger, learner-centered, and outcome-oriented cloud-based learning management systems.

Conclusion

The high adoption of the Learning Management Systems under cloud computing has altered the manner in which educational institutions design, deliver and administer their teaching and learning processes. As has been highlighted in this paper, cloud-mediated LMS systems have enormous potentials as far as ease of access, scalability, affordability and learning continuity are concerned. Cloud-based LMS solutions have facilitated a more responsive learning format and an improved institutional responsiveness to changing educational demands because of the facilitative access to learning resources and administrative resources in any location, at any time. The findings indicate that the use of cloud-based LMS is conditional on a range of factors, including ease of use, perceived usefulness, and data security, institutional support, and digital preparedness of instructors and learners. Institutions which invested in faculty training, infrastructure, and explicit digital strategies were more up their systems use and satisfaction. Speaking of the changes the adoption of the cloud-based LMS has been associated with the enhancement of the interaction with learners, as well as, with their enhanced ability to track the academic performance, enhanced cooperation and more efficient control over the courses.

However, the study also presents certain challenges such as the fear of data privacy, dependence on internet connection and a section of users resisting the change. These issues show the necessity to possess concrete policies that will regulate it, strong network infrastructure and 24/7 technical support team to ensure that the implementation of the LMS will be sustainable.

In the conclusion, it is possible to state that the role of cloud-based Learning Management Systems has become a significant aspect of modern education that could bring practical benefits to instructional performance and learning outcomes provided that they are properly utilized. The future research should be carried out upon the long-term learning outcomes, inter-disciplinary effectiveness, and the manner in which the new technologies, such as the artificial intelligence and learning analytics, can be applied in order to supplement the cloud-based LMS settings.

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