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Optimizing Learning Management System in Online Learning to Improve Student Learning Outcomes

Muntobingah[1]

Universitas PGRI Adi Buana, Surabaya, Indonesia[1]

ABSTRACT

Digital transformation in higher education encourages the utilization of Learning Management Systems (LMS) as online learning platforms that enhance the flexibility and effectiveness of student learning processes. This study aims to analyze the utilization of LMS in supporting improved student learning outcomes through a Systematic Literature Review (SLR) approach. The research data were obtained by reviewing scientific articles published over the last five years and analyzed using content analysis techniques. The findings indicate that LMS plays an important role in providing flexible learning access, increasing student engagement, supporting self-directed learning, and facilitating academic interaction through various digital features. However, the effectiveness of LMS implementation is influenced by system quality, digital literacy readiness, instructional design, and institutional support. Optimizing LMS implementation requires the integration of technological and pedagogical aspects to create meaningful learning experiences. Therefore, LMS can serve as an essential strategy for developing digital learning in higher education and contribute to improving student learning outcomes sustainably.

Keywords: *Digital Learning, Learning Management System, Online Learning, Students.*

CORRESPONDING AUTHOR:
Muntobingah
Universitas PGRI Adi Buana, Surabaya, Indonesia

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1. | INTRODUCTION

The development of information and communication technology has brought significant changes in the implementation of higher education, especially in the learning process. Digital transformation encourages universities to develop a learning system that is more flexible, adaptive, and able to reach the needs of students without being limited by space and time. One form of innovation that is developing widely is the use of the Learning Management System (LMS) as an online learning medium that allows the learning process to take place in a structured manner through digital platforms. LMS not only functions as a means of delivering materials, but also as a management system for academic activities that includes communication, evaluation, assignment collection, and monitoring of student learning activities (Al-Fraihat et al., 2020).

The development of LMS use is increasing as higher education institutions face major changes due to the COVID-19 pandemic which led to the shift from face-to-face learning to digital-based learning. This condition encourages universities to adopt various online learning platforms as the main alternative in maintaining the sustainability of the educational process. Research by Coman et al. (2020) shows that online learning is an important strategy for universities in dealing with changes in the educational environment, even though its implementation faces various challenges such as technological readiness, users' digital capabilities, and the quality of learning interactions. Adedoyin and Soykan (2020) similarly stated that online learning has great opportunities in increasing educational flexibility, but its success is highly dependent on the readiness of the infrastructure and pedagogical strategies implemented.

In the context of student learning, LMS has a strategic role in supporting the creation of student-centered learning. Through the LMS, students can access teaching materials independently, participate in discussion forums, do evaluations digitally, and get feedback more quickly. Martin et al. (2020) explain that effective online learning does not only depend on the use of technology, but also on learning design, interaction patterns, and student engagement during the learning process. Thus, LMS is an important instrument that can improve the quality of the learning experience if used optimally.

However, the existence of an LMS does not automatically guarantee an improvement in student learning outcomes. The effectiveness of an LMS is influenced by various factors, such as system quality, ease of use, user engagement, digital literacy capabilities, and institutional support. Rasheed et al. (2020) explained that one of the main challenges of online learning is low student involvement due to limited interaction, lack of motivation for independent learning, and technical obstacles. Therefore, the use of LMS needs to be understood not only as the application of technology, but as part of a learning strategy that integrates aspects of technology, pedagogy, and characteristics of learners.

Student learning outcomes are one of the important indicators in assessing the success of LMS implementation. Various studies show that student activities in the

digital learning environment have a relationship with academic achievement. Darko (2021) found that the intensity of LMS use can be related to student academic performance because activities such as material access, discussion participation, and assignment completion reflect the level of learning engagement. In addition, Moubayed et al. (2018) show that student involvement in the e-learning environment has a positive relationship with academic performance, so the use of LMS activity data can be the basis for increasing learning effectiveness.

In addition to technological factors, psychological and social aspects in online learning also have an influence on learning success. Social interaction, learning satisfaction, and self-regulation are important factors that determine student experience in using LMS. Liu et al. (2021) explained that social interaction in online learning plays a role as a factor that affects student satisfaction with the learning process. Meanwhile, Almoeather (2020) showed that the use of digital learning platforms can support students' independent learning if it is designed according to user needs.

Based on this description, the use of LMS as an online learning medium is an important issue to be studied because its success is not only determined by the existence of technology, but also by how the technology is used to improve the quality of student learning processes and outcomes. Therefore, this study aims to analyze the use of the Learning Management System as an online learning medium in improving student learning outcomes through the Systematic Literature Review (SLR) approach. This study is expected to provide an understanding of the effectiveness of LMS, the factors supporting and inhibiting its implementation, as well as strategies for optimizing the use of LMS in higher education environments.

2. | RESEARCH METHOD

This study uses the Systematic Literature Review (SLR) approach to identify, evaluate, and analyze various previous research results related to the use of Learning Management System (LMS) as an online learning medium in improving student learning outcomes. The SLR method was chosen because it is able to provide a systematic, transparent, and structured literature review process through the stages of searching, selection, analysis, and synthesis of various relevant scientific sources. This approach allows researchers to gain a comprehensive understanding of the development of research related to the effectiveness of LMS, the factors that affect the success of LMS implementation, and its contribution to improving the quality of learning in higher education.

The research process is carried out through several main stages, namely the formulation of research questions, literature search strategies, article selection processes, data extraction, and analysis of study results. The research questions in this study are focused on three main aspects, namely: (1) how the use of LMS is applied as an online learning medium in higher education, (2) how the use of LMS affects student learning outcomes, and (3) what factors support and hinder the effectiveness of LMS

implementation. These questions are used as a basis for determining the criteria for the literature to be analyzed.

The source of research data was obtained through searching for scientific articles published in the last five years. Databases used in the literature search process include Google Scholar, ScienceDirect, SpringerLink, and other academic journal databases. Keywords used in the search process include "Learning Management System", "LMS", "online learning", "e-learning", "higher education", "student learning outcomes", and "academic performance". The inclusion criteria in this study include scientific articles that discuss the use of LMS or online learning platforms in the context of higher education, available in the form of journal articles or scientific proceedings, published in the range of 2018–2022, and related to the effectiveness of learning or student learning outcomes.

Furthermore, articles that have been obtained through the search process are filtered based on the relevance of the title, abstract, and content of the article. Articles that do not have a direct relationship to the use of LMS, do not focus on student learning, or do not provide information relevant to the research objectives will be excluded from the analysis process. After going through the selection process, the selected articles were then analyzed using content analysis techniques to identify the main themes that emerged in previous research. The analysis process was carried out by grouping the results of the research based on aspects of LMS function, the effectiveness of online learning, student involvement, supporting and inhibiting factors, and the relationship between LMS use and learning outcomes.

The results of the literature analysis process are then synthesized descriptively to obtain a comprehensive picture of the use of LMS in online learning. The synthesis was carried out by comparing findings from various previous studies so that patterns, trends, and research gaps related to the implementation of LMS in higher education can be identified. Using the SLR approach, this study is expected to be able to provide an objective study of the contribution of LMS as an online learning medium in improving student learning outcomes as well as providing recommendations for the development of more effective digital learning strategies.

3. | RESULTS AND DISCUSSION

Based on the results of the Systematic Literature Review study on various studies over the last five years, it was found that the Learning Management System (LMS) has an important role in supporting the transformation of online learning in the higher education environment. LMS is not only seen as a technological device to deliver learning materials, but also as a system that is able to integrate various academic activities, such as the management of teaching materials, communication between lecturers and students, assignment collection, evaluation implementation, and monitoring of learning activities. The results of the study show that the effectiveness of LMS is greatly influenced by the ability of institutions and users to optimize the

function of the technology to support an interactive learning process and oriented to student learning outcomes.

Analysis of the literature shows that the success of LMS implementation is closely related to system quality, information quality, ease of use, and user satisfaction. Al-Fraihat et al. (2020) explained that the success of an e-learning system is determined by a combination of technological factors and user factors, where a good system quality can increase student acceptance of digital learning. This shows that an LMS that has an easy-to-use interface, stable access, and complete learning features has more potential to increase student engagement. Therefore, LMS development is not enough to be only oriented towards the provision of technology, but must also consider the user experience in following the learning process.

Changes in learning patterns due to the COVID-19 pandemic have further accelerated the adoption of LMS as the main medium in the implementation of online learning. Universities are required to make adjustments to conventional learning models towards a more flexible digital learning system. Research by Coman et al. (2020) shows that online learning is an important solution for the sustainability of higher education during the pandemic, although it still faces obstacles in the form of limited interactions, lecturer readiness, and student adaptability. These findings are reinforced by Turnbull et al. (2021) who stated that higher education institutions need to carry out digital transformation in a sustainable manner so that the use of learning technology is not only temporary, but also part of future education strategies.

In its implementation, LMS provides various benefits to the student learning process. Through the LMS, students have the flexibility to access learning materials at any time and from various locations. This flexibility supports the formation of independent learning because students can manage their study time according to their individual needs. Martin et al. (2020) explain that effective online learning requires a combination of good learning design, active interaction, and student engagement. Thus, LMS becomes a medium that is able to support student-centered learning if the available features are optimally utilized.

The results of the study also show that the use of LMS has a relationship with increased student involvement in the learning process. Student activities in the LMS such as reading materials, participating in discussion forums, doing assignments, and participating in evaluations can be indicators of academic engagement. Moubayed et al. (2018) found that the level of student involvement in the e-learning environment has a relationship with academic performance, so activity data in the LMS can be used to understand student learning patterns. In line with this, Darko (2021) shows that the use of LMS platforms such as Blackboard is related to student achievement because digital learning activities reflect the level of student participation in the academic process.

The relationship between LMS and student learning outcomes is not only influenced by the frequency of technology use, but also by the quality of interaction and students' ability to manage their learning process. Almoeather (2020) explained that

the use of LMS can support self-regulated learning because students have the opportunity to access learning resources, manage learning time, and evaluate their learning progress independently. In addition, Liu et al. (2021) found that social interaction in online learning plays an important role in student satisfaction, which can then affect the effectiveness of learning. This shows that LMS needs to be designed not only as a repository of materials, but as a learning space that allows communication and collaboration to occur.

Based on the results of the literature synthesis, some of the main factors that affect the success of an LMS can be summarized as follows:

Table 1. Key factors influencing the success of an LMS

LMS Implementation Factors	**Description of Impact on Learning**
System and technology quality	Determine the ease of access, platform stability, and convenience of using the LMS
Digital competence of users	Affect the ability of lecturers and students to utilize LMS features
Learning design	Determine the quality of the material, interactive activities, and evaluation strategies
Student involvement	Relating to learning activities and academic achievement
Institutional support	Supporting sustainability implementation through policies and infrastructure

In addition to supporting factors, the results show that the implementation of LMS still faces various obstacles. Rasheed et al. (2020) identified that the main challenges of online learning include limited interaction, low learning motivation, and students' difficulties in adapting to the digital learning environment. These challenges show that the existence of an LMS must be accompanied by a learning strategy that is able to increase student engagement. Without the right pedagogical approach, LMS has the potential to only become a material distribution medium without having a significant impact on the quality of learning.

In the context of higher education, the readiness factor of students and lecturers is also an important aspect in determining the effectiveness of LMS. Marlina et al. (2021) show that student performance in online learning is influenced by various factors, including learning quality, technological readiness, and user adaptability. This shows that the improvement of learning outcomes through LMS cannot be separated from the readiness of human resources who use this technology. Therefore, digital literacy training for lecturers and students is an important step in increasing the effectiveness of LMS use.

Research by Prabowo et al. (2022) also shows that student performance in online learning is influenced by the quality of the learning experience obtained while using digital platforms. Students who have access to a structured learning system tend to have

a better learning experience. These findings show that LMS can be a supporting factor in improving learning outcomes if it is able to provide a systematic and easy-to-use learning environment.

The use of LMS is also growing through the use of learning activity data. Mandalapu et al. (2022) show that student activities in LMS can be analyzed to determine the relationship between system usage patterns and academic performance. A learning analytics-based approach allows institutions to identify students who need additional support and improve learning strategies based on objective data.

In addition to dedicated LMS platforms such as Moodle or Blackboard, various digital learning applications such as Google Classroom have also shown contributions to improving learning outcomes. Fadhilah et al. (2022) found that the use of online learning platforms can have a positive impact on learning outcomes because students gain ease of accessing materials and participating in learning activities flexibly. This shows that the effectiveness of an LMS does not only depend on the type of platform, but on how the technology is used in supporting learning objectives.

The change in learning towards a digital system also requires attention to the emotional aspects and student involvement. Deng (2021) shows that students who have higher emotional engagement tend to have a better level of satisfaction with online learning. Meanwhile, Bond et al. (2021) explained that the online learning experience during the pandemic shows the importance of building interaction, communication, and academic support so that students stay engaged in the learning process.

Based on the results of the study, it is shown that LMS has great potential in improving student learning outcomes through increased access to learning, flexibility, interaction, and management of academic activities. However, the success of an LMS is not only determined by the technology used, but also by the quality of learning design, user readiness, institutional support, and digital learning management strategy. Thus, the use of LMS needs to be positioned as part of pedagogical innovations that integrate technology and learning approaches that are oriented to student needs.

4. | CONCLUSION

The use of the Learning Management System (LMS) as an online learning medium has an important role in supporting the improvement of the quality of learning in the higher education environment. Based on the results of the Systematic Literature Review study, LMS not only functions as a means of delivering learning materials, but also as a platform that is able to integrate various academic activities, ranging from learning resource management, learning communication, assignment collection, evaluation implementation, to monitoring student learning activities. The existence of LMS provides flexibility in the learning process so that students can access materials and carry out academic activities more independently according to their respective learning needs.

The results of the study show that the use of LMS contributes to improving student learning outcomes through increased learning engagement, easy access to learning resources, wider academic interaction, and support for independent learning. However, the effectiveness of an LMS does not only depend on the existence of technology, but is also influenced by the quality of learning design, digital readiness of users, content quality, institutional support, and online learning management strategies. Therefore, the implementation of LMS needs to be directed not only to the technical aspect, but also to strengthening the pedagogical aspect in order to be able to create a meaningful learning experience.

Optimizing the use of LMS requires collaboration between institutions, lecturers, and students. Institutions need to provide supporting infrastructure and policies, lecturers need to develop interactive digital learning designs, while students need to improve digital literacy skills and learning independence. With the right approach, LMS can become a strategic instrument in digital learning transformation that is able to increase the effectiveness of the educational process and support the achievement of student learning outcomes in a sustainable manner.

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The authors declare that there is no conflict of interest.

Ethical Approval and Originality Statement

Ethical approval was obtained for this study. The manuscript represents original work and has not been previously published, nor is it under consideration by another journal.

Data Disclosure Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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