OPEN ACCESS

Volume 9 (4), October-December 2025, 1376-1387

E-ISSN:2580-1643

Jurnal JTIK (Jurnal Teknologi Informasi dan Komunikasi)

DOI: https://doi.org/10.35870/jtik.v9i4.4181

The Influence of Learning Management System on the Success of Blended Learning : Systematic Literature Review

I Made Dharma Putra [1*], Ni Nyoman Parwati [2], Ketut Agustini [3], Anak Agung Adi Wiryya Putra [4]

[1*,2,3] *Universitas Pendidikan Ganesha, Buleleng Regency, Bali Province, Indonesia.*

[4] *Universitas Pendidikan Nasional, Denpasar City, Bali Province, Indonesia.*

a r t i c l e i n f o

Article history:
Received 20 February 2025
Received in revised form 20 March 2025
Accepted 1 May 2025
Available online October 2025.

Keywords:
Blended Learning; Learning Management System; Instructional Media.

a b s t r a c t

This study aims to examine the effect of Learning Management System (LMS) on the success of blended learning using the Systematic Literature Review (SLR) method. The literature analyzed came from accredited journals indexed in Scopus and Google Scholar databases, with a publication range of 2020-2024 and the selection process was carried out based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) so that 20 journals were obtained that showed that LMS is effective in increasing the success of blended learning. Based on the analysis of articles and journals, this review highlights that LMS significantly increases several aspects of blended learning. Specifically, the use of LMS leads to a significant increase in several aspects of blended learning. LMS has been shown to be a critical determinant in enhancing student engagement within blended learning environments. Furthermore, LMS supports early data detection, which ultimately improves student learning outcomes. Students also experience higher satisfaction levels when LMS is integrated into blended learning courses. Beyond student benefits, LMS facilitates enhanced course management and delivery, providing a robust framework for modern education with effective organization and flexible learning experiences. The effectiveness of teaching is also improved through the integration of technology-mediated learning approaches via LMS. Moreover, LMS can accelerate the adaptation of teachers to distance education, increasing adoption rates and supporting various aspects of blended learning implementation. From this study, it can be seen that in general it shows indicators that LMS can improve student learning outcomes and learning independence in accordance with the objectives of blended learning. However, the effectiveness of LMS varies by educational context, and the intention to continue using LMS is influenced by perceptions of usefulness and satisfaction. The review concludes that several key elements maximize the impact of LMS on blended learning success: positive user experience, active teacher involvement, utilization of LMS data, and consideration of the educational context. LMS adoption is driven by the need for flexibility and to accelerate the digitalization of education, its can be seen from the increased effectiveness and ease of learning with flexible and cost-effective access to materials, as well as increasing learning independence by facilitating students to learn according to their respective speeds and learning styles.Effective implementation, however, requires addressing teacher anxiety by providing adequate support, such as internet and computer/gadget availability. These findings confirm that LMS plays a very important role in increasing the success of blended.

Kata Kunci:
Pembelajaran Campuran; Sistem Manajemen Pembelajaran; Media Pembelajaran.

a b s t r a k

Penelitian ini bertujuan untuk menguji pengaruh Learning Management System (LMS) terhadap keberhasilan blended learning dengan menggunakan metode Systematic Literature Review (SLR). Literatur yang dianalisis berasal dari jurnal terakreditasi yang terindeks dalam database Scopus dan Google Scholar, dengan rentang publikasi tahun 2020-2024 dan proses seleksi dilakukan berdasarkan Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) sehingga diperoleh 20 jurnal yang menunjukkan bahwa LMS efektif dalam meningkatkan keberhasilan blended learning. Berdasarkan analisis artikel dan jurnal, tinjauan ini menyoroti bahwa LMS secara signifikan meningkatkan beberapa aspek blended learning. Secara khusus, penggunaan LMS mengarah pada peningkatan yang signifikan dalam beberapa aspek blended learning. LMS telah terbukti menjadi penentu penting dalam meningkatkan keterlibatan siswa dalam lingkungan blended learning. Lebih jauh, LMS mendukung deteksi data dini, yang pada akhirnya meningkatkan hasil belajar siswa. Siswa juga mengalami tingkat kepuasan yang lebih tinggi ketika LMS diintegrasikan ke dalam kursus blended learning. Selain manfaat bagi siswa, LMS memfasilitasi peningkatan manajemen dan penyampaian kursus, menyediakan kerangka kerja yang kuat untuk pendidikan modern dengan organisasi yang efektif dan pengalaman belajar yang fleksibel. Efektivitas pengajaran juga ditingkatkan melalui integrasi pendekatan pembelajaran yang dimediasi teknologi melalui LMS. Selain itu, LMS dapat mempercepat adaptasi guru terhadap pendidikan jarak jauh, meningkatkan tingkat adopsi dan mendukung berbagai aspek implementasi pembelajaran campuran. Dari penelitian ini, dapat dilihat bahwa secara umum menunjukkan indikator bahwa LMS dapat meningkatkan hasil belajar siswa dan kemandirian belajar sesuai dengan tujuan pembelajaran campuran. Namun, efektivitas LMS bervariasi menurut konteks pendidikan, dan niat untuk terus menggunakan LMS dipengaruhi oleh persepsi kegunaan dan kepuasan. Tinjauan tersebut menyimpulkan bahwa beberapa elemen kunci memaksimalkan dampak LMS pada keberhasilan pembelajaran campuran: pengalaman pengguna yang positif, keterlibatan guru aktif, pemanfaatan data LMS, dan pertimbangan konteks pendidikan. Penerapan LMS didorong oleh kebutuhan akan fleksibilitas dan percepatan digitalisasi pendidikan, hal ini dapat dilihat dari meningkatnya efektivitas dan kemudahan pembelajaran dengan akses materi yang fleksibel dan hemat biaya, serta meningkatnya kemandirian belajar dengan memfasilitasi siswa untuk belajar sesuai dengan kecepatan dan gaya belajar masing-masing. Namun, penerapan yang efektif memerlukan penanganan kecemasan guru dengan menyediakan dukungan yang memadai, seperti ketersediaan internet dan komputer/gadget. Temuan ini menegaskan bahwa LMS memegang peranan yang sangat penting dalam meningkatkan keberhasilan pembelajaran campuran.

Corresponding Author. Email: dharma.putra@student.undiksha.ac.id [1].

ACM Computing Classification System (CCS)
EBSCOhost
Communication and Mass Media Complete (CMMC)

1. Introduction

Blended learning is an innovative learning approach that strategically combines face-to-face classroom sessions with bold learning activities. The goal of this integration is to create a richer, more flexible, and more effective learning experience by leveraging the strengths of both learning methods. It goes beyond simply combining the two formats but involves designing curriculum and activities that complement each other to achieve optimal learning outcomes (FDM Nasir, MAM Hussain, H Mohame., 2021). Some specific models that illustrate the application of blended learning include the flipped classroom and various rotation models. In the flipped classroom, students learn new material independently outside of class, allowing face-to-face time to be used for in-depth discussion and practical application. Rotation models, such as station rotations, individual rotations, and lab rotations, have students move through a variety of scheduled learning activities, at least one of which involves bold learning. These models demonstrate how blended learning can be personalized and tailored to the needs of diverse students. The core of blended learning implementation often lies in the Learning Management System (LMS), a software platform designed to deliver, manage, and track educational content and activities online, providing various tools for communication, collaboration, and assessment (M Tubagus, S Muslim, S Suriani., 2020).

The combination of these two concepts is increasingly common in modern education, offering flexibility and diverse learning opportunities for learners. The definition of blended learning emphasizes a combination of delivery methods, but the specific ratio and nature of this combination can vary significantly depending on the context. This variability is likely to affect the role and impact of the LMS in learning success. The LMS functions as a tool to support blended learning, implying that success is not solely determined by the existence of an LMS, but by how effectively the system is utilized to support pedagogical goals in a blended learning environment. The adoption of blended learning is driven by the many benefits it offers, including increased flexibility, wider accessibility, and the potential to accommodate diverse learning needs of learners. In addition, the COVID-19 pandemic has significantly accelerated the adoption of blended learning models in educational institutions around the world (F Razali, T Sulaiman, AFM Ayub., 2022). Higher education institutions are increasingly recognizing blended learning as an integral factor in the education system. The shift to blended learning triggered by the pandemic provides a unique context to examine the role of LMS. Many institutions have been forced to adopt and utilize these systems quickly, potentially exposing their strengths and weaknesses in a stressful situation. Previous studies have provided valuable insights into the impact of LMS on the success of blended learning. Several studies highlighted the important role of LMS in enhancing student engagement. For example, Ustun *et al.* (2021) found that LMS is an important determinant of student engagement in a blended learning environment. Other studies have shown that LMS facilitates structured content delivery and efficient communication, which contribute to a better learning experience (Mohd Nasir *et al.*, 2021). In addition, LMS has also been shown to support various assessment methods, which can improve student learning outcomes (Fahd *et al.*, 2021). The success of Blended Learning is closely related to the integration and effective utilization of LMS, which can be understood through the lens of Community of Inquiry (CoI) theory and the Technological Pedagogical Content Knowledge (TPACK) framework.

CoI theory emphasizes the importance of building social, cognitive, and instructional presence in an online learning environment facilitated by an LMS. LMS features that support effective interaction, reflection, and instructional guidance contribute to a deep and collaborative learning experience. Thus, LMS design and implementation that considers these three presences are crucial to creating a strong learning community in a blended context. Meanwhile, the Technological Pedagogical Content Knowledge (TPACK) framework highlights that instructors need to have an integrated understanding of technology, pedagogy, and content to optimally utilize LMS in Blended Learning. The instructor's ability to select and use LMS features that are in accordance with pedagogical goals and content characteristics will greatly affect the effectiveness of teaching and student learning outcomes. By mastering TPACK, instructors

can design an engaging, relevant, and meaningful blended learning experience through the appropriate use of LMS technology. However, the effectiveness of LMS in blended learning is influenced by various factors. Bervell & Arkorful (2020) emphasized the importance of facilitating conditions, voluntariness of use, and usage behavior in determining the success of LMS utilization. Abidin *et al.*'s (2021) study highlighted that students' satisfaction with the use of LMS in blended learning will increase their intention to continue using the system. Factors such as LMS usability, system quality, information quality, and instructor support also play an important role in determining students' perceptions and attitudes toward LMS (Goh & Yang, 2021).

In addition, several studies have explored the role of LMS in specific educational contexts. For example, Zainil *et al.* (2024) examined the use of LMS as a blended learning medium in elementary schools and emphasized the importance of parental involvement as facilitators and supervisors. Other studies have highlighted the potential of LMS to support project-based learning, collaborative learning, and the development of metacognitive skills (Mahande *et al.*, 2021). Although these studies have contributed significantly to our understanding of the impact of LMS on blended learning, there are still gaps in our knowledge. Further research is needed to explore how LMS can be optimized to support innovative pedagogical strategies, promote collaborative learning, and personalize students' learning experiences. In addition, longitudinal research examining the long-term impact of LMS use on student learning outcomes and retention is still limited. This systematic literature review aims to critically analyze the influence of LMS on blended learning success based on the available body of research. Furthermore, the review seeks to synthesize findings from various studies to provide a comprehensive understanding of the relationship between LMS and blended learning success. The structure of this review will include an analysis of user perceptions and satisfaction with LMS, factors driving LMS adoption and implementation, the impact of LMS on student engagement and learning outcomes, contextual variations in LMS adoption and effectiveness, and LMS continuance intentions and future research directions.

2. Research Methodology

The Systematic Literature Review (SLR) method is a type of literature review that uses systematic methods to collect secondary data, critically evaluate studies, and synthesize findings qualitatively or quantitatively. This is a process of identifying, assessing, and interpreting all available research evidence to provide answers to specific research questions (RQ). And this study uses the Systematic Literature Review (SLR) method with the aim of identifying, evaluating, and reviewing research in certain fields that are relevant and interesting to support the development of further research (Hamid Sutanto *et al.*, 2021). The theoretical basis for the preference for this method is strengthened by the perspective of Nursalam and colleagues (2020) who highlight the advantages of SLR in summarizing and synthesizing knowledge from various sources of information.

The object of this study is to examine in depth the influence of the Learning Management System on the Success of Blended Learning. This study uses the Systematic Literature Review (SLR) approach to identify, evaluate, and review research in certain fields that are relevant and interesting to support the development of further research (Hamid Sutanto *et al.*, 2021). This literature review process focuses on the publication of scientific articles in the period between 2020 and 2024 where the articles used are articles indexed in Scopus and Articles from Google Scholar, obtained from the Publish or Perish database. This is used to find out the latest trends in the development of LMS and blended learning to ensure the relevance of the findings to current conditions. To maintain the quality of reproducibility of the search results, the article involves the use of specific keywords that are closely related, namely "Learning Management System", "Blended Learning". All articles obtained from the initial search are then carefully selected using predetermined inclusion and exclusion benchmarks, highlighting especially the proximity of the topic and the existence of complete article documents. Adopting the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, this study involves determining selection parameters, data extraction methods, removing identical articles, and selecting studies based on titles, summaries, and keywords with the aim of reducing

the risk of bias and error in the research stage (Shabira *et al*., 2024). Where in the identification phase, researchers determine definitive parameters for the literature that will be integrated into the research database, namely limited to scientific publications that explicitly examine the implementation of the Influence of LMS on the success of blended learning.

At the stage of determining data criteria, literature selection is carried out carefully to ensure that only documents that meet the requirements for the specified keywords will be selected. This document selection procedure involves two main phases, namely inclusion and exclusion which are applied in stages to ensure the suitability and quality of the data analyzed (Gede *et al*., 2024). The Inclusion Standard is to focus the search on studies that are in accordance with the research questions related to the type of study, population, intervention, outcomes, language, and time of publication, to increase the relevance, homogeneity, transparency, and reproducibility of the literature analyzed. Conversely, the exclusion standard is used to filter publications that are not centered on the topic, do not have access to the full text, have inadequate methodological quality.

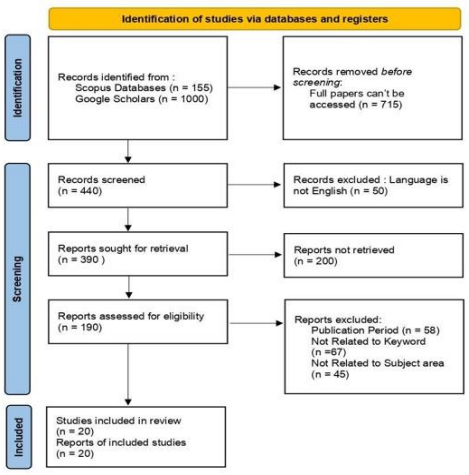

Figure 1. PRISMA Diagram

A total of 20 selected journals are the core of the analysis in this study, after going through a series of strict selection stages from a total of 1200 initial publications. The process began with 200 unique documents from the Publish or Perish database (Scopus indexed) and 1000 journals from Google Scholar for a total of 1200 journals to be examined. Screening based on title, keywords, abstract, and full text resulted in 535 journals. Further elimination due to language and accessibility reduced the number to 170. A thorough eligibility evaluation finally identified 20 journals that were most relevant to the research method and subject. This transparent selection process is documented in a PRISMA diagram, ensuring the validity and quality of the sources used. The inclusion criteria in this study were national and international journals that discussed the influence of Learning Management System on blended learning at various levels of education, factors that influence its implementation, and methods used in its implementation. Meanwhile, the exclusion criteria included journals that did not focus on Learning Management System in blended learning, did not have full text access, inadequate methodological quality, and journals that only discussed Learning Management System or blended learning separately without integrating the two. Journals in languages other than English were also excluded.

3. Results and Discussion

Results

The following is a summary of various studies examining the utilization of Learning Management Systems (LMS) in blended learning contexts across different educational settings; Bervell and Arkorful (2020) investigated LMS-enabled blended learning in distance tertiary education, finding that LMS serves as a central online platform for managing digital learning. With features such as virtual classrooms, content facilitation, communication, and assessment tools, LMS enhances the learning process by making it more flexible, personalized, and effective. The study concluded that LMS plays a pivotal role in improving online learning in blended environments. Ustun *et al.* (2021) explored the impact of LMS on student engagement and community building in blended learning. Their study showed that LMS, as a web-based platform, supports the integration of face-to-face learning with online activities. This approach helps increase student engagement and learning outcomes, providing a richer and more personalized learning experience. The research highlighted that

LMS is a critical determinant of student engagement in blended learning environments. Abidin *et al.* (2021) examined the factors influencing the continuation of LMS use in blended learning. They emphasized that LMS is integral in combining face-to-face learning with online activities, thus enhancing learning effectiveness, student engagement, and overall outcomes. The study concluded that the continued use of LMS in blended learning significantly increases students' satisfaction with their learning experience.

Zainil *et al.* (2024) focused on the use of LMS in elementary schools for blended learning, emphasizing its role in integrating face-to-face learning with online activities to enhance student learning outcomes. Their research concluded that LMS is essential for effectively managing digital learning in primary education, making it a key tool for blended learning at the elementary level. Goh and Yang (2021) explored the relationship between e-engagement, flow, and LMS usage in blended learning environments. They found that creating engaging, immersive learning experiences through LMS is critical to sustaining student participation. Their research demonstrated that flow experiences, fostered by LMS features, significantly influenced students' intent to continue using the platform in a blended learning context. Fahd *et al.* (2021) investigated the potential of LMS interaction data to predict student performance in blended learning. They concluded that LMS usage patterns, such as frequency of material access and participation in forums, correlate with learning outcomes. This finding supports the idea that LMS can help educators identify at-risk students early and provide timely interventions to improve academic performance. Mohd Nasir *et al.* (2021) assessed student satisfaction in using LMS for blended learning in higher education. Their study highlighted that ease of use, supportive conditions, and strong interaction within LMS contribute significantly to student satisfaction, which in turn enhances the overall learning experience. Goyal *et al.* (2023) discussed the implementation of Moodle as an LMS in a blended learning approach. They found that Moodle effectively integrates online learning with face-to-face teaching, offering various tools that improve teaching effectiveness and learning outcomes. The research showed that LMS enhances teaching by combining synchronous and asynchronous learning, which leads to better student engagement. Ibrahim and Shaalan (2023) conducted a systematic review of Knowledge Management (KM) integration in higher education through LMS in blended learning environments. They found that LMS facilitates the management and sharing of knowledge, which enhances learning effectiveness and promotes innovation in education. Their review emphasized the importance of integrating KM with LMS to optimize blended learning outcomes. Ni'mah *et al.* (2024) explored the implementation of Outcome-Based Education (OBE) within blended learning using LMS. They concluded that LMS supports the OBE framework by facilitating the delivery of materials, assignments, assessments, and interactions that align with the curriculum's intended outcomes, thus increasing student engagement and interest. Asyari (2024) focused on students' perceptions and attitudes toward LMS-based learning in blended environments.

The study highlighted the importance of understanding students' needs and preferences to design more effective blended learning systems that utilize LMS to enhance motivation and learning outcomes. Rahmi *et al.* (2024) examined the use of H5P interactive content in Moodle LMS for blended learning. Their study showed that integrating interactive content into Moodle significantly improves student engagement and learning outcomes by enriching the online learning activities combined with face-to-face sessions. Nguyen (2024) discussed the application of Artificial Intelligence (AI) in blended learning environments. Their study demonstrated that AI integration into LMS could personalize learning, provide intelligent feedback, and optimize content delivery, thus improving overall learning outcomes. The potential of AI to enhance blended learning effectiveness was explored through international case studies and its application at Thu Dau Mot University. Prestoza (2024) analyzed the use of LMS in blended learning by teachers in public schools in the Philippines. The research found that LMS accelerates teachers' adaptation to distance education and increases adoption rates. It also highlighted challenges such as technical issues and the need for training, suggesting that LMS offers significant advantages in supporting blended learning in public schools. Pani and Vieira (2021) discussed the

integration of LMS into dental simulation clinics for blended learning in pediatric dentistry. Their study emphasized the importance of combining practical, hands-on experience with online learning resources provided by LMS to improve learning outcomes and competency development. Babenko *et al.* (2024) explored the implementation of blended learning approaches in higher education using LMS. They found that LMS plays a crucial role in enhancing the quality and effectiveness of learning by integrating online resources with face-to-face interactions, providing flexibility and supporting diverse teaching methodologies. Mahande *et al.* (2021) proposed a model for assessing metacognitive skills through LMS in vocational education. The study demonstrated that LMS can facilitate the assessment of students' metacognitive behaviors, such as planning and reflecting on their learning, thereby improving students' learning strategies and outcomes in vocational contexts.

Cao (2023) investigated the benefits and challenges of using LMS in blended learning from the perspectives of foreign language teachers and students in Vietnam. The study found that LMS offers flexibility, improves interaction, and supports independent learning, but also presents challenges related to technical aspects and workload, emphasizing the need for adequate support and training. Wang *et al.* (2024) empirically investigated the teaching effects of LMS in blended learning environments. Their study showed that LMS usage positively influenced student engagement, material understanding, and overall learning outcomes, thereby enhancing the effectiveness of blended learning models. Desai *et al.* (2022) discussed the optimal use of LMS for dynamic mathematics classrooms in a blended learning environment. Their research highlighted how LMS features, such as interactive content and assessment tools, improve students' conceptual understanding and engagement in mathematics, leading to better learning outcomes. Each study emphasizes the vital role of LMS in facilitating blended learning, with a focus on improving student engagement, learning outcomes, and satisfaction. Despite challenges such as technical issues and the need for continuous teacher training, the studies collectively demonstrate the positive impact of LMS on the effectiveness of blended learning in various educational contexts. The research designs used in the studies examined in this review are diverse, ranging from quantitative and qualitative approaches to development and mixed methods. This variety enhances the validity of the findings regarding the effectiveness of Learning Management Systems (LMS) in supporting the successful implementation of blended learning models. The table below summarizes the different research designs used, alongside the number of journals that employed each approach. The desire to measure and generalize implementation results is the main reason why quantitative methods are superior. Numerical data allows researchers to statistically analyze effectiveness, efficiency, and learning outcomes, so that findings can be applied to a wider population. In addition, the focus on measurable outcomes, the ease of large-scale data collection through surveys or LMS log data, and the ability to conduct in-depth statistical analysis make quantitative approaches well suited to identifying trends, testing hypotheses, and comparing different aspects of blended learning implementations with LMSs.

While quantitative methods offer advantages in terms of measurement and generalization, it is important to recognize the complementary roles of qualitative and mixed methods research. Qualitative research provides in-depth insights into user experiences, perceptions, and implementation contexts that may be missed by numerical data. By combining measurable quantitative data and in-depth qualitative data, mixed methods offer a more holistic and richer perspective for investigating the impact of LMS on learning dynamics in a blended learning context. Successful implementation of a Learning Management System (LMS) in blended learning environments hinges on a complex interaction of several factors, including technological, pedagogical, institutional, and user-related aspects. The effectiveness of LMS is not solely dependent on the platform itself but on how it is integrated and utilized within a specific educational context. From a technological standpoint, the reliability of the LMS system is essential. Factors like stable servers, adequate internet connectivity, and high-quality, relevant educational materials are crucial to ensuring user satisfaction and ongoing usage. Additionally, the availability of diverse, well-functioning features, such

as discussion forums and assessment tools, contributes significantly to the system's effectiveness. Features like interactive content, including those created with H5P, have been shown to enhance student knowledge and engagement. Instant feedback mechanisms, such as quizzes or assignments, also play an essential role in motivating students to engage with the system and improve learning outcomes. In terms of pedagogical integration, the design of the blended learning curriculum must strategically blend online and face-to-face components. The selection of appropriate teaching activities, resources, and assessment methods for each mode of instruction is key to the success of the LMS in supporting blended learning. The effectiveness of the LMS is further amplified when the chosen blended learning models, such as flipped classrooms or rotation models, are tailored to the subject's needs and learner characteristics. Instructors' roles are also critical—teachers must not only deliver content but also act as facilitators and engage students in meaningful online activities. Their active involvement and ability to adjust teaching strategies based on data from the LMS can significantly influence the learning experience. Institutional and environmental support are also essential for the success of LMS implementation.

This includes the provision of reliable infrastructure, such as internet access and devices, as well as responsive technical support. Clear institutional policies and leadership that foster an environment of innovation and knowledge sharing are also critical. Furthermore, ongoing training and professional development for educators on how to effectively use the LMS and integrate it into their teaching strategies are crucial to achieving long-term success. User factors, particularly the digital literacy of both students and faculty, significantly impact the successful use of LMS. Without sufficient technical skills, users may struggle to navigate the system, which can hinder their engagement and learning outcomes. Motivation and engagement are also vital drivers of LMS usage. The design of challenging and stimulating activities can enhance student engagement, which is correlated with positive learning outcomes. Additionally, the degree of user acceptance and satisfaction, influenced by the LMS's perceived ease of use and usefulness, has a strong impact on continued usage. For younger students, such as those in elementary schools, parental involvement plays a significant role in LMS usage. As students progress through different educational levels, the factors influencing LMS usage evolve. In secondary schools, the development of digital literacy and increased student engagement becomes more critical, while higher education institutions often see extensive use of LMS due to greater learner autonomy. The effectiveness of the LMS is thus shaped by the unique characteristics of each educational level, emphasizing the need to consider user factors when designing and implementing LMS systems. Finally, the integration of new technologies, such as Artificial Intelligence (AI), offers promising enhancements to LMS in blended learning. AI can help personalize learning experiences by analyzing student data, automating assessments, and providing on-demand tutoring support. However, the successful implementation of AI requires clear policies regarding data privacy and biases, as well as adequate user training to ensure its effective use in the blended learning environment.

In sum, the success of LMS implementation in blended learning environments is shaped by a combination of technological, pedagogical, institutional, and user-related factors, with the integration of new technologies like AI potentially offering additional support to optimize learning experiences.

The integration of Learning Management Systems (LMS) into blended learning environments has a profound and multifaceted impact, which can be divided into positive contributions, challenges, and emerging trends. One of the positive contributions of LMS is its role in enhancing learning outcomes and teaching effectiveness. Studies have shown that LMS supports the implementation of Outcome-Based Education (OBE), providing more effective assessment methods and a deeper understanding of student performance (Ni'mah *et al.*, 2024). Additionally, LMS facilitates the integration of technology-mediated learning, which boosts teaching effectiveness and enables universities to implement a more flexible and effective blended learning model (Pani & Vieira, 2021). Furthermore, LMS supports improved course management and delivery, offering educators a robust framework for organizing content,

managing resources, and creating flexible learning experiences. This transforms how distance education is delivered and even enhances traditional face-to-face instruction (Bervell & Arkorful, 2020). Another significant advantage of LMS is its ability to increase student engagement and satisfaction. Students' acceptance of LMS is closely linked to their sense of community and how engaged they feel within the learning environment. Factors such as ease of use, usefulness, and interactivity within the LMS platform contribute to greater student satisfaction (Ustun *et al.*, 2021). The inclusion of interactive content, like that created with H5P, further enhances engagement and satisfaction by improving student knowledge and skills (Rahmi *et al.*, 2024). LMS also supports specific pedagogical approaches, such as innovative teaching-learning-evaluation (TLE) techniques, which can be particularly beneficial for subjects like mathematics (Desai *et al.*, 2022). Additionally, LMS platforms have predictive capabilities, using data from student interactions to identify at-risk students, enabling early interventions to improve learning outcomes (Fahd *et al.*, 2021). However, the implementation of LMS is not without its challenges and considerations. The sustained success of LMS in blended learning is influenced by various factors, such as user satisfaction with the service, the quality of the technical system, and the availability of relevant information within the LMS.

The success of LMS also depends on whether its use is voluntary or mandatory and how users behave toward the system (Bervell & Arkorful, 2020). Moreover, both teacher and student perspectives on the benefits and challenges of LMS need to be considered for the system's success (Cao, 2023). There is also the issue of feasibility and readiness—institutions must assess their capacity to support remote learning and the readiness of educators to adopt LMS and blended learning approaches (Prestoza, 2024). Additionally, a thorough needs analysis of teachers' digital skills, teaching experience, and the role of parental involvement, particularly at the elementary level, is crucial for successful LMS implementation (Zainil *et al.*, 2024). Looking ahead, several emerging trends indicate the future direction of LMS in blended learning. The integration of Artificial Intelligence (AI) into LMS platforms is an area of increasing interest, promising to further enhance learning personalization, assessment, and tutoring (Nguyen, 2024). Knowledge Management (KM) processes are also being integrated into higher education institutions to promote innovation and support blended learning environments (Ibrahim & Shaalan, 2023). Research has also shown that e-engagement and flow experiences significantly affect the continued use of LMS, highlighting the importance of creating engaging online environments (Goh & Yang, 2021). Furthermore, the development of models for assessing metacognitive skills through LMS in vocational education is gaining attention as a way to improve learning (Mahande *et al.*, 2021). Additionally, the perceptions and attitudes of students toward LMS-based learning provide important insights for designing more effective blended learning environments (Asyari, 2024). Finally, the implementation of specific LMS platforms like Moodle is an ongoing area of research, particularly in its use for blended learning in various educational contexts (Goyal *et al.*, 2023). In conclusion, the use of LMS in blended learning environments brings substantial benefits, such as improved learning outcomes, enhanced course management, and increased student satisfaction, though challenges related to user engagement and institutional readiness must be addressed. The future of LMS in blended learning holds promising opportunities for integration with AI, knowledge management, and more personalized learning experiences.

Discussion

The use of Learning Management Systems (LMS) in blended learning has been shown to have a positive impact on the effectiveness of the learning process. Based on various studies reviewed, several key factors influencing the success of LMS implementation in blended learning involve technical, pedagogical, and institutional support. According to Abidin *et al.* (2021), the intention to continue using LMS in blended learning environments is greatly influenced by users' perceptions of the system's ease of use and usefulness. Additionally, Bervell & Arkorful (2020) emphasize that factors such as facilitating conditions, including stable internet connections and adequate technical support, play a significant role in the success of LMS implementation in higher education. LMS also enhances student engagement in the learning process. As found by Goh & Yang (2021), e-

engagement and the flow experience influence students' intention to continue using LMS in blended learning environments. This experience depends heavily on the pedagogical design that can foster meaningful interactions between students and the learning materials. For example, Desai *et al.* (2022) revealed that using LMS in dynamic mathematics classrooms improves students' conceptual understanding, demonstrating how LMS can be tailored to support specific subjects. Furthermore, LMS effectiveness is also related to its ability to support outcome-based learning. Ni'mah *et al.* (2024) show that LMS that supports an outcome-based education (OBE) curriculum can improve the achievement of more structured and measurable learning outcomes.

This is consistent with the findings of Fahd *et al.* (2021), which state that student interaction data with LMS can be used to predict their academic performance, allowing for early identification of students at risk and enabling timely intervention. However, challenges in LMS implementation cannot be ignored. As Cao (2023) explained, both students and teachers often face difficulties using LMS if there is inadequate training or if hardware and software are not properly available. Thus, continuous training and technical support are crucial to ensure the optimal use of LMS. Additionally, Ibrahim & Shaalan (2023) highlight the importance of knowledge management integration in higher education, where the integration of LMS with knowledge management can foster innovation and improve the quality of learning. LMS use also affects students' perceptions of their learning experience, as found by Ustun *et al.* (2021).

They showed that students who feel more connected to the learning community built through LMS tend to be more engaged and satisfied with their learning experience. Therefore, LMS design that facilitates social and cognitive interaction becomes a crucial aspect to consider for increasing student engagement and satisfaction in blended learning. Overall, integrating LMS in blended learning offers numerous benefits, including improved course management, enhanced student engagement, and the ability to monitor and evaluate learning outcomes more effectively. However, to achieve optimal results, LMS implementation must take into account technical, pedagogical, and institutional factors, as well as the readiness of both teachers and students.

4. Conclusion

In conclusion, the successful implementation of an LMS in blended learning is a complex ecosystem that requires alignment between the technology platforms that reliable and easy to use, innovative and learner-centered pedagogical design, strong institutional support (including infrastructure, policies, and training), and acceptance and active engagement from users (students and teachers) who have adequate digital literacy. Specific contexts such as educational level and discipline also play an important role in determining the most effective implementation strategies. The impact of LMS on blended learning is complex and multifaceted. While LMS offers numerous benefits in terms of enhanced learning outcomes, course management, and student engagement, its effective implementation requires careful consideration of various factors, including user satisfaction, pedagogical approaches, and contextual readiness. Emerging trends like AI and KM integration hold the potential to further transform blended learning environments facilitated by LMS. For an LMS to have the maximum positive impact on blended learning, institutions must prioritize design and support that focuses on user needs. This includes ensuring the LMS is perceived as easy to use and useful, which significantly influences student acceptance, engagement, and satisfaction (Mohd Nasir *et al.*, 2021).

Providing adequate facilitating conditions and robust technical support is crucial for both teachers and students to effectively utilize the LMS (Bervell & Arkorful, 2020). Teacher training and support should focus on pedagogical strategies that leverage LMS functionalities to create interactive and engaging learning experiences, which can enhance learning outcomes and student motivation (Rahmi *et al.*, 2024), Furthermore, institutions should consider the specific needs and contexts of their users, conducting needs analyses to tailor LMS implementation and support to address challenges related to digital literacy, access, and diverse learning environments (Zainil *et al.*, 2024). To optimize LMS integration in blended learning,

institutions should explore emerging trends and innovative applications. This involves leveraging LMS to support outcome-based education, enabling effective assessment of student learning outcomes (Ni'mah *et al.*, 2024). The potential of AI within LMS to personalize learning and provide adaptive support should be investigated to enhance the learning experience (Nguyen, 2024). Additionally, fostering knowledge management practices within LMS can benefit educators and promote innovation in teaching and learning (Ibrahim & Shaalan, 2023). Research on e-engagement, flow, and metacognitive skill development suggests that LMS can be designed to promote deeper learning experiences and self-regulated learning (Mahande *et al.*, 2021). Finally, continuous evaluation and research are essential to identify best practices, address challenges, and refine LMS implementation strategies to ensure their effectiveness in diverse blended learning settings (Cao, 2023). This review has significant implications for educational practice. Educators need to carefully design blended learning, effectively integrating online and face-to-face activities through an LMS for maximum results. Institutions are also required to provide ongoing training for educators in the use of an LMS and its integration with innovative teaching strategies. Based on the findings of this observation, practical recommendations for Educational Institutions are take concrete steps to improve the effectiveness of blended learning through LMS.

First, investment in infrastructure such as reliable internet connectivity, adequate hardware, and responsive technical support are the main foundations for successful LMS implementation. In addition, to improve the effectiveness of blended learning through LMS, educational institutions need to implement ongoing teacher training programs with an initial duration of at least 3-5 intensive days that include an introduction to the LMS, integrative pedagogical strategies, and advanced features, followed by regular follow-up sessions and mentoring support. In terms of digital infrastructure, this requires providing adequate devices for teachers and students along with stable internet connectivity and responsive technical support, as well as planning for regular system maintenance and updates. Furthermore, selecting and customizing an LMS that suits the needs of the institution and supports diverse pedagogical approaches will strengthen the quality of learning. Collaboration between teachers in sharing best practices and resources also needs to be encouraged to create a collaborative learning environment. Data collection and analysis from the LMS can be utilized to monitor student progress, identify problems, and demonstrate teaching effectiveness. Finally, student engagement can be increased through interactive and engaging learning activities in the LMS, so that their motivation and learning satisfaction are optimized. Based on the analysis of factors influencing the success of LMS implementation in blended learning, future research needs to explore more deeply the dynamics of interactions between the various elements. Longitudinal studies that track the evolution of LMS usage and its impact on student learning outcomes over time would be valuable. In addition, research that focuses on developing innovative pedagogical models that optimally integrate LMS features to support different learning styles and needs of students would make a significant contribution to effective blended learning design. Given the importance of institutional support, future research should also investigate strategies for building an institutional culture that supports faculty collaboration, knowledge sharing, and adoption of best practices related to LMS use.

Related to the impact of LMS usage on blended learning, future research should continue to explore ways to maximize the positive benefits of LMS while addressing the challenges associated with its implementation. Research on the application of AI in LMS to personalize learning, provide adaptive feedback, and automate administrative tasks has great potential to improve the efficiency and effectiveness of blended learning. In addition, research exploring how LMS can be used to support the development of 21st-century skills, such as critical thinking, collaboration, and communication, is highly relevant. Finally, comparative research evaluating the effectiveness of different blended learning models supported by LMSs in different contexts (e.g., disciplines, educational levels, cultures) would provide valuable insights to inform evidence-based decision-making in blended learning implementation. This study, despite using the PRISMA framework for rigor, is subject to several potential limitations inherent in SLR methodology. These include the potential for

publication bias, where positive results are overrepresented, and language bias due to submitting non-English studies. Database bias may arise from the selection of Scopus and Google Scholar, potentially overlooking studies in other specialist databases. Reliance on specific search terms may limit the scope of review, and the subjective nature of quality assessment introduces potential bias in study selection. Furthermore, the review may inadvertently overestimate certain educational contexts or geographic regions, which may limit the generalizability of the findings. Henceforth, ongoing evaluation of LMS implementation in blended learning is needed.

Ongoing evaluation allows institutions to compare the effectiveness of LMS use, identify areas for improvement, and adjust based on feedback and data. To provide more structured guidance on how institutions can systematically assess the impact of LMS on blended learning, future research could focus on the application of a specific evaluation framework, such as the Kirkpatrick Model. The Kirkpatrick Model, with its four levels of evaluation (Reaction, Learning, Behavior, and Outcome), offers a comprehensive approach to broadcasting the effectiveness of a training program or educational intervention; its application in the context of LMS implementation can help institutions to not only measure user satisfaction but also assess improvements in student knowledge and skills, changes in teaching and learning behaviors, and overall impact on educational outcomes.

5. References

Abidin, Z., Rokhman, F., & Mathrani, A. (2021). Exploring the influencing factors of learning management systems continuance intention in a blended learning environment. *International Journal of Innovation and Learning*, *30*(2), 175-187. https://doi.org/10.1504/IJIL.2021.117221.

Babenko, D., Dotsenko, N., Gorbenko, O., Polyansky, P., & Ivanov, G. (2024). Implementation of the blended learning approach in the conditions of the learning management system of the higher education institution. *Modern Economics*, 6–13. https://doi.org/10.31521/modecon.V44(2024)-01.

Bervell, B., & Arkorful, V. (2020). LMS-enabled blended learning utilization in distance tertiary education: Establishing the relationships among facilitating conditions, voluntariness of use, and use behavior. *International Journal of Educational Technology in Higher Education, 17*(1). https://doi.org/10.1186/s41239-020-0183-9.

Cao, T. X. L. (2023). Benefits and challenges of using LMS in blended learning: Views from EFL teachers and students at a Vietnamese public university. *International Journal of TESOL & Education, 3*(3), 78–100. https://doi.org/10.54855/ijte.23335.

Desai, R., Rai, N., & Karekar, J. (2022). Optimum use of LMS for dynamic mathematics classrooms in blended mode. *Journal of Engineering Education Transformations, 36*(Special Issue 2), 492–499. https://doi.org/10.16920/jeet/2023/v36is2/23075.

Fahd, K., Miah, S. J., & Ahmed, K. (2021). Predicting student performance in a blended learning environment using learning management system interaction data. *Applied Computing and Informatics*. https://doi.org/10.1108/ACI-06-2021-0150.

Goh, T. T., & Yang, B. (2021). The role of e-engagement and flow on the continuance with a learning management system in a blended learning environment. *International Journal of Educational Technology in Higher Education, 18*(1). https://doi.org/10.1186/s41239-021-00285-8.

Goyal, S., Khaliq, F., & Vaney, N. (2023). Implementation of the online learning management system 'Moodle' as a blended approach to online teaching. *Indian Journal of Physiology and Pharmacology, 67*(1), 64–72. https://doi.org/10.25259/IJPP_208_2022.

Ibrahim, S., & Shaalan, K. (2023). A systematic review of knowledge management integration in higher

educational institutions with an emphasis on a blended learning environment. *Lecture Notes in Networks and Systems, 550* LNNS, 319–339. https://doi.org/10.1007/978-3-031-16865-9_25.

Mahande, R. D., Darmawan, F. A., & Malago, J. D. (2021). Metacognitive skill assessment model through the blended learning management system in vocational education. *Jurnal Pendidikan Vokasi, 11*(1). https://doi.org/10.21831/jpv.v11i1.36912.

Mohd Nasir, F. D., Hussain, M. A. M., Mohamed, H., Mohd Mokhtar, M. A., & Karim, N. A. (2021). Student satisfaction in using a learning management system (LMS) for blended learning courses for tertiary education. *Asian Journal of University Education, 17*(4), 442–454. https://doi.org/10.24191/ajue.v17i4.16225.

Ni'mah, A. T., Solihin, F., & Sari, I. U. (2024). Blended learning implementation of outcome-based education curriculum in learning management systems. *E3S Web of Conferences, 499*. https://doi.org/10.1051/e3sconf/202449901020.

Pani, S. C., & Vieira, L. A. C. (2021). Integrating online learning management systems to dental simulation clinics—An example of blended learning in pediatric dentistry. *Journal of Dental Education, 85*, 1163–1166.

Prestoza, M. J. (2024). Assessing remote learning's feasibility: A comprehensive analysis of Philippine public-school teachers' use of learning management systems and blended learning approaches. *Journal of Research, Policy & Practice of Teachers & Teacher Education, 14*(1), 21–27. https://doi.org/10.37134/jrpptte.vol14.1.3.2024.

Rahmi, U., Fajri, B. R., & Azrul, A. (n.d.). Effectiveness of interactive content with H5P for Moodle-Learning Management System in blended learning. *Journal of Learning for Development, 11*(1).

Students' perceptions and attitudes toward learning based on learning management system: A future recommendation on blended learning design. (2024). *Pegem Journal of Education and Instruction, 14*(2). https://doi.org/10.47750/pegegog.14.02.09.

Ustun, A. B., Karaoglan Yilmaz, F. G., & Yilmaz, R. (2021). Investigating the role of accepting learning management system on students' engagement and sense of community in blended learning. *Education and Information Technologies, 26*(4), 4751–4769.

Zainil, M., Helsa, Y., Sutarsih, C., Nisa, S., Sartono, & Suparman. (2024). A needs analysis on the utilization of learning management systems as blended learning media in elementary school. *Journal of Education and E-Learning Research, 11*(1), 56–65. https://doi.org/10.20448/jeelr.v11i1.5310.