

RESEARCH ARTICLE:

## Examining the Impact of Learning Management Systems in African Higher Education: A Systematic Review

Abdul Feroz Maluleke<sup>1</sup> and Godfrey Maake<sup>2</sup>

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### Abstract

*Learning Management Systems (LMSs) are increasingly prevalent in higher education, fundamentally altering the educational landscape. This study evaluates students' and academics' experiences with the use of LMS, shedding light on its impact across the African educational context. Despite the growing importance of LMSs adoption, there remains a dearth of comprehensive research exploring its implications across various African educational settings. Employing the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology, we conducted a systematic review of 54 articles from the Web of Science (WoS) database spanning the years 2020 to 2024. Through this rigorous approach, we sought to discern and analyse the perceptions of students and academics with regard to LMSs utilisation. The use of VOSviewer enabled the visualisation and identification of the most common keywords in this field. The findings highlight varied impacts of LMSs implementation on teaching methodologies, student engagement and overall learning outcomes. Furthermore, the review identifies prevalent themes that students and academics face when adopting LMSs, such as Improvement of Educational Outcomes, Challenges related to LMSs integration, Accessibility and Inclusivity as well as User Interface and Navigation. This study contributes valuable insights for African educational institutions that navigate the digital transformation of learning environments. The findings offer practical guidance for African universities seeking to optimise LMSs implementation strategies. They also enhance the overall educational experiences for both students and educators.*

**Keywords:** digital learning; learning management systems; higher education; systematic literature review

### Introduction

The use of Learning Management Systems (LMSs) has received considerable attention in recent years, primarily due to their critical role in facilitating digital learning. The emergence of digital learning is driving the rapid development and adoption of LMSs across the higher education spectrum (Saleh *et al.*, 2022). In the pursuit of Sustainable Development Goals (SDGs), education emerges as a potent force for positive change by fostering knowledge dissemination, critical thinking and skill acquisition (Chapman and Aspin, 2013: 50). Amidst the evolving landscape of modern education, LMSs have become pivotal tools in African higher education; facilitating the seamless delivery of course materials, interactions, and assessments (Lonn and Teasley, 2009: 686; Hadi *et al.*, 2022). LMSs enhance accessibility of educational content, allowing students to access course materials and resources anytime and anywhere. Through this, LMSs accommodate diverse learning styles and students' varied learning patterns (Kean *et al.*, 2012). For academics, LMSs provide an efficient platform for content dissemination, organizing lecture notes, multimedia presentations and supplementary resources (Kean *et al.*, 2012: 140; Johnson *et al.*, 2018). These efficient platforms free up time for educators to employ interactive teaching methodologies, thereby enhancing student learning experiences (Ulfatin *et al.*, 2021). Engagement, crucial to effective learning, is bolstered by LMS tools such as discussion forums, real-time quizzes, and collaborative projects, which promote

<sup>1</sup>Tshwane University of Technology, [Malulekaaf@tut.ac.za](mailto:Malulekaaf@tut.ac.za) | <https://orcid.org/0000-0003-2390-1517>

<sup>2</sup>Tshwane University of Technology, [maakeg1@tut.ac.za](mailto:maakeg1@tut.ac.za) | <https://orcid.org/0000-0001-9208-4640>

student interaction and critical thinking. Additionally, LMSs enable academics to monitor participation, identify struggling students and provide tailored interventions (Martin and Bolliger, 2018).

Existing research on LMSs has predominantly focused on either students or academics' adoption of LMSs within the African educational context; resulting in an incomplete understanding of their comprehensive experiences when using these platforms (Phan *et al.*, 2022). It is essential to consider both groups' perspectives to assess the successful implementation and potential benefits of LMSs usage (McGill and Klobas, 2009). Furthermore, much of the literature has focused on quantitative metrics such as user engagement or completion rates; overlooking qualitative aspects like usability, user perceptions, satisfaction and pedagogical effectiveness (Bervell and Umar, 2018). Bervell and Umar (2018) suggest that contextual factors affecting LMS experiences such as cultural differences, institutional settings, technological infrastructure and individual characteristics remain underexplored. These factors significantly influence users' perceptions and interactions with these systems (Usoro *et al.*, 2014). As such, this study adopts a systematic review approach to address these research gaps comprehensively. This study aims to evaluate the diverse experiences encountered by students and academics when using LMSs in African Higher Educational Institutions (HEIs).

## Literature Review

In higher education, a robust and dynamic Learning Management System (LMS) is considered indispensable for efficiently managing and conducting teaching, learning, and assessment processes (Suriseti and Veluvali, 2022). As technology increasingly pervades all aspects of life, educational institutions predominantly rely on institutional LMS platforms to cater to the needs of both instructors and students (Simon *et al.*, 2024). Besides supplementing traditional face-to-face education, LMSs facilitate remote and asynchronous learning by extending course accessibility beyond the confines of physical classrooms (Sayfour, 2016). Since LMSs are defined as web-based tools specifically designed for educational settings, they serve educators, learners, and administrators by creating and managing instructional materials and resources (Yamani *et al.*, 2022). These platforms foster active engagement in learning activities, whether online or offline, supporting both specific and broader educational objectives (Daar *et al.*, 2023). The primary objectives of LMSs include enhancing traditional teaching methods and enabling the development of flexible instructional strategies (Elmunyah *et al.*, 2023). Educational institutions adopt LMSs as integral components of their technology infrastructure, streamlining teaching and learning processes (Al Afi and Rao Naidu, 2020). Educators leverage LMSs to plan, manage, and deliver instructional content effectively, incorporating diverse media such as text, e-books, graphics, web links, sound, and interactive videos to enrich learning experiences (Yawisah *et al.*, 2022).

According to Tinmaz and Lee (2020), the successful implementation of LMSs in education hinges on several key elements identified in current literature. LMSs employ a variety of tools and features, including course administration, online group chat, discussion forums, assessment management and grading, document management, course evaluation tracking, and participant reporting (Ajjola *et al.*, 2021; Daar *et al.*, 2023). Elmunyah *et al.* (2023) emphasise that LMSs offer educators and students flexibility in accessing and interacting with assignments and learning activities at their convenience, reinforcing learning processes in online classrooms. Bradley (2021) highlights that LMSs support communication, collaboration, and discussion among learners, enhancing their engagement in the learning process. Additionally, LMSs facilitate social interactions in online education, making communication more accessible and comfortable for students (Elmunyah *et al.*, 2023). Using built-in technologies designed to encourage interaction, LMSs have evolved beyond simply providing a means for teachers to store and show course materials (Simon *et al.*, 2024). Educators utilise LMSs to guide discussions, facilitate virtual exercises, set learning expectations, offer choices, and assist students in problem-solving and decision-making (Bradley, 2021). Moreover, LMSs enable students to collaborate on educational assessments by utilising interactive tools such as discussion boards, video conferencing, and threaded conversations (Veluvali and Suriseti, 2022). These features support learners in comprehending and retaining essential subject matter, as the learning content is readily available and accessible.

LMSs offer numerous benefits that enhance the educational experience for both teachers and students. They assist teachers in managing student enrollment and providing learning resources to students timeously (Daar *et al.*, 2023). LMSs provide virtual classroom settings that support distance learning (Bradley, 2021), and they play a vital role in supporting and enhancing teaching and learning processes (Yawisah *et al.*, 2022). One notable advantage of LMS adoption is the efficiency with which instructors can manage learning content (Yawisah *et al.*, 2022). Furthermore, LMSs encourage students to explore new concepts throughout their coursework, ensuring

that they remain focused on their learning objectives and enhancing their educational experiences (Elmunsyah *et al.*, 2023). Built-in tools and resources help users access crucial course materials and information, typically organised in folders that facilitate learning (Veluvali and Suriseti, 2022; Bradley, 2021). By leveraging these capabilities, LMSs have become critical in advancing flexible, student-centered learning environments within higher education.

## Methodology

This systematic review investigates the perceptions of students and academics regarding the use of LMSs in African higher educational institutions. The study employs the Web of Science (WoS) database for a comprehensive coverage of peer-reviewed literature; ensuring a diverse range of bibliographic sources and abstracts. Articles published between 2020 and 2024 (June 2024) were included to capture the latest trends in perceptions and practices surrounding LMSs in the African context. Keywords utilised in the search strategy include "Learning Management Systems" or "LMSs", "Higher Education Institutions", and "Africa", ensuring both breadth and relevance in identifying pertinent literature. By focusing on recent publications, this review aims to provide insights into evolving attitudes towards LMSs among stakeholders in African academia. The systematic approach adheres to established guidelines such as PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), ensuring rigour and transparency throughout the review process. Synthesizing findings from selected publications will illuminate key themes and offer implications for policy, practice, and future research in enhancing educational technology adoption within African higher education. Articles included in this systematic review were required to meet the following criteria, as specified by PRISMA guidelines (Moher *et al.*, 2009):

- **Language:** Publication in English.
- **Topic:** Focus on Learning Management Systems (LMSs) in higher education.
- **Setting:** Emphasis on higher educational institutions.
- **Relevance:** Directly address perceptions or experiences of students or academics regarding LMSs.
- **Timeframe:** Published between 2020 and 2024 (25 June) to ensure inclusion of recent literature.

Articles not published in English were excluded; following standard practice to maintain consistency and accessibility in language (Moher *et al.*, 2009). Studies that did not specifically investigate LMSs in the context of higher education were excluded to maintain focus and relevance. Furthermore, publications not centred on higher educational institutions were excluded from aligning with the scope of this review. The search strategy employed Web of Science (WoS) to identify relevant literature; using keywords such as 'Learning Management systems' or 'LMSs', 'higher education institutions' and 'Africa'. Initially, 981 records were retrieved. Through systematic screening, duplicates and non-English publications were removed, adhering to PRISMA guidelines for transparent reporting (Moher *et al.*, 2009). After applying the inclusion and exclusion criteria 54 articles were deemed eligible for inclusion in this review. Figure 1 shows the flow chart of the study selection process.

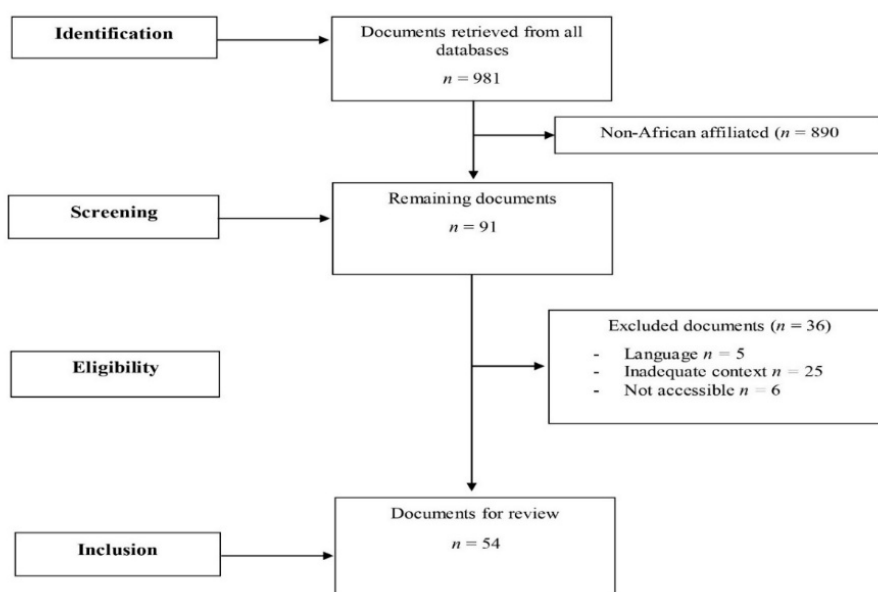


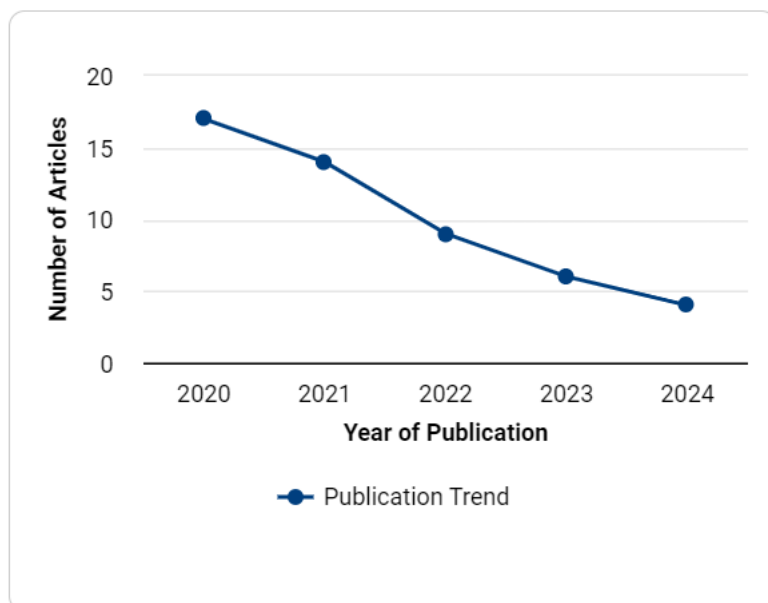
Figure 1: Publication trend from 2020 -2024

## Findings

Our analysis of the literature on LMS adoption in African HEIs unfolds through a structured exploration across three phases. Firstly, we present descriptive statistics encompassing the publications identified for this systematic review. These statistics illuminate the evolving publication trends surrounding the use of LMSs in African HEIs from 2020 to 2024; shedding light on the frequency of scholarly publications and the influential authors and countries contributing to this field. In the second phase, the authors delve into the formulation of thematic insights derived from the reviewed literature. This phase discerns the predominant themes encountered by HEIs in Africa as they navigate the integration of LMSs into teaching and learning practices. By synthesising these themes, the study aims to offer a comprehensive understanding of the challenges and benefits experienced across diverse educational contexts within the African continent. In the third phase of our analysis, we employed VOSviewer software to conduct a co-occurrence analysis of keywords and authors extracted from the selected publications. This visualisation tool enables the mapping out of key concepts and the collaborative networks shaping scholarly discourse in this field. This study seeks to contribute nuanced insights into the landscape of LMS adoption in African higher education through these three analytical phases. It provides valuable perspectives for institutions, policymakers and researchers who are striving to enhance educational outcomes through digital technologies.

### *Descriptive statistics of examined studies*

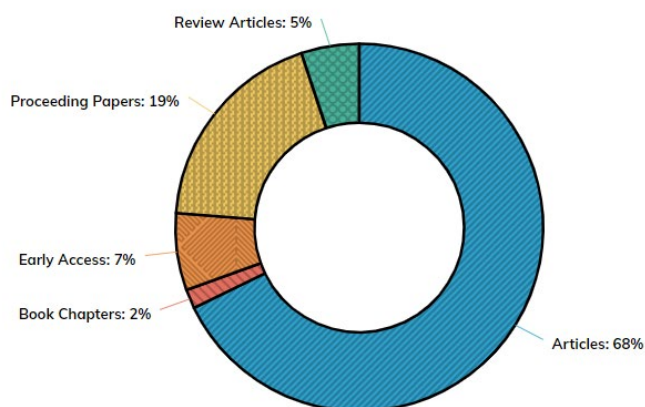
The descriptive statistics in the context of this study focus on explaining the collection of articles selected for review in terms of types of publication, top 10 countries, publication count in the past five years, Sustainable Development Goals (SDGs) themes and top 10 universities with most publications. These publications of the top 10 universities are based on the information extracted from the WoS database in relation to the usage of LMSs in African HEIs. Foremost in the descriptive statistics is the trend in publications (refer to Figure 2). Evidently, the highest number of publications was reported in 2020 (17 publications); followed by 2021 (14 publications). The trend in publication volume depicts a decelerating publication phenomenon; with only 4 publications reported in 2024 (25 June 2024).



**Figure 2:** Publication trend from 2020 -2024

**Source:** WoS database, 2020 – 2024 (25 June 2024) and authors' own compilation

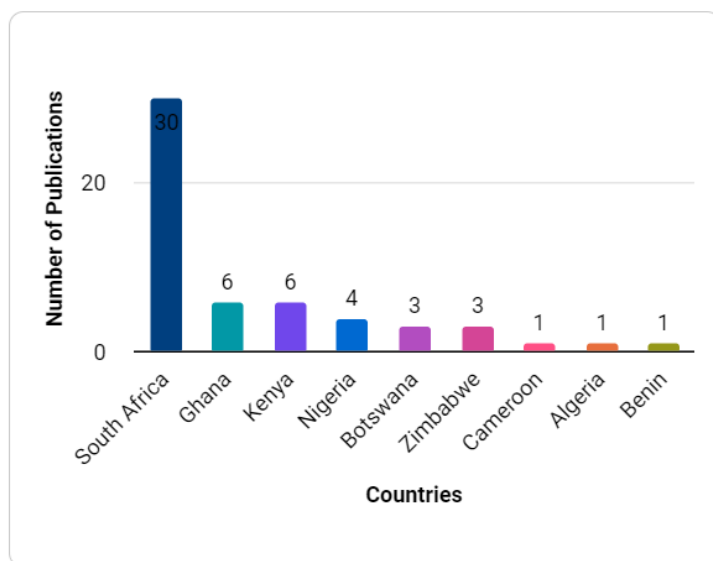
With respect to publication types related to LMS adoption in African HEIs, Figure 3 depicts the concentration of the types of publications that were extracted from the WoS database. The most popular publication types were journal articles, followed by conference proceedings papers. This information shall prove useful to authors who intend to publish research on the use of LMSs to improve education in the African continent. Furthermore, the results indicate the lack of publication of book chapters and books; which further highlights the need for researchers to write these types of publications.



**Figure 3:** Publication types

**Source:** WoS database, 2020 – 2024 (25 June 2024) and authors' own compilation

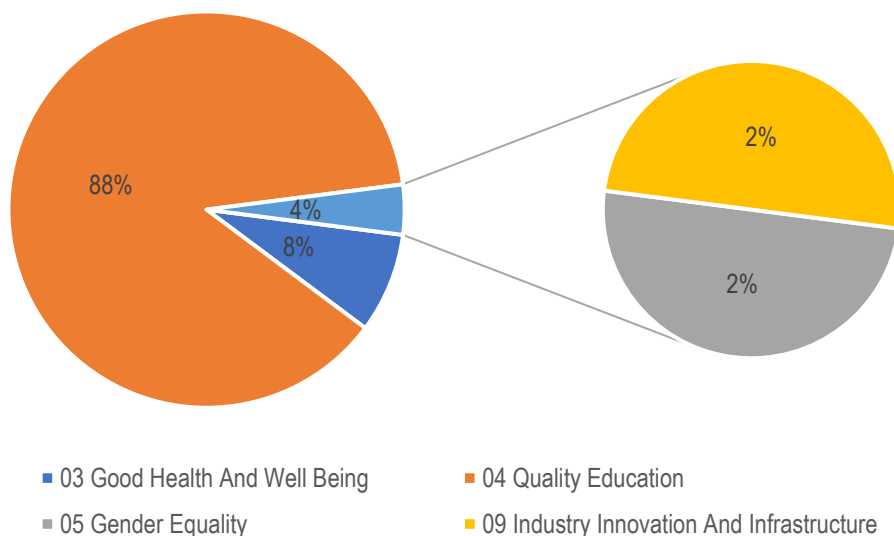
The adoption of educational technologies such as LMSs has been growing steadily in African educational contexts. Country-wise publication in this field presents an interesting outline; with only a few countries having a number of publications. The country with the most publications was South Africa (30 publications), followed by Ghana and Kenya (6 publications respectively) and Nigeria (4 publications). Other countries that are featured in this list are Botswana, Cameroon, Zimbabwe, Algeria and Benin; as depicted in Figure 4. These findings highlight the need for other African countries, lagging behind, to engage in LMS research across higher educational contexts.



**Figure 4:** Top 10 countries publication count

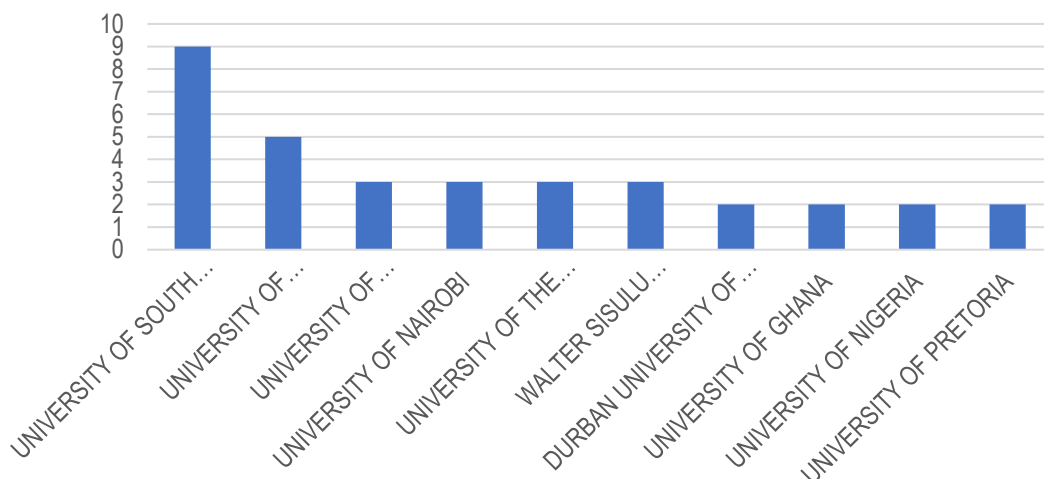
**Source:** WoS database, 2020 – 2024 (25 June 2024) authors' own compilation

The Sustainable Development Goals (SDGs) present a critical framework for guiding research and education development in the African higher education spectrum. Through the alignment of research with SDG themes, African HEIs can address pressing local and continental challenges such as inequality, quality of education, poverty and industrial innovation (Mbithi *et al.*, 2021). Research linked to SDGs offers the prospect of substantial benefits; including enhanced societal relevance of academic output. It also offers the prospect of increased funding opportunities from international organisations and donors, and improved collaboration between academia, industry and governmental bodies. In the past five years, there have been four SDGs-related publications. These were related to the use of LMSs in African HE; Good Health and Wellbeing (8%), Quality Education (88%), Gender Equality (2%) and Industry Innovation and Infrastructure (2%). These findings highlight the need for African authors to link their research to SDG themes.



**Figure 5:** Pie Chart showing publications according to SDG themes  
**Source:** WoS database, 2020 – 2024 (25 June 2024) and authors' own compilation

The integration of LMSs for learning purposes in the digital era is something that every country aims to achieve. Figure 6 depicts data retrieved from the WoS database; indicating the top 10 institutions of higher learning with the most publications. Foremost, South African HEIs dominate the table, with the University of South Africa having the most number of publications (9), followed by the University of KwaZulu-Natal (5). Other universities with publications include the University of Botswana (3), the University of Nairobi (3), the University of the Free State (3), Walter Sisulu University (3), Durban University of Kwa Zulu Natal (2), the University of Ghana (2), the University of Nigeria (2) and the University of Pretoria (2). Again, this further shows the gap in LMS-related research among African HEIs.



**Figure 6:** Affiliation-wise Top 10 Universities  
**Source:** WoS database, 2020 – 2024 (25 June 2024) and authors' own compilation

### Identification of prominent themes

This section presents an analysis of the challenges and benefits faced by African Higher Education Institutions (HEIs) in adopting Learning Management Systems (LMSs) for educational purposes. A systematic review of 54 research articles retrieved from the WoS database was conducted to synthesise the current understanding in this area. Initially, a broad spectrum of themes emerged from the literature; reflecting the multifaceted nature of LMSs adoption in African HEIs. These themes were systematically reviewed and categorised to ensure a comprehensive, yet focused, analysis. The following key themes were identified through iterative analysis and consolidation:

- **Improvement of Educational Outcomes:** This theme encompasses the impact of LMSs on enhancing student learning outcomes, academic performance and overall educational quality within African HEIs.
- **Challenges related to LMSs integration** This theme highlights the challenges and strategies related to the development of digital literacy skills among students and educators; as well as the provision of support systems for effective e-learning implementation.
- **Accessibility and Inclusivity:** These address the accessibility of LMSs platforms to diverse student populations across different regions and socio-economic backgrounds and ensure inclusivity in educational opportunities.
- **User Interface and Navigation:** The focus here is on the usability aspects of LMSs interfaces tailored to the needs and technological capabilities prevalent in African contexts; facilitating intuitive navigation and user-friendly experiences.

The analysis was facilitated by using Atlas's; a qualitative data analysis software proficient in systematic text analysis. This software enabled systematic coding, organisation, and exploration of emergent themes and patterns across the reviewed literature. Each identified theme will be examined in detail in the subsequent sections; drawing upon the findings from the reviewed literature. The discussion will critically analyse the challenges and benefits associated with LMSs adoption in African HEIs; offering insights into strategies for enhancing educational practices and outcomes in the African continent.

### ***Improvement of educational outcomes***

A plethora of research suggests that LMS adoption is seen as a pathway to improve educational outcomes, particularly in less developed countries. Scholars assert that there is a significant relationship between the use of LMS resources and students' academic performance (Okike and Mogorosi, 2020). Mohammed *et al.* (2024) investigated the acceptance and factors influencing the implementation of cloud-based LMSs in developing nations; focusing specifically on six Nigerian colleges. Key findings indicate that developing learning models could be used to predict the effects of study inputs on LMSs. Similarly, Ahmed (2024) underscores the potential of machine learning in improving educational outcomes through predictive analytics in African HEIs. An important aspect of e-learning through LMSs use is the quality of interaction between students and educators. Against this backdrop, Mumtaz *et al.* (2024) highlight the need to develop models to aid in forecasting weekly usage of LMSs metrics; offering valuable insights for enhancing educational practices and student engagement strategies. LMSs could be used to predict procrastination behaviour in online learning environments using machine learning algorithms. Hussein *et al.* (2018) posit that certain LMSs features allow the incorporation of predictive models to enhance student engagement and reduce procrastination. In their systematic review paper, Omanyo and Ndiege (2023) synthesised findings on how LMSs could be used to optimise education processes and outcomes in the area of Knowledge management within African HEIs. Their research highlights the need for tailored strategies to overcome LMSs implementation challenges. The use of LMSs can foster the enhancement of student performance within HEIs. According to Khan *et al.* (2023), significant correlations exist between student performance and several factors; including the frequency of resource views, gaps in activity, previous semester grades, and initial term test evaluations. These insights enable educators to identify students who may require additional support or intervention based on their predicted academic trajectory.

LMSs have become essential tools in fields such as nursing education; particularly with the increased reliance on online learning accelerated by the COVID-19 pandemic. Namada (2021) underscores the transformative role of LMSs in modern education; particularly under the backdrop of the COVID-19 pandemic. LMSs platforms support diverse learning needs and enhance educational outcomes through the effective integration of digital tools and strategic management of e-learning initiatives. Online learning, facilitated via LMSs, offers many benefits for students who have first-time experience learning online (Mtshali *et al.*, 2022). Furthermore, LMSs facilitate the benefits of interactions and engagement with regard to increased flexibility, socialisation, convenience and accessibility of learning content (Mtshali *et al.*, 2022). However, e-learning via LMSs poses other challenges, such as a lack of real-time responses and related financial costs. The use of e-learning systems, specifically LMSs, enhances understanding of the factors influencing students' continued usage of LMSs. Kuadey *et al.* (2023) pinpoint the importance of resources, self-efficacy, enjoyment and social influence in fostering sustained engagement with e-learning platforms. Contrary to traditional learning methods, LMSs such as Moodle play a crucial role in managing educational activities in tertiary institutions (Samaila *et al.*, 2022).

### **Challenges related to LMS integration**

The adoption of LMSs in African HEIs is often associated with challenges related to computer skills proficiency among students, academics and faculties. Enakrire (2024) conducted a study evaluating the significance of computer skills among lecturers in an open-distance e-learning environment in Nigeria; highlighting their role in enhancing teaching and learning. Their key findings indicate that computer skills enable lecturers to proficiently use programming languages, manage online platforms and utilise communication tools such as social media and teleconferencing (Enakrire, 2024). Van der Merwe *et al.* (2023) conducted a systematic review study that focused on analysing e-learning challenges in sub-Saharan African HEIs from 2016 to 2022. The study identified computer and technological skills (ICT) among the persistent challenges faced by HEIs in this region (Van der Merwe *et al.*, 2023). Additionally, the findings highlight the persistence of context-specific challenges across South African HEIs; necessitating a holistic top-down approach to support institutions, instructors and students effectively. Similarly, other authors highlight other challenges, such as technical issues and financial costs needed to provide adequate training and resources for students and academic staff (Mtshali *et al.*, 2022).

Ndou *et al.* (2023) conducted a study at a rural-based university in South Africa during the COVID-19 pandemic; focusing on the challenges and readiness to adopt an online LMSs. The findings of this study underscore the role of LMSs as a vital platform for knowledge sharing and highlight key challenges such as connectivity issues and lack of preparedness (Ndou *et al.*, 2023). The research aims to inform educational authorities about the vital importance of technology in crisis management within higher education settings. Challenges pertaining to readiness to embrace educational technology in African education are a well-known phenomenon. Studies reveal significant variability in preparedness in relation to LMS adoption across African HEIs. Common strategies included leveraging existing LMSs, adopting video conferencing tools such as Zoom and Microsoft Teams, and developing online educational resources (Chipamaunga *et al.*, 2023). Other challenges stated by Chipamaunga in this regard include unequal access to technology and internet connectivity among students and faculties, limited digital literacy and resource constraints (Chipamaunga *et al.*, 2023). In fostering e-learning initiatives through LMS usage, Maharaj (2023) recommends that educational bodies in Africa enhance pedagogical strategies for online teaching, improve technological infrastructure and support and develop comprehensive training programmes for educators on effective online teaching practices. Furthermore, Munyaradzi *et al.* (2024) assert the need for African HEIs to consider enhancing faculty training programmes in order to improve their proficiency with the LMSs and to bridge the gap in readiness in remote learning environments.

### **Accessibility and inclusivity**

LMS adoption in African HEIs can either enhance or hinder accessibility and inclusivity, depending on the extent of infrastructure development and support for diverse student needs. The COVID-19 pandemic eliminated the disparity in the access of education across the African continent. In South Africa, for example, institutions of higher learning faced various challenges related to educational access due to the COVID-19 pandemic (Dube, 2020; Oyerinde and Dienga, 2023). Scholars highlight the necessity and effectiveness of new technologies and innovations introduced during the pandemic; particularly in engineering education (Oyerinde and Dienga, 2023). According to Noorbhai *et al.* (2024), e-learning integration has advantages and disadvantages perceived by various stakeholders. Role players in the educational spectrum underscore the potential of ICTs, including e-learning and LMS integration. These are sustainable strategies for enhancing Health Science education and improving healthcare delivery in South Africa; despite existing constraints and disruptions like COVID-19 (Noorbhai *et al.*, 2024). As such, Dlamini and Ndzinisa (2020) underscored the need for universities to go beyond technological adoption and address systemic issues to create truly inclusive learning environments.

When implementing educational technology for learning to enhance education accessibility, it is imperative to investigate students' intention to use the anticipated technology. In a study conducted in Somalia, Başaran and Hussein (2023) found several factors (usefulness, user satisfaction, ease of use, complexity, trialability and university support) to significantly contribute towards students' acceptance and use of video conferencing tools for learning. This highlights the necessity for educational institutions to provide supportive environments and continuous engagement with students to enhance their educational experiences; particularly in technologically disadvantaged regions (Başaran and Hussein, 2023). These findings are corroborated by the findings of Kondoro *et al.* (2023), who posit the critical need for real-world user testing; particularly with visually impaired individuals, in order to enhance the accessibility and usability of LMSs like Moodle. Lubanyana *et al.* (2022) evaluated the impact of e-learning, specifically in rural universities; with a focus on the rural area of Butterworth, South Africa. The study



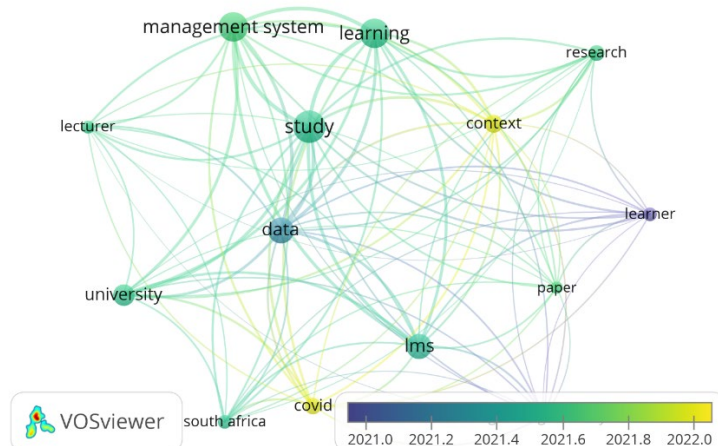
findings revealed the critical role of e-learning in rural university settings and highlighted substantial challenges that need to be addressed. These challenges include improving ICT infrastructure; enhancing service delivery and overcoming environmental limitations (Lubanyana *et al.*, 2022; Matarirano *et al.*, 2021). The findings suggest a need for targeted interventions to optimise the use of e-learning tools beyond assessment purposes, promoting broader educational engagement and access to learning resources in rural areas.

### **User interface and navigation**

As many African HEIs adopt LMSs for teaching and learning purposes, it is imperative to evaluate the impacts of the LMSs user interface and navigation on students and academics. Highlighting these challenges related to user-friendly designs and intuitive accessibility is paramount since this can influence user satisfaction and effective utilisation of educational resources. The adoption of e-learning necessitates critical benchmarks for LMS design and the recommendation of an optimal approach for maximising LMS utilisation in universities and higher education institutions (Al-Mamary *et al.*, 2023). In the African educational context, our analysis revealed varying results related to challenges with respect to LMS user interaction and acceptance. Shayan *et al.* (2023) reported higher levels of user acceptance among Canvas users compared to Blackboard, which was observed consistently at both question and TAM construct levels. Lwande *et al.* (2021) advance the importance of estimating learning styles and cognitive traits from LMSs, addressing the gap where LMS platforms typically lack features for detailed behavioural analysis beyond basic access statistics. Educational institutions are advised to use LMS data to estimate learning styles and cognitive traits using LMSs data (Lwande *et al.*, 2021). Educational institutions can use these insights to inform decisions regarding LMS selection and implementation strategies, aiming to enhance user engagement, satisfaction and, ultimately, educational outcomes. Venter (2020) conducted a study at the University of South Africa that focused on understanding how students self-direct their learning across different online and offline learning spaces, aiming to shed light on the challenges of low participation rates in formal LMSs and high dropout rates. Venter (2020) found that students engage extensively in informal collaborations across online and offline platforms outside the formal LMSs. Furthermore, students establish diverse social ties through these collaborations; leveraging social capital to access resources, support and knowledge from peers (Venter, 2020). It is paramount for African HEIs to understand these facets in order to enhance user experience and maximise the benefits of LMS adoption in the educational context.

### **VOSviewer analysis**

In the final phase of our analysis, we employed VOSviewer to examine the keywords extracted from the 54 selected publications; focusing on Learning Management Systems (LMSs) in the context of African higher education. Initially, VOSviewer identified 1,677 keywords from these publications. Subsequently, we applied a minimum occurrence threshold of 10; resulting in 22 keywords meeting this criterion for relevance scoring. VOSviewer assigned a relevance score of 60% to each of these 22 keywords; leading to the selection of 13 keywords for further detailed analysis and visual representation. Figure 7 presents the visualisation of the keyword co-occurrence network map derived from the VOSviewer analysis. The proximity between nodes in the map indicates the strength and degree of relatedness between keywords; with shorter distances reflecting stronger associations.



**Figure 7:** Keyword Co-occurrence Network Map of LMSs in African Higher Education

Figure 7 depicts the visualisation of the keyword co-occurrence network map from the VOSviewer analysis. The distance between each node denotes the strength and keyword relatedness. When the distance between the nodes is shorter, the relationship between the keywords is deemed to be strong. Notably, Figure 7 illustrates a prominent green cluster comprising 8 keywords, which collectively highlight the predominant theme of LMSs utilisation among academics and students in university settings. Furthermore, the VOSviewer analysis identified two noteworthy keywords, "COVID" and "context,"; underscoring the significant research conducted during the COVID-19 pandemic when numerous African higher education institutions adopted LMSs for emergency e-learning initiatives during lockdowns.

## Discussion

Adopting Learning Management Systems (LMSs) to enhance educational outcomes in African higher education has gained significant importance as a global imperative during the COVID-19 pandemic. This study's findings indicate a widespread transition amongst African higher learning institutions from traditional teaching methods to digitally enhanced learning; facilitated by LMSs. The integration of LMSs enables educators to employ diverse learning activities that foster active student engagement throughout the learning process. This integration is particularly crucial in Africa, given its historical infrastructural challenges, as it extends educational access to diverse settings; including rural areas. By incorporating LMSs, African higher education institutions (HEIs) can effectively enrol more students, facilitated by the platform's capabilities in course planning, content creation and assessment administration. Moreover, LMS integration promotes collaboration among educators, students, tutors and administrators. Educators and administrators utilise LMS functionalities to monitor student progress, manage course materials and facilitate communication through features such as discussion forums, chat rooms and blog postings.

This study highlighted significant challenges associated with the integration of Learning Management Systems (LMSs) in African higher education. Considering the economic context of African society, many students encounter difficulties adapting to digital learning resulting in some falling behind. A key obstacle identified is the lack of computer literacy among students, as noted in the literature. Furthermore, resistance to transitioning from traditional to virtual classrooms contributes to the slow adoption of LMSs in many African countries. Additionally, inadequate ICT infrastructure and unreliable internet connectivity pose substantial barriers to effective online learning in African HEIs. Moreover, common challenges include intermittent internet access, limited technical support and compatibility issues between e-learning platforms and course materials. According to Mohammadi *et al.* (2021), students cite insufficient computer knowledge and access as primary obstacles to e-learning. Therefore, it is crucial for African HEIs to invest in robust ICT infrastructure to support digital learning initiatives successfully. Equally important is the investment in training programmes for students and educators to enhance their comfort and proficiency with LMS adoption. These measures are essential to mitigate challenges and ensure the effective integration of digital learning technologies across African higher education institutions.

In response to the imperative of ensuring universal access to education, institutions and regulatory bodies are currently striving to overcome barriers exacerbated by the COVID-19 pandemic. Many educational establishments have embraced technology; resorting to distance learning to maintain academic continuity. However, the digital divide, infrastructure limitations, and diverse socio-economic conditions in Africa present significant challenges. Poor access to reliable internet and inadequate technological infrastructure is major obstacles; hindering the widespread adoption of e-learning across the continent (Eden *et al.*, 2024). Ensuring equitable access to LMSs is crucial for providing all students with equal opportunities to educational resources, regardless of their background. Urban students tend to fare better than their rural counterparts, who often face challenges such as limited access to digital devices and unreliable internet connectivity (Reddy *et al.*, 2022). Disparities in learning outcomes can also stem from ineffective pedagogical approaches when using LMSs; where students may struggle with complex topics due to insufficient support and clarification. To address these issues, African HEIs should prioritise creating inclusive learning environments that cater to diverse populations. This involves implementing comprehensive assessments of LMS usability, providing training for both students and educators, and ensuring access to learning materials in various formats, such as transcripts, videos and recordings. By focusing on these strategies, HEIs can mitigate learning inequalities and foster an environment where all students have equal opportunities to succeed in their educational pursuits.

In addition to the previously mentioned challenges, students in African HEIs commonly face issues with the usability of LMS interfaces. A clear and intuitive user interface and navigation are crucial for ensuring a positive

learning experience. Proper training and technical support are also vital to enhance satisfaction among both educators and students. The LMS interface should be designed to be user-friendly, facilitating seamless integration and adoption by students. Given that many students access LMSs through mobile phones, it is imperative to ensure that the platform is responsive and mobile-friendly. This approach supports accessibility and usability across different devices, enhancing the overall user experience. Conducting research to gather feedback from students and educators about their LMS experiences can provide valuable insights for addressing these usability challenges effectively. Ultimately, a user-friendly LMS interface contributes significantly to fostering positive learning experiences, increasing engagement and enhancing overall student satisfaction within African HEIs. By prioritising interface design and usability, institutions can better support their educational objectives and facilitate effective digital learning environments.

As with any other research, this study has potential limitations. Firstly, one of the limitations could be related to publication bias within the selected research articles retrieved from the Web of Science (WoS) database. The database may not include all relevant studies on LMS adoption in African HEIs. Future research can consider other databases in addition to the WoS database to yield a more nuanced understanding. Secondly, another limitation could be language bias; as the systematic review may have excluded studies published in languages other than those covered by the WoS database (often in English). This exclusion could lead to a lack of representation of valuable insights and perspectives from non-English publications, particularly from regions where local languages are predominant. Thirdly, another limitation could be the generalisability of the findings due to infrastructural variations across African HEIs. Key findings conducted in more resource-rich institutions or specific regions may not fully apply to institutions with different socio-economic or technological contexts within Africa.

## Conclusion and Recommendations

This systematic literature review aimed to examine the impact of Learning Management Systems (LMSs) use in African higher education contexts. A notable finding was the limited publication of LMS usage by African Higher Education Institutions (HEIs), highlighting a significant gap that needs addressing. This study contributes to a deeper understanding of how LMSs impact the African educational context, offering insights crucial for policymakers to enhance student experiences. Effective adoption of LMSs allows for access to educational content, promoting community well-being, and supporting Sustainable Development Goals (SDGs) attainment, thereby driving community development and welfare. It is essential to ensure equitable access to LMSs platforms despite challenges such as internet connectivity and data costs. Simplifying LMS user interfaces and providing robust technical support are recommended to foster positive perceptions of LMS usage amongst university stakeholders. Digital learning platforms facilitate seamless communication, assessment grading, access to study materials and collaborative learning; thus, enhancing educational outcomes in developing nations. However, educators and students must possess adequate computer skills to fully leverage LMS advantages. Investing in ICT infrastructure is crucial for sustaining a robust learning environment. Future research directions should include longitudinal studies to track the enduring impacts of LMS adoption on educational outcomes in African HEIs. Comparative studies across diverse African regions can explore variations in LMS adoption strategies, challenges and outcomes. Additionally, qualitative research should investigate the experiences, perceptions, and obstacles faced by students, faculty, and administrators during the implementation of LMSs.

## Declarations

**Interdisciplinary Scope:** This article demonstrates an interdisciplinary scope by integrating research insights on digital technologies, specifically the use of learning management systems (LMS), and their benefits for managers and policymakers within the African context. It emphasizes the role of managers, deans, heads of departments, and other stakeholders in ensuring the optimal use of LMS-related technologies to improve educational outcomes.

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