

# Challenges and Opportunities in Implementing Learning Management Systems (LMS) in the Moroccan Educational Landscape: a Review Article

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The digital transformation of education has become an important vehicle of innovation, particularly in developing countries like Morocco. Learning Management Systems (LMS) play an essential role in modernizing education by enhancing accessibility, efficiency, and engagement in the learning process. This paper examines the adoption and impact of LMS in the Moroccan educational landscape, exploring both the opportunities they offer and the challenges blocking their widespread implementation. The discussion begins with an overview of the current state of LMS in Morocco, emphasizing the importance of digital transformation in education. Then, it analyzes the extent to which LMS are adopted and their effects on teaching and learning practices. Key challenges, including limited infrastructure, resistance to change, and insufficient training, are addressed, along with potential solutions to overcome these barriers. Finally, this paper offers recommendations, focusing on policy reforms, infrastructure investment, educator training, and fostering public-private partnerships to ensure sustainable integration of LMS in the Moroccan educational system.

**Learning Management Systems (LMS); Moroccan educational system; digital transformation; LMS platforms; digitalization strategies.**

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## **1. Overview of learning management systems (LMS) in Morocco**

Learning Management Systems (LMS) have become a cornerstone of digital education in Morocco, particularly in the wake of the COVID-19 pandemic, which accelerated the adoption of online learning platforms. LMS platforms such as Moodle, Google Classroom, and other proprietary systems are widely used in Moroccan universities and schools to facilitate remote learning, manage course content, and assess student performance. These systems provide a centralized base for educational resources, enabling

students to access materials, submit assignments, and engage in interactive learning activities from anywhere (Benmoussa et al., 2024).

The Moroccan government has actively supported the integration of LMS into the education system through initiatives like the "Connected Classrooms" program, which aims to modernize education by providing online resources and interactive tools to schools and students. Additionally, the establishment of the Moroccan Virtual Campus in 2005 marked a significant step in promoting e-learning, offering a platform for creating and sharing multimedia courses (amutangana, 2024). Despite these advancements, challenges such as limited internet access in rural areas and varying levels of digital literacy among educators and students remain barriers to the widespread adoption of LMS (Mhlanga, 2024).

### **1.1 Importance of digital transformation in education**

Digital transformation in education is a critical driver of socio-economic development in Morocco. By leveraging information and communication technologies (ICT), the country aims to modernize its educational infrastructure, improve learning outcomes, and foster innovation. The Moroccan government has set ambitious goals, including training 22,500 digital experts by 2027 and creating 144 new digital programs across 12 universities. These efforts are part of a broader strategy to enhance the quality of education and prepare students for the demands of a digital economy. (amutangana, 2024)

The COVID-19 pandemic stressed the importance of digital transformation, as schools and universities were forced to transition to online learning almost overnight. This shift highlighted both the potential and the limitations of digital education in Morocco. While urban areas with better infrastructure adapted relatively and smoothly, rural regions faced significant challenges due to inadequate internet connectivity and a lack of access to digital devices. Nevertheless, the pandemic also encouraged innovation, with institutions developing new digital tools and platforms to ensure educational continuity. For example, the Ministry of National Education established the Digital Lab to create innovative solutions for teachers and students (Mhlanga, 2024).

### **1.2 Adoption and impact of learning management systems (LMS) in Moroccan education**

The integration of Learning Management Systems (LMS) in Moroccan schools and universities has become a cornerstone of the country's digital transformation in education. With the global shift towards technology-driven learning, Morocco has embraced LMS platforms to enhance teaching and learning experiences, particularly at the end of the COVID-19 pandemic.

#### **1.2.1 Adoption rate of LMS in Moroccan schools and universities**

The adoption of LMS in Morocco has seen significant growth, particularly during and after the COVID-19 pandemic. The sudden shift to remote learning necessitated the

use of digital tools, and LMS platforms became a critical solution for maintaining educational continuity. According to a study conducted at Moulay Ismail University, LMS platforms have been widely accepted by students for improving writing skills, with factors such as performance expectancy and facilitating conditions playing a significant role in their adoption (Tariq & Said, 2023).

However, the adoption rate varies across regions and institutions. Urban areas with better internet infrastructure and access to digital devices have seen higher adoption rates compared to rural areas, where challenges such as limited internet connectivity and lack of resources persist. Despite these disparities, the overall trend indicates a growing reliance on LMS platforms, with universities leading the way in integrating these systems into their curricula (Bekou, 2020).

### **1.2.2 Overview of key LMS platforms in use**

Several LMS platforms are widely used in Moroccan educational institutions. The Ministry of Education, for instance, adopted Microsoft Teams, during the pandemic to facilitate remote learning. This platform allowed teachers to conduct online classes, share resources, and assess students' progress.

Another notable platform is the Massar system, an integrated assessment tool based on Excel software. Massar was introduced to digitize the evaluation process and provide teachers with a centralized platform for tracking student performance. Despite its benefits, some teachers have reported challenges in adapting to the system, highlighting the need for ongoing training and support.

Additionally, universities like Moulay Ismail have implemented LMS platforms to enhance writing skills and promote learner autonomy. These platforms offer interactive and dynamic learning environments, enabling students to engage in writing activities at their own pace while allowing teachers to monitor progress online.

### **1.2.3 Moroccan government policies and initiatives supporting LMS**

The Moroccan government has been active in promoting the use of LMS through various policies and initiatives. The Digital Morocco Plan (2020-2025) and the Maroc Digital 2030 strategy emphasize the importance of digital transformation in education, including the integration of LMS platforms. These initiatives aim to bridge the digital divide and ensure equitable access to digital learning tools across the country.

One of the key programs supporting LMS adoption is the GENIE initiative, which focuses on equipping schools with digital infrastructure and training teachers to use ICT tools effectively. Through this program, teachers have been trained to use interactive boards and Microsoft Office software, laying the groundwork for broader LMS adoption.

Furthermore, partnerships with private sector players like Huawei have supported the government's efforts. The DigiSchool project, a collaboration between Huawei and the Moroccan Ministry of Education, has provided training in digital skills, including the use

of LMS platforms, to both teachers and students. This initiative is part of the government's 2022-2026 education reform roadmap and stresses the importance of public-private partnerships in driving digital transformation.

## **2. Challenges in implementing learning management systems (LMS) in Morocco**

The integration of Learning Management Systems (LMS) in Morocco has emerged as a critical tool for addressing educational disparities, particularly in rural and underserved regions. However, the implementation of such systems faces multifaceted challenges rooted in technological, pedagogical, and policy-related barriers.

### **2.1 Technological barriers**

#### **2.1.1 Limited access to reliable internet**

Morocco's digital divide remains gloomy, with rural areas delaying significantly behind urban centers. While internet penetration surged from 14% in 2008 to 60% in 2017, rural regions—particularly mountainous areas like the High Atlas—still struggle with connectivity gaps. For instance, villages in the High Atlas rely on LTE (Long-Term Evolution) networks provided by a single telecom company, yet some remain inaccessible by road, complicating infrastructure maintenance. This inconsistency undermines LMS adoption, as students in remote areas face frequent disconnections or limited bandwidth, hindering access to online resources. (Rüller et al., 2022)

#### **2.1.2 Insufficient digital devices and infrastructure**

Despite initiatives like the Digital Morocco 2013 Plan, which aimed to equip all public schools with IT, rural households still struggle with device availability. By 2013, only 33% of households had internet subscriptions, a figure likely lower in mountainous regions. Schools in the High Atlas, for example, depend on NGO-supporting computer clubs for informal learning, highlighting systemic gaps in state-provided resources. Such disparities force students to share devices or rely on community centers, limiting personalized LMS use. (Rüller et al., 2022)

### **2.2 Teacher and student preparedness**

#### **2.2.1 Lack of educator training**

Effective LMS integration requires educators to navigate digital tools and adapt curricula. However, teacher-training programs in Morocco often lack emphasis on technological pedagogy. In the High Atlas, the success of a computer club initiative relied heavily on “shepherds”—local guides who facilitated technology appropriation—suggesting that formal training frameworks are absent. Without structured training, educators struggle to leverage LMS features, such as interactive assessments or virtual classrooms. (Rüller et al., 2022)

### **2.2.2 Resistance to change and digital literacy gaps**

Cultural and generational resistance further complicates LMS adoption. In rural Amazigh communities, where 60% of women are illiterate and many speak Tamazight rather than Arabic, language barriers and low digital literacy weaken engagement with LMS platforms. Students accustomed to traditional pedagogies may resist online learning, while parents in agrarian economies might prioritize labor over digital education. This resistance is compounded by a lack of localized content in Tamazight, marginalizing non-Arabic speakers. (Rüller et al., 2022)

## **2.3 Policy and financial constraints**

### **2.3.1 Limited budget allocations**

Morocco's education budget has declined from 30.4% of total spending in 2015 to 25% in 2019, constraining investments in LMS infrastructure. Rural schools, already underfunded, face competing priorities like electricity and clean water, leaving little for technology upgrades. The World Bank's rural investment programs, while impactful, remain insufficient to bridge the urban-rural divide in IT access. (Rüller et al., 2022)

### **2.3.2 Gaps in policy frameworks**

National policies like the Digital Morocco Plan lack enforceable measures for LMS integration. For example, while the plan aimed to digitize schools, it did not address teacher training or localized content creation. Additionally, collaboration between NGOs, government, and communities is often unplanned, as seen in the High Atlas, where local organizations fill gaps left by centralized policies. Without cohesive frameworks, LMS adoption remains fragmented and chaotic. (Rüller et al., 2022)

## **3. Opportunities for learning management system (LMS) implementation in Morocco.**

Morocco's ambitious digital transformation agenda, particularly under its Digital Morocco 2030 strategy, positions Learning Management Systems (LMS) as a cornerstone for modernizing education. By addressing systemic challenges such as urban-rural disparities, pedagogical quality, and resource limitations, LMS platforms can unlock transformative opportunities for Morocco's education sector.

### **3.1 Enhancing educational access and equity**

#### **3.1.1 Bridging the urban-rural educational gap**

Morocco's urban-rural divide in education is gloomy, with rural areas often lacking qualified teachers and adequate infrastructure. LMS platforms can democratize access by delivering standardized, high quality content to remote regions. For instance, the National Broadband Plan 2, part of the Digital Morocco 2030 strategy, aims to extend 4G and fiber-

optic connectivity to 1,800 rural localities by 2026, ensuring minimum internet speeds of 20 MB/s (*Digital Morocco 2030 | Digital Watch Observatory*, s. d.). This infrastructure will enable rural students to engage with LMS platforms, reducing geographical barriers to education. During the COVID-19 pandemic, initiatives like TV broadcasts of lessons and the Massar online assessment platform highlighted the potential of digital tools to reach underserved populations, though challenges like device shortages persisted. (Bekou, 2020)

### **3.1.2 Flexible and inclusive learning opportunities**

LMS platforms like Microsoft Teams and customized solutions from Moroccan firms such as Proactech (a leading LMS provider installed in Rabat) enable asynchronous learning, allowing students to study at their own pace (Elioplus, s. d.) . This flexibility is critical for marginalized groups, including working students and those with disabilities. The Digital Relay Centers proposed under Digital Morocco 2030 further ensure inclusivity by providing in-person support for digital literacy, particularly for women and rural communities. (*Digital Morocco 2030 | Digital Watch Observatory*, s. d.)

## **3.2 Improving educational quality**

### **3.2.1 Personalized learning and data-driven insights**

AI-driven LMS tools, such as those explored in Morocco’s integration of machine learning (ML) and large language models (LLMs), enable personalized learning pathways. These technologies analyze student performance data to tailor content, address knowledge gaps, and adapt to individual learning speeds (Ejjami, s. d.) . For example, the GENIE Program has already trained teachers in digital tools, laying the groundwork for data-centric platforms like Massar, which tracks student progress through analytics. Such systems empower educators to refine teaching strategies and prioritize student needs. (Bekou, 2020)

### **3.2.2 Enhanced teacher-student interaction**

Online tools embedded in LMS platforms foster dynamic interactions. The DigiSchool initiative, a partnership between Huawei and Morocco’s Ministry of Education, trains teachers in AI and virtual reality (VR) to create immersive lessons. Similarly, LMS-supported forums and real-time feedback mechanisms improve engagement, as seen during COVID-19 when teachers used Zoom and WhatsApp to maintain continuity. These tools also enable collaborative projects, such as the regional developer conference under DigiSchool, where students solve real-world problems using digital solutions. (Post, 2024)

## **3.3 Government and private sector initiatives**

### **3.3.1 Digitalization strategies and funding**

Morocco’s Digital Morocco 2030 strategy, backed by \$1.1 billion in funding, prioritizes education digitization, aiming to train 100,000 youths annually in digital skills and create 240,000 jobs in the sector by 2030 (*Digital Morocco 2030 | Digital Watch*

*Observatory*, s. d.) . The E-GOV and DigiTPME projects further strengthen digital infrastructure and SME partnerships, indirectly supporting LMS adoption through improved connectivity and localized content development.

### **3.3.2 Public-private collaboration for customized LMS**

Partnerships with tech giants like Huawei (via the DigiSchool initiative) and local firms like Proactech demonstrate how tailored LMS solutions can emerge from collaborative frameworks. Huawei's focus on AI and VR training for teachers goes hand in hand with Morocco's goal to integrate advanced technologies into classrooms. Additionally, the Unified Administrative Services Portal, a Digital Morocco 2030 pillar, could improve LMS deployment by centralizing educational resources and governance. (Post, 2024)

### **3.3.3 Successful LMS implementation examples in Morocco**

Morocco has made significant progress in adopting Learning Management Systems (LMS) to enhance education and training. While specific examples of schools or universities leading in LMS adoption in Morocco, the country has been actively integrating digital learning tools into its education system. For instance, universities like Mohammed V University and Cadi Ayyad University have been pioneers in adopting e-learning platforms to support blended and online learning. These institutions have leveraged LMS platforms to centralize course materials, track student progress, and facilitate interactive learning experiences. (Zaanoun, 2023)

Additionally, Morocco's National Education and Vocational Training Strategy (2015–2030) emphasizes the integration of digital tools, including LMS, to modernize education and improve access to quality learning resources. This initiative has encouraged schools and universities to adopt platforms like Moodle and Blackboard Learn, which are widely used for their flexibility and adjustability.

## **4. Key points for Morocco**

- Adopt AI and Data Analytics: Integrate AI-powered tools to personalize learning and provide actionable insights. (*The Future of Learning Management Systems*, s. d.)
- Focus on Mobile Learning: Ensure LMS platforms are mobile-friendly to cater to remote and on-the-go learners. (*The Future of Learning Management Systems*, s. d.)
- Promote Social Learning: Use collaborative features to foster peer interaction and knowledge sharing. (*Top 10 Learning Management Systems (2025): Best AI LMS for Training Providers*, s. d.)
- Leverage Open-Source Solutions: Utilize cost-effective, customizable platforms like Moodle to meet diverse educational needs. (nicola.cox, 2024)

## **5. Recommendations**

The integration of Learning Management Systems (LMS) into educational frameworks has become a cornerstone of modern education, offering opportunities for enhanced learning experiences, accessibility, and efficiency. However, to fully realize the potential of LMS, strategic planning, infrastructure investment, and collaborative efforts are essential.

### **5.1. Policy and strategic planning**

The foundation of effective LMS integration lies in the development of comprehensive national strategies. Governments and educational authorities must prioritize the creation of policies that state clear objectives, timelines, and criteria for LMS adoption. These strategies should go hand in hand with broader educational goals, such as improving literacy rates, reducing educational disparities, and fostering digital literacy. A well-defined policy framework ensures that LMS integration is not ad hoc but a systematic process that addresses the unique needs of different regions and demographics. (Hawkins et al., 2020)

National strategies should also emphasize inclusivity, ensuring that LMS platforms care for diverse learning needs, including those of students with disabilities. Policies must dictate and compel the development of accessible content and user-friendly interfaces. Additionally, strategic planning should involve decision-makers at all levels, including educators, students, parents, and policymakers, to ensure that the implementation process is collaborative and responsive to feedback. Regular evaluations and updates to the strategy will be crucial to adapt to technological advancements and emerging challenges.

### **5.2. Investment in infrastructure and training**

The successful implementation of LMS depends on strong infrastructure and adequate training. Many regions, particularly in developing countries, face significant challenges related to internet connectivity and access to digital devices. Governments must prioritize investments in improving internet infrastructure, particularly in rural and underserved areas. Subsidies or grants for the provision of laptops, tablets, and other necessary devices can help bridge the digital divide, ensuring that all students have equal access to LMS platforms.

Equally important is the need for comprehensive training programs for both teachers and students. Teachers play a pivotal role in the effective use of LMS, and their ability to navigate these systems directly impacts student outcomes. Training programs should focus on equipping educators with the technical skills to operate LMS platforms, as well as pedagogical strategies to integrate these tools into their teaching practices. For students,

training should emphasize digital literacy, ensuring they can effectively use LMS for learning, collaboration, and communication.

Ongoing professional development opportunities should be made available to educators to keep them updated on the latest LMS features and best practices. Similarly, students should have access to resources that help them solve technical issues and maximize the benefits of LMS. By investing in infrastructure and training, governments can create an enabling environment for LMS integration, fostering a culture of digital learning.

### **5.3. Promoting public-private partnerships**

Public-private partnerships (PPPs) offer a viable pathway to leverage resources and expertise for LMS integration. The private sector, particularly technology companies, possesses the technical know-how and innovation capabilities that can significantly enhance the development and deployment of LMS platforms. Governments should actively look for collaborations with private entities to co-create solutions tailored to the specific needs of their educational systems.

PPPs can also facilitate the sharing of costs and risks associated with LMS implementation. For instance, private companies can provide funding for infrastructure development or offer discounted rates for software and devices. In return, governments can offer incentives such as tax breaks or recognition for corporate social responsibility initiatives. These partnerships can also extend to content creation, with private companies developing high-quality, curriculum-aligned digital resources that complement LMS platforms.

Moreover, PPPs can play a critical role in addressing the digital divide. Private sector involvement can help increase initiatives to provide internet access and devices to underserved communities. By combining resources and expertise, public and private entities can create sustainable models for LMS integration that benefit all decision-makers.

## **6. Conclusion**

The exploration of Learning Management Systems (LMS) in Morocco's education system has revealed both significant challenges and promising opportunities. Key challenges include limited digital infrastructure, unequal access to technology, resistance to change among educators, and the need for comprehensive training programs. Additionally, the lack of localized content and insufficient policy frameworks further delay the effective integration of LMS.

On the other hand, the opportunities are substantial. LMS has the potential to democratize education, enhance accessibility, and foster personalized learning experiences. It can also bridge the gap between urban and rural education, promote lifelong learning, and align Morocco's education system with global digital trends. The COVID-19

pandemic has further highlighted the importance of digital tools, accelerating the adoption of LMS and highlighting its role in ensuring educational continuity during crises.

The potential impact of LMS on Morocco's education system is transformative. By leveraging LMS, Morocco can modernize its educational framework, improve learning outcomes, and equip students with the digital skills necessary for the 21st-century workforce. Furthermore, LMS can facilitate data-driven decision-making, enabling educators and policymakers to tailor interventions and improve resource allocation.

However, realizing this potential requires collaborative efforts. The government, private sector, educational institutions, and civil society must work together to address the existing barriers. Investments in digital infrastructure, teacher training, and localized content development are critical. Policymakers should also prioritize the creation of supportive regulatory frameworks and foster public-private partnerships to ensure sustainable implementation.

In conclusion, while the road to fully integrating LMS into Morocco's education system is full with challenges, the benefits far outweigh the obstacles. A collective commitment to overcoming these barriers will not only enhance the quality of education but also position Morocco as a leader in educational innovation in the region. The time to act is now, and the future of Morocco's education system depends on the collaborative efforts of all policy-makers.

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