
RESEARCH ARTICLE

From Option to Necessity: The Digitalization of Higher Education in Morocco - A Literature Review

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ABSTRACT

The integration of digital technologies into higher education has become a defining transformation of the contemporary university, and Morocco offers a distinctive case of this global movement. This paper reviews the evolution of digitalization in Moroccan higher education, from the earliest national information and communication technology (ICT) integration efforts of the late 1990s to its recent framing as an institutional requirement rather than a strategic option. Drawing on a qualitative synthesis of the existing literature, it examines peer-reviewed journal articles, conference papers, and institutional and policy reports published between 2008 and 2025, retrieved from academic databases including Semantic Scholar, ScienceDirect, SpringerLink, and Google Scholar. The reviewed literature is organized into five analytical phases: the theoretical foundations of technology adoption and integration; the global emergence of e-learning; pre-pandemic digitalization in Morocco; the COVID-19 acceleration; and the post-pandemic shift toward institutionalization. The review identifies a consistent pattern: despite successive national strategies, digitalization is repeatedly described as partial, unevenly resourced, and constrained by a recurring set of obstacles - inadequate digital infrastructure, limited faculty training, resistance to pedagogical change, and a persistent urban-rural digital divide. The COVID-19 pandemic acted as a catalyst that shifted digitalization from an optional initiative to an operational necessity, while more recent policy frameworks, notably the PACTE ESRI 2030, reinforce its status as an institutional obligation. Unlike prior reviews centred on institutional performance or digital inclusion specifically, this review foregrounds the historical trajectory of the transition itself, and it outlines underexplored areas - particularly long-term learning outcomes and regional disparities - that remain open for future research.

KEYWORDS

Digitalization - Higher education - Morocco - E-learning - Blended Learning - Digital transformation - COVID-19

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1. Introduction

In the landscape of modern higher education, the integration of digital technologies has emerged as a fundamental shift, reshaping the very identity and operation of the contemporary university worldwide. Institutions that once treated information and communication technologies (ICT) as an optional supplement to classroom teaching now increasingly rely on them for instruction, administration, and research alike. Morocco is no exception to this movement, but its path toward a digital university has been distinctive: gradual and uneven for two decades, then abruptly accelerated by the COVID-19 pandemic, and more recently reframed by national policy as a structural obligation rather than an institutional choice.

This shift in status—from choice to obligation—is more than rhetorical. It marks a change in how digitalization is governed, funded, and expected of universities, and it raises the question of what, exactly, the accumulated body of research tells us about the process and its effects. Moroccan scholarship on the topic has grown considerably, spanning early studies of ICT use in specific faculties,

governance analyses of individual universities, emergency-remote-teaching studies produced during the pandemic, and conceptual work on the "intelligent" or "4.0" university. Despite the growing body of scholarship, relatively little attention has been devoted to synthesizing this literature through the lens of the transition from voluntary digital adoption to institutionalized digital transformation.

This review addresses that gap. It synthesizes the literature on the digitalization of Moroccan higher education in order to answer three questions: (1) How has the process evolved, from early ICT policy to the present; (2) What recurring benefits and obstacles does the literature report; and (3) Where do the most significant research gaps lie? The review is organized chronologically, following the field as it developed: from the theoretical models researchers have used, through the global emergence of e-learning, to the Moroccan trajectory before, during, and after the pandemic, closing with a synthesis of recurring themes and a discussion of what remains unexamined.

2. Method

2.1 Approach

This study employs a structured narrative literature review to synthesize and critically examine the existing scholarship on the digitalization of higher education in Morocco. Its aim is to provide an interpretive and integrative synthesis of the literature by tracing the evolution of digitalization in Moroccan higher education and identifying its recurring themes, rather than producing an exhaustive or statistically reproducible catalogue of publications. This approach is appropriate given the dispersion of the relevant literature across French- and English-language publications, conference proceedings, and institutional reports, and it aligns with previous reviews addressing digital transformation and educational technology in the Moroccan context (e.g., Bakkali et al., 2023; Mejdoubi et al., 2024).

2.2 Search and selection

Relevant literature was retrieved from Semantic Scholar, ScienceDirect, SpringerLink, and Google Scholar using combinations of the keywords "digitalization," "digital transformation," "e-learning," "ICT," "higher education," "university," and "Morocco," together with their French equivalents. The search covered publications from 2008 to 2025. The starting point was selected because this period corresponds to the emergence of more structured discussions and initiatives related to ICT integration and e-learning in Moroccan higher education. Studies were retained when they addressed digitalization, e-learning, or digital transformation specifically within the Moroccan higher education context; a smaller set of international and theoretical sources was included to establish the conceptual and historical background. Purely technical papers with no educational dimension were excluded. The selected literature was organized into five thematic and chronological sections that reflect the evolution of digitalization in Moroccan higher education.

3. Theoretical and Conceptual Foundations

Research on the adoption of digital technologies in universities draws on a well-established set of theoretical models, and Moroccan studies are no exception. Understanding these models is essential because they provide the conceptual foundations through which researchers have interpreted the successes, failures, and resistances that recur throughout the empirical literature. Table 1 summarizes the main frameworks identified in the literature.

3.1 Technology-acceptance models

One of the most widely used frameworks is the **Technology Acceptance Model (TAM)**, introduced by Davis (1989), which explains an individual's intention to use a technology through two central perceptions: perceived usefulness and perceived ease of use. TAM was itself derived from the Theory of Reasoned Action and the Theory of Planned Behaviour, and it was later extended into the **Unified Theory of Acceptance and Use of Technology (UTAUT)** by Venkatesh et al. (2003), which integrated eight competing models around four determinants: performance expectancy, effort expectancy, social influence, and facilitating conditions. Systematic reviews confirm that TAM and UTAUT remain the dominant lenses for studying technology acceptance in higher education (Xue, Rashid, & Ouyang, 2024).

3.2 Diffusion of innovations

A second foundational framework is Rogers' **Diffusion of Innovations theory** (1962; 2003), which describes how an innovation spreads through a social system over time via defined stages (knowledge, persuasion, decision, implementation, confirmation) and across adopter categories (innovators, early adopters, early majority, late majority, laggards). The theory is frequently applied

to educational technology because its attributes of adoption - relative advantage, compatibility, complexity, trialability, and observability - align closely with the decisions universities and faculty members face when introducing digital tools.

3.3 Pedagogical integration frameworks

The acceptance and diffusion models explain whether and how technologies are taken up, but they say little about the quality of the pedagogy that results. Educational-technology research therefore complements them with frameworks addressing technology integration into teaching itself. One of the most influential frameworks is the Technological Pedagogical Content Knowledge (TPACK) framework of Mishra and Koehler (2006), which builds on Shulman’s notion of pedagogical content knowledge to argue that effective teaching with technology requires the situated interaction of three bodies of knowledge - technological, pedagogical, and content knowledge - rather than technical skill alone. Another widely discussed technology-integration model is **SAMR** (Substitution, Augmentation, Modification, Redefinition), which offers a scale for judging whether a digital tool merely substitutes for a traditional practice or genuinely transforms it. These frameworks are directly relevant to the Moroccan case, where studies have highlighted that the availability of digital tools alone does not guarantee meaningful learning outcomes (Ben Attou, 2022). This reinforces the argument that successful digital integration requires not only technological access but also appropriate pedagogical knowledge and practices.

3.4 Application in the Moroccan literature

Moroccan researchers have drawn directly on this combined toolkit. In their governance study of Cadi Ayyad University, El Ferouali et al. (2021) draw on several theoretical perspectives, including technology acceptance and organizational change approaches, to analyze stakeholders' perceptions of digital transformation at Cadi Ayyad University. Maghni (2024) provides a conceptual discussion in the same vein, classifying the theoretical models of digital transformation in higher education and linking them to enabling technologies such as artificial intelligence, big data, the Internet of Things, and virtual reality. Together these works show that Moroccan scholarship is theoretically anchored in the international literature while adapting it to a national context characterized by institutional, technological, and organizational challenges.

Framework	Core idea	Key reference
TAM	Adoption driven by perceived usefulness and perceived ease of use.	Davis (1989)
UTAUT	Four determinants: performance expectancy, effort expectancy, social influence, facilitating conditions.	Venkatesh et al. (2003)
Diffusion of Innovations	Innovations spread through stages and adopter categories; five adoption attributes.	Rogers (1962; 2003)
TPACK	Effective tech integration needs the interaction of technological, pedagogical, and content knowledge.	Mishra & Koehler (2006)
SAMR	Scale from substitution to redefinition for judging depth of technology integration.	Puentedura (2006)

Table 1. Major theoretical frameworks informing research on higher education digitalization.

4. The Global Emergence of Digitalization in Higher Education

The digitalization of Moroccan universities did not occur in isolation; it developed within a broader global transformation of higher education that provides essential context. Online education is often associated with the 2012 "Year of the MOOC," but it predates that moment by four decades. As Levin (2024) notes, distance education at scale began with the founding of open universities such as the UK Open University in 1971, which used broadcast media to reach learners beyond the campus.

The trajectory since then is commonly described in phases: the spread of the internet and web-based learning through the 1990s; the diffusion of learning management systems (LMS) such as Moodle in the 2000s; and the sudden emergence of Massive Open Online Courses (MOOCs) around 2008-2012, when elite universities began offering free courses through platforms such as Coursera, edX, and Udacity (Levin, 2024). These courses attracted millions of learners worldwide over the following decade and,

while the early predictions of a wholesale "revolution" gave way to a more measured "evolution," they durably legitimized online and blended learning within mainstream institutions and stimulated a broader shift toward digital credentials and flexible provision.

This global movement supplied both the tools and the vocabulary that Moroccan universities would adopt. MOOCs in particular became an early vector of digitalization in Morocco: national initiatives such as the Maroc Universite Numerique platform and institutional projects at universities including Cadi Ayyad were influenced by the international MOOC model (Elouesdadi & Rochdi, 2021; Riyami et al., 2019). The Moroccan experience, in other words, can be read as a national inflection of this wider international arc - one shaped by the same technologies but constrained by distinctive infrastructural and social conditions.

5. Digitalization in Moroccan Higher Education Before COVID-19

5.1 A sequence of national programs

The integration of ICT into Moroccan higher education has been a stated strategic priority since the late 1990s, and the pre-pandemic period is best understood as a sequence of ambitious national programs whose implementation often faced challenges in achieving their objectives. Tsouli and El Moukhi (2025) date the national strategy for integrating ICT into the education system to 1998, and El Ferouali et al. (2021) reconstruct the institutional timeline in detail: the MARWAN academic network (1998), the Moroccan Virtual Campus (2004), the GENIE program (2006), the Injaz program (2010), and the Maroc Numeric 2013 strategy. Table 2 sets out this policy timeline.

5.2 Limited uptake and early pilots

The literature is relatively consistent in reporting that implementation and actual practices remained limited. El Ferouali et al. (2021) document that, until the end of 2019, the digital content produced under these programs remained very limited, and that obstacles to ICT integration were diverse: underused installed equipment, weak pedagogical mastery of digital tools, poor local management, and a lack of motivation among stakeholders. Early empirical studies in specific disciplines reinforce this picture. Ouafi and Nabil (2013) examined the situation and prospects of e-learning in the health sciences, and Bouroumi and Fajr (2014) reported on a case study of collaborative and cooperative e-learning, both indicating that digital pedagogy was being piloted at the course level well before it became an institutional priority. Studies of ICT use in Franco-Moroccan collaborative training contexts (Riyami, 2018) and of ICT use in times of crisis (Sidir & Benchenna, 2008) extend this history back further.

5.3 Two structural themes

Two structural themes emerge from this period that will persist throughout the review. The first is the digital divide: because of uneven internet access, the cost of subscriptions, and the precarious situation of many families, distance learning could reproduce or intensify existing social disparities between urban and rural areas and across social strata (El Ferouali et al., 2021). The second is the tension between top-down strategy and genuine appropriation: several authors argue that unreflective ICT integration risks merely perpetuating traditional teaching methods through a new medium, and call instead for adaptive, participatory governance rather than a simple top-down mandate (El Ferouali et al., 2021).

Year	Program / strategy	Main objective
1998	MARWAN (Moroccan academic network)	Provide universities with high-speed internet connectivity.
2004	Moroccan Virtual Campus (CVM)	Promote the use of ICT in classroom teaching.
2005/2006	GENIE program	Generalize ICT in education; equip institutions and train teachers.
2009-13	Maroc Numeric 2013	Equip universities with computing tools and internet; train teachers.
2010	Injaz	Subsidize laptops and internet access for students.
2020	COVID-19 emergency remote teaching	Ensure pedagogical continuity via platforms, TV, and radio.
2023-30	PACTE ESRI 2030	Place digital transformation at the centre of a new university model.

Table 2. Timeline of national ICT and digital-transformation policies in Moroccan higher education. Adapted from El Ferouali et al. (2021) and national policy sources

6. The COVID-19 Rupture: From Choice to Obligation

6.1 The forced transition

The COVID-19 pandemic is treated across the literature as the decisive turning point in the digitalization of Moroccan higher education. Ferhane (2022) captures this shift by arguing that digital transformation became an obligation rather than a choice during the COVID-19 period. When in-person teaching was suspended, the Ministry and universities mobilized every available means - online platforms, social networks, virtual classes, audio files, and national and regional television and radio channels - to ensure pedagogical continuity (El Ferouali et al., 2021). El Ferouali et al. (2021) observe that this emergency effectively reactivated the dormant GENIE program and, in the space of two months, significantly increased digital content production compared with previous years.

6.2 Readiness and hybrid outcomes

Empirical studies of the period converge on a consistent assessment: Moroccan were not fully prepared for a large-scale shift to online learning, and what they achieved in practice was a hybrid arrangement rather than full e-learning. Faculty-experience research documents a lack of ICT infrastructure and difficulties sustaining student engagement, alongside newfound flexibility in the pace of teaching and increased learner-content interaction. Case studies at specific institutions describe both the disruption and the improvisation it required: Kerroum et al. (2020), writing as the crisis unfolded, proposed an agile organizational model for the digital transformation of Hassan II University of Casablanca, arguing that the traditional university needed a mapped, adaptable model rather than an ad hoc response. Hayar et al. (2022) examined the same period through the lens of inclusion, presenting the i-UH2C use case and foregrounding the accessibility dimension of the emergency transition.

6.3 A pedagogical, not merely technical, challenge

Ben Attou (2022), in a case study of the Faculty of Letters and Human Sciences at Ibn Zohr University in Agadir, offers one of the more critical readings of this moment. Drawing on observation sessions and focus groups with students, she argues that the digital tools deployed were "only the apparent part of the iceberg": the rapid transition exposed a deeper, structural crisis in higher education related to unfinished reforms, the state's gradual withdrawal, and profound differences in the digital maturity of institutions. Her experimental comparison of a transmissive versus an interactive teaching approach found that students taught through a passive, transmissive digital format displayed limited reflection and active resistance, whereas an interactive approach produced markedly greater engagement - a finding she develops into a proposed hybrid "Edu-Lab" pedagogy. The lesson she draws is that "it is not enough to connect a webcam to ensure pedagogical continuity" (Ben Attou, 2022, p. 70); digitalization is an educational and societal challenge, not merely a technological one.

7. The Post-Pandemic Landscape and the Institutionalization of Digitalization

7.1 Consolidation of hybrid models and the persistent divide

In the aftermath of the pandemic, the literature shifts from documenting emergency improvisation to assessing what endured and to analysing a new wave of national policy that reframes digitalization as a permanent institutional obligation. The first tendency is the consolidation of hybrid and blended models as a lasting outcome of the pandemic experience, together with continued attention to the digital divide. Ghazali and Benbrahim (2024) assess the integration of e-learning platforms across Moroccan higher education and foreground the persistent gap between urban and rural students in access to connectivity and devices, suggesting that the divide identified before the pandemic persisted after campuses reopened. Tsouli and El Moukhi (2025), drawing on the experiences of 166 students in the Rabat-Kenitra region, likewise assess the post-crisis state of e-learning and its implications for student participation.

7.2 The "intelligent" and "4.0" university

The second tendency is conceptual and strategic: a growing body of work frames the Moroccan university's future in terms of the "digital," "intelligent," or "4.0" university. Benmoussa et al. (2024) survey the transition toward a digital and intelligent university, arguing that the integration of new technologies has become increasingly important to improve academic activities, governance, and research. Boussof et al. (2024) offer a reflective study of digital transformation in the Moroccan university context, and Diab

(2025) describes the "new configuration" of the Moroccan public university in the digital era, emphasizing infrastructure modernization alongside the equity risks that accompany it.

7.3 From strategy to obligation

Crucially, several recent works locate this transformation within an explicit national policy that frames digitalization as an institutional priority rather than an optional initiative. Ez-Zouhayry et al. (2025) analyse the PACTE ESRI 2030, the national strategy that places digital transformation and the development of transversal or "soft" skills at the center of a new model for Moroccan higher education, and argue that inclusive public policy is essential to accompany the change. A conceptual review by Mejdoubi et al. (2024) synthesizes the literature specifically on the impact of digitalization on the performance of Moroccan universities, reporting improved access to information, facilitation of distance learning, and stronger student-teacher collaboration, while cautioning that the digital divide and the need to adapt traditional teaching methods continue to limit the benefits. This policy turn—from strategy as encouragement to strategy as institutional expectation—is what justifies reading the entire trajectory as a movement "from choice to obligation."

8. Synthesis: Recurring Themes and Research Gaps

8.1 Continuity of obstacles

Read as a whole, the literature reveals a striking continuity across more than two decades. Regardless of publication year, many Moroccan studies describe digitalization as partial, unevenly distributed across institutions and departments, and often dependent on individual initiatives rather than fully coordinated strategies. Four obstacles recur frequently across the literature and emerge as central challenges in the field: inadequate digital infrastructure; limited training of faculty in digital tools and pedagogy; resistance to change among staff who fear a loss of authority or control; and a persistent urban-rural digital divide. The notable feature is their persistence across studies published over different periods in 2008, 2013, 2021, and 2025, suggesting that successive national strategies have addressed some visible challenges without fully resolving underlying conditions.

8.2 The pandemic as discontinuity

Against this continuity, the pandemic stands out as the one genuine discontinuity: it transformed digitalization from an aspiration into an immediate institutional necessity and compressed a decade of content production into months, without, however, resolving the structural obstacles that preceded it. The most recent literature accordingly describes a system that is now committed to digital transformation at the level of policy while still contending with the same infrastructural and human constraints on the ground. This trajectory can be understood as a five-phase movement from theoretical foundations and global emergence to pre-pandemic experimentation, COVID-19-driven acceleration, and post-pandemic institutionalization.

8.3 Research gaps

Three research gaps follow from this synthesis. First, the literature is far richer in describing what is being done - strategies, platforms, governance arrangements - than in measuring what difference it makes. Rigorous studies of long-term learning outcomes, as opposed to perceptions and self-reported experience, appear limited. Second, a significant proportion of the evidence base consists of single-institution qualitative case studies (Cadi Ayyad, Hassan II Casablanca, Ibn Zohr Agadir, among others); comparative and national-scale quantitative work is comparatively rare, a limitation that several authors, including El Ferouali et al. (2021), explicitly acknowledge. Third, the urban-rural and inter-regional disparities repeatedly identified across the literature are seldom studied as the primary object of analysis rather than as a secondary caveat. These three gaps - impact, scale, and equity - define the space in which further research is most needed.

Study	Type	Focus	Key finding
Sidir & Benchenna (2008)	Conceptual	ICT use in times of crisis	Digital pedagogy questions are long-standing.
Ouafi & Nabil (2013)	Sectoral review	E-learning in health sciences	E-learning piloted at course level early.
Bouroumi & Fajr (2014)	Case study	Collaborative e-learning	Early collaborative e-learning practice.
Riyami (2018)	Empirical	ICT effects, Franco-Moroccan training	ICT effects in cross-national collaboration.

Riyami et al. (2019)	Empirical	MOOCs in higher education	MOOCs as an early vector of digitalization.
Kerroum et al. (2020)	Model proposal	Agile model, Hassan II Casablanca	Calls for a mapped, adaptable model.
El Ferouali et al. (2021)	Qualitative (interviews)	Governance, Cadi Ayyad	Digitalization "embryonic"; four obstacles.
Elouesdadi & Rochdi (2021)	Case study	MOOCs, Maroc Univ. Numerique	MOOCs serving professionalization.
Ben Attou (2022)	Experimental / focus groups	Pedagogy, FLSH Ibn Zohr Agadir	Interactive beats transmissive teaching.
Ferhane (2022)	Conceptual	Agile university model under COVID	"Obligation, not a choice."
Hayar et al. (2022)	Case study	Inclusive transformation, i-UH2C	Foregrounds inclusion/accessibility.
Benmoussa et al. (2024)	Review / survey	Digital & intelligent university	Integration of new tech now necessary.
Boussouf et al. (2024)	Reflective study	Digital transformation reality	Requires digital infrastructure mastery first.
Ghazali & Benbrahim (2024)	Empirical	E-learning; digital divide	Urban-rural divide persists post-pandemic.
Mejdoubi et al. (2024)	Literature review	Impact on university performance	Benefits offset by divide and pedagogy.
Tsouli & El Moukhi (2025)	Empirical (166 students)	E-learning, Rabat-Kenitra	Assesses post-crisis participation.
Ez-Zouhayry et al. (2025)	Policy analysis	PACTE ESRI 2030, soft skills	Digitalization as institutional obligation.
Diab (2025)	Conceptual	New configuration of the university	Modernization plus equity risks.

Table 3. Overview of the principal Moroccan studies reviewed.

9. Conclusion

This review has traced the digitalization of Moroccan higher education from its origins in late-1990s ICT policy, through the gradual and uneven pre-pandemic period, the decisive rupture of COVID-19, and the subsequent consolidation of hybrid models under a national policy framework that increasingly treats digital transformation as an institutional priority. The dominant impression left by the literature is one of continuity in the obstacles and discontinuity in the mandate: the same infrastructural, pedagogical, and social constraints recur across two decades, even as the status of digitalization has shifted decisively from optional to required.

For the field, the implication is that the next generation of research must move beyond describing digital initiatives and strategies toward measuring their effects on learning, institutional performance, and equity between regions and social groups in the Moroccan context. Such research is essential for determining whether digital transformation has produced meaningful educational change beyond policy commitments and technological adoption.

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