Evaluating the Impact of Online Learning Systems on Institutional Performance in Kenya's Public Universities

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Abstract

The study examined how online learning affects the performance of public universities in Kenya, focusing on how Learning Management Systems (LMS), institutional readiness, and implementation efficiency influence academic and institutional outcomes. Although online learning has been globally recognized for expanding access and flexibility, evidence from developing countries, including Kenya, shows inconsistent adoption and limited effectiveness due to infrastructural and pedagogical challenges. The study addressed this gap by analyzing the relationship between online learning systems and university performance. Specifically, it sought to: (i) examine the effect of online learning systems on academic performance, and (ii) assess institutional readiness and efficiency in implementing online learning. The study covered seven purposively selected public universities, involving 537 respondents (384 students and 153 staff). Using a descriptive quantitative research design, guided by pragmatism and deductive reasoning, data were collected through structured questionnaires and interviews, supported by secondary documents. Stratified and simple random sampling ensured representativeness. Reliability testing using Cronbach's alpha yielded values between 0.762 and 0.778, confirming strong internal consistency, while expert review and factor analysis validated the instruments. Data were analyzed using SPSS, employing descriptive and inferential techniques, including correlation, ANOVA, and logistic regression. The research was anchored in the Technology Acceptance Model (TAM) and the Diffusion of Innovations (DOI) theories, which explain user adoption behavior and the institutional diffusion of educational technologies. Findings revealed that LMS improved openness, communication, and institutional visibility, though efficiency and resource sharing remained inconsistent. The study concludes that online learning has positively influenced university performance but recommends greater investment in ICT infrastructure, staff training, and innovation-driven learning environments.

Keywords: *Academic performance, ICT infrastructure, Institutional readiness, Learning Management Systems (LMS), Online learning*

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1.0 Introduction

The rapid global shift to online learning during and after the COVID-19 pandemic transformed the delivery of higher education, exposing both the potential of digital platforms to expand access and persistent concerns about learning quality, equity, and readiness (Akpen, 2024). Systematic reviews indicate that well-designed online modalities can support student engagement and, in some contexts, improve learning outcomes; however, effectiveness depends on instructional design, platform functionality (LMS), and user competencies (Rueda, 2024; Akpen, 2024). At the same time, global trends reveal a post-pandemic recalibration: investment cycles, pedagogical expectations, and the integration of AI tools are reshaping how institutions evaluate the value and sustainability of online offerings (Nassary, 2024).

Regionally, African universities demonstrated adaptive capacity by shifting to remote modalities during crises, but the transition exposed infrastructural, pedagogical, and policy gaps across countries. Studies across sub-Saharan Africa highlight uneven internet access, limited staff training in online pedagogy, and weak institutional readiness as key constraints to effective digital learning (Owidi, 2023; Kirongo, 2022). Research from East Africa specifically suggests that while universities can leverage LMS and digital resources to broaden reach, successful outcomes depend on coherent institutional strategies, investment in human capital, and robust monitoring of learning quality (Owidi, 2023; Omito, 2024).

In Kenya, public universities rapidly adopted online platforms during the pandemic, sparking debate about academic standards, equity, and institutional capacity. National studies and program evaluations report improvements in content openness and communication via LMS, but also point to inconsistent implementation, staff readiness gaps, and variable student experiences, factors that moderate the impact of online learning on academic performance (Omito, 2024; Kirongo, 2022). Consequently, empirical investigation into how LMS functionality, institutional readiness, and implementation efficiency translate into measurable performance outcomes within Kenyan public universities remains timely. This study, therefore, situates itself at the intersection of documented global benefits and regional/local constraints, aiming to assess the degree to which online learning systems influence academic performance and institutional effectiveness in Kenya's public higher education sector.

Statement of the problem

Despite growing global acceptance of online learning as a transformative tool in higher education, its effectiveness in enhancing academic performance remains contested, particularly in developing contexts. Globally, studies show that while online learning promotes flexibility and access, its success depends on institutional readiness, infrastructure, and user competence (Rueda, 2024; Akpen, 2024). Regionally, African universities continue to face challenges, including inadequate ICT infrastructure, limited digital literacy among faculty, and weak policy frameworks to support sustainable online education (Owidi, 2023; Nassary, 2024). In Kenya, public universities rapidly transitioned to online platforms, yet evidence shows that implementation was uneven, with significant variations in learning outcomes, student engagement, and quality assurance (Kirongo, 2022; Omito, 2024).

The existing literature inadequately explains how these online learning systems specifically influence institutional performance and academic achievement in Kenyan public universities. Moreover, few empirical studies have examined the relationship between Learning Management System (LMS) functionality, institutional preparedness, and student outcomes. This creates a critical gap in understanding the effectiveness and efficiency of online learning as a tool for academic excellence in Kenya's public higher education sector. Therefore, this study seeks to address these gaps by analyzing the impact of online learning on the performance of public universities in Kenya.

Objectives

i. To examine how online learning systems affect academic performance at public universities in Kenya.
ii. To assess the institutional readiness and efficiency of implementing online learning to improve educational quality in public universities in Kenya.

Scope of the study

This study assesses the impact of online learning on the performance of public universities in Kenya. It examines how Learning Management Systems (LMS), institutional readiness, and implementation efficiency influence academic performance and educational quality. The study covers seven purposively selected public universities, with students, ICT staff, and registrars as respondents, to ensure a representative understanding of Kenya's higher education context.

Limitation of the study

This study was limited to selected public universities in Kenya, which may limit the generalizability of the findings to private institutions. Data collection relied on self-reported responses, which could introduce bias. Additionally, variations in internet connectivity, institutional policies, and technological infrastructure across universities may have influenced participant experiences, affecting the consistency of responses regarding the impact of online learning on academic performance.

"The study findings reveal that online learning systems, particularly Learning Management Systems (LMS), enhance openness, communication, and access to educational resources"

Significance of the study

This study is significant because it provides empirical insights into how online learning influences the performance of public universities in Kenya. The findings will guide university administrators and policymakers in strengthening institutional readiness, improving Learning Management Systems (LMS), and enhancing teaching and learning outcomes. For educators, the study offers evidence-based strategies to optimize digital pedagogies and student engagement. Students will benefit from improved online learning experiences and academic outcomes. Additionally, the research contributes to the growing body of literature on digital transformation in higher education in developing contexts, bridging the knowledge gap between technology adoption and institutional

performance. Policymakers, including the Ministry of Education and the Commission for University Education (CUE), may use the findings to formulate effective policies for the sustainable integration of online learning in Kenyan universities.

Literature Review

Research on online learning since 2020 yields mixed but instructive findings: while digital modalities can increase access and flexibility, their effects on learning outcomes depend on instructional design, platform quality, and user readiness (Akpen, 2024). Systematic reviews indicate that well-designed online courses supported by functional Learning Management Systems (LMS) and active instructional strategies can sustain or even improve student engagement and achievement; however, risks such as reduced interaction, learner isolation, and uneven pedagogical quality persist when platform use is superficial (Akpen, 2024; Rueda, 2024).

Regionally, studies across sub-Saharan Africa emphasize structural constraints that moderate the effectiveness of online learning. Limited broadband, high data costs, and inconsistent electricity undermine continuous access; concurrently, gaps in staff digital pedagogy and weak institutional policies limit the translation of technology into performance gains (World Bank, 2024; Owino, 2023). Empirical research shows that the presence of an LMS alone does not guarantee impact — utilization, content openness, and targeted communication practices determine whether digital systems support learning outcomes (Mwaura, 2024; Kiruma, 2023).

Kenyan evidence aligns with these regional patterns. Institutional case studies and cross-sectional surveys show that Kenyan universities rapidly adopted LMSs during the pandemic, improving access and aspects of communication and content openness; yet implementation has been uneven, with notable shortfalls in staff preparedness, quality assurance, and consistent student engagement (Wekullo et al., 2023; Owino, 2023). Studies specifically examining LMS functionality report that features that enable resource sharing, analytics, and targeted messaging correlate with improved coordination but require deliberate capacity building to improve assessment quality and student performance (Mwaura, 2024).

Taken together, the literature suggests two insights relevant to this study: (1) online learning can positively influence academic performance when LMS functionality, pedagogical design, and institutional readiness are aligned; and (2) in contexts such as Kenya, infrastructural constraints and variable institutional capacity create gaps between LMS availability and demonstrable performance gains. This body of work underscores the need for empirical investigations that link LMS features, institutional readiness indicators, and measurable academic outcomes, which is exactly the focus of the present study.

Theoretical review

This study is grounded in two theoretical perspectives: the Technology Acceptance Model (TAM) and the Diffusion of Innovation (DOI) Theory. The Technology Acceptance Model, developed by Davis (1989) and refined in subsequent studies, explains how users accept and use technology, based on two major factors: perceived usefulness and perceived ease of use. In the context of online learning in public universities, TAM is relevant because the successful adoption and use of Learning Management Systems (LMS) depend on whether

students, lecturers, and administrators find these systems beneficial and easy to navigate. Recent studies emphasize that perceived usefulness significantly influences users' willingness to engage with online learning platforms, which in turn affects academic performance (Nguyen, 2023; Akpen, 2024). This aligns with the study's first objective: examining the effect of online learning systems on academic performance in public universities.

The Diffusion of Innovations (DOI) Theory, proposed by Rogers (2003), offers a broader lens for understanding the adoption of online learning technologies across institutions. It highlights innovation characteristics such as compatibility, complexity, observability, and trialability as determinants of adoption. In Kenya's public universities, DOI theory helps explain variations in institutional readiness and efficiency in implementing online learning systems, aligning with the second study objective. Recent literature underscores that the successful diffusion of digital learning innovations in universities depends on supportive leadership, ICT infrastructure, and collective faculty engagement (Kiruma, 2023; Owino, 2023). Together, these theories offer a robust conceptual framework for analyzing the behavioral and institutional dynamics that shape the effectiveness of online learning.

2.0 Materials and Methods

The study used a descriptive quantitative design to assess ICT preparedness for online learning transformation in Kenya's public universities (Saunders et al., 2019). Guided by a pragmatist research philosophy and a deductive approach, the investigation evaluated existing theories of technology adoption in higher education settings (Venkatesh et al., 2022).

The target population consisted of students and staff from all 39 chartered public universities in Kenya. From this population, seven universities were purposively selected to represent diverse institutional contexts. The study used Mugenda and Mugenda's formula to determine the sample size for large populations. The formula $n = (z^2 * p * q) / E^2$ was applied, with $z = 1.96$ for a 95% confidence level, $p = 0.5$, $q = 0.5$, and $E = 0.05$ margin of error. Substituting these values yielded $n = 384$ respondents. This ensured adequate representation and statistical reliability. Stratified random sampling was then used to distribute the sample across students and staff from the selected universities, thereby enhancing inclusivity and ensuring each subgroup was proportionately represented in the final sample (Nikolopoulou, 2022).

Data were primarily collected through structured questionnaires and interviews, supplemented with secondary data from university documents and institutional reports. To enhance the quality of the instruments, a pilot study with 20 respondents was conducted, allowing for refinement based on feedback. Reliability testing using Cronbach's alpha yielded coefficients ranging from 0.762 to 0.778, indicating strong internal consistency. Content and construct validity were confirmed through expert evaluation and exploratory factor analysis.

Data analysis was conducted using SPSS, applying descriptive and inferential statistics, including correlation analysis, ANOVA, and logistic regression, to examine relationships among the study variables (Apuke, 2017). The research received ethical approval from the National Commission for Science, Technology, and Innovation (NACOSTI). Participation was voluntary, and respondents provided informed consent. Assurances of confidentiality and

anonymity were strictly maintained throughout the research process.

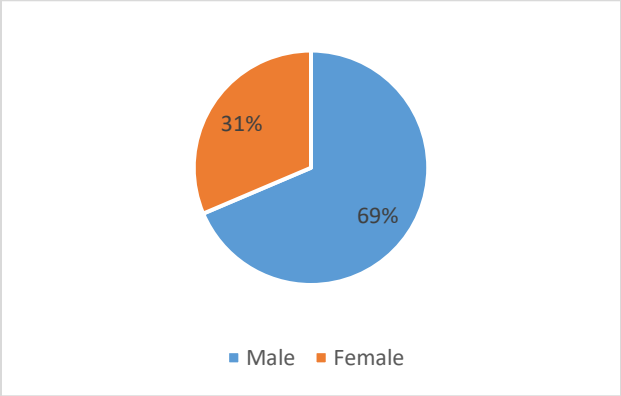
3.0 Results and Discussion

Gender of the Respondents

The findings are shown in Figure 1.

Figure 1

Gender of the Respondents



The study's findings indicate that 68.6% of participants were male and 31.4% were female. This distribution closely mirrors the overall composition of the student population in Kenya's public universities, suggesting that the sample was well-balanced and representative. Consequently, the results are unlikely to be influenced by gender bias, ensuring credibility and fairness in interpreting the impact of online learning on university performance across both male and female participants.

Age of the Respondents

Understanding the age distribution of respondents is essential for assessing the study population's diversity and representativeness. Age can influence technological adaptability, learning preferences, and perceptions of online education. The study, therefore, analyzed the age profiles of registrars, ICT staff, and students to determine how generational differences may affect attitudes and engagement with online learning systems. The results are presented in Table 1.

Table 1

Age of the Respondents

		Frequency	*Percent*
Registrar	31-40 years	9	47.4
	41-50 years	3	15.8
	51-60 years	6	31.6
	61-70 years	1	5.3
	Total	*19*	*100.0*
ICT staff	20-30 years	3	18.8
	31-40 years	9	56.3
	41-50 years	3	18.8
	51-60 years	1	6.3
	Total	*16*	*100.0*
Students	15-19 years	12	10.2
	20-25 years	101	85.6
	26-30 years	4	3.4
	31-35 years	1	.8
	Total	*118*	*100.0*

Most registrars (47.4%) are aged 31-40 years, followed by those aged 51-60 years (31.6%), 41-50 years (15.8%), and 61-70 years (5.3%). Regarding the ICT staff, most are aged 31-40 years (56.3%), followed by those aged 20-30 years (18.8%), 41-50 years (18.8%), and 51-60 years (6.3%). Finally, in the student sample, most are aged 20-25 years (85.6%), while the other age

groups are 15-19 years (10.2%), 26-30 years (3.4%), and 31-35 years (0.8%). The data collected by the surveys used in the present study cover a wide range of age groups. They can therefore be used to conclude the effects of transitioning to an online learning delivery system on the academic performance of public universities in Kenya.

Level of Education of Registrar and ICT staff

The results are shown in Table 2.

Table 2

Level of Education of Registrar and ICT staff

	Frequency	*Percent*
Certificate	5	14.3
Diploma	3	8.6
Degree	15	42.9
Masters	8	22.9
PhD	4	11.4
Total	*35*	*100.0*

Most of the registrars and ICT staff have obtained a degree (42.9%). 22.9% have obtained a master's degree, 14.3% a certificate, 11.4% a PhD, and 8.6% a diploma. This indicates that registrars and ICT staff have the requisite education to provide an authorized and credible opinion on the topic of this research: identifying the effects on the academic performance of public universities in Kenya and the levels of preparedness in implementing an online learning delivery system.

The level of the course the students pursued

The results are shown in Table 3.

Table 3

Level of Course the Students Pursued

	Frequency	*Percent*
Certificate	1	.8
Diploma	7	5.9
Degree	110	93.2
Total	*118*	*100.0*

A large majority (93.2%) of students indicate they are pursuing a degree, while 5.9% of interviewees indicate they are pursuing a diploma. Only 0.8% are pursuing a certificate. This suggests that the students were drawn from different university programs that offered online learning. This is in line with the overall student population in Kenya and the targeted public universities. Hence, these students are expected to provide credible information on how transitioning to an online learning delivery system could affect the academic performance of public universities in Kenya.

Position of the Respondents

The findings are illustrated in Table 4.

Table 4.

Level of Education of Registrar and ICT staff

		Frequency	*Percent*
Registrar	Lecturer	6	31.6
	ICT staff	7	36.8
	Registrar	2	10.5
	Administration	4	21.1
	Total	*19*	*100.0*
ICT staff	Lecturer	2	12.5
	ICT staff	14	87.5
	Total	*16*	*100.0*

According to the findings, registrars indicated that they were lecturers (31.6%), ICT staff (36.8%), and, to a lesser extent, in administration (21.1%) or as registrars only (10.5%). Among the ICT staff, most work in ICT (87.7%), and the others are lecturers (12.5%). This implies that all registrars and ICT staff targeted by our survey are, in one way or another, engaged in transforming their respective universities' teaching systems into online learning delivery systems. This proportion was consistent with the study's targeted population. Hence, they provide credible information on how transforming to an online learning delivery system could affect the academic performance of public universities in Kenya.

Number of Years at the University

The findings are illustrated in Table 5.

Table 5

Number of Years at the University

	Frequency	*Percent*
Less than 5 years	8	22.9
5-10 years	14	40.0
11-15 years	10	28.6
16-20 years	3	8.6
Total	*35*	*100.0*

According to Table 5, 40.0% of participants had been at the university for 5-10 years, 28.6% for 11-15 years, 22.9% for less than 5 years, and 8.6% for 16-20 years. This indicates that most respondents had been at their respective universities long enough to provide credible information on how transitioning to an online learning delivery system could affect the academic performance of public universities in Kenya.

Impact of Online Learning on Public University Performance

The primary objective of the research was to assess the impact of online learning on academic achievement at public universities. Table 6 presents the findings.

Table 6

Statements on Impact of Online Learning on Academic Performance

Professionals (ICT staff and registrar)	***Mean***	***Std. Dev.***
The university's LMS helps in introducing openness to the e-content to the outside users	2.086	1.147
The LMS helps enhance the openness that promotes the University's ranking in the world	2.000	0.939
The University has better targeted and customized communication with learners, staff, and administrators	2.200	1.023
The staff have been sharing and reusing resources	2.514	1.222
The online learning is done efficiently	2.657	1.305
The online learning system should be improved to achieve its objectives	1.971	1.071
Online learning is better than face-to-face learning	2.743	1.039

The study used a coding convention to interpret the mean values derived from respondents' feedback. A mean value of less than 1.5 indicated strong agreement, a score between 1.5 and 2.5 represented agreement, 2.5 to 3.5 signified neutrality or uncertainty, 3.5 to 4.5 denoted disagreement, and values above 4.5 reflected strong disagreement.

According to this scale, respondents generally agreed that the online learning system should be improved to effectively achieve its intended objectives, as indicated by a mean of 1.97. They also agreed that the Learning Management System (LMS) enhances openness, thereby contributing positively to the university's global ranking, with a mean of 2.00. Similarly, they acknowledged that the university's LMS promotes openness to external users of e-content, as reflected in a mean of 2.09. Additionally, respondents agreed that the LMS facilitates better-targeted, more customized communication among learners, staff, and administrators, as indicated by a mean score of 2.20.

However, respondents were uncertain about several aspects. They were unsure whether staff effectively shared and reused resources (mean = 2.51) or whether online learning was conducted efficiently (mean = 2.66). Likewise, opinions were divided on whether online learning was superior to traditional face-to-face learning (mean = 2.74).

These findings suggest that while online learning has increased openness and improved institutional visibility, its efficiency and comparative advantage over conventional methods remain unclear. This observation aligns with Makhaya and Ogange (2019) who found that teachers generally held positive perceptions of e-learning's usefulness, and with Junus et al. (2021) who noted that most instructors possess adequate technical skills to engage effectively with virtual learning platforms.

4.0 Conclusion

The study examined how online learning affects the performance of public universities in Kenya. The findings revealed that online learning systems, particularly Learning Management Systems (LMS), have enhanced openness, communication, and access to educational resources. However, efficiency, resource sharing, and the overall quality of online delivery remain inconsistent across institutions. Respondents generally agreed that LMS promotes institutional visibility and engagement but expressed uncertainty about its superiority over traditional learning methods.

These findings affirm the Technology Acceptance Model (TAM) by showing that perceived usefulness and ease of use significantly influence students' and staff members' adoption and use of online learning systems. Similarly, the Diffusion of Innovations (DOI) Theory is supported, as the adoption and success of online learning varied with institutional readiness, ICT infrastructure, and staff competence. The study therefore concludes that while online learning has contributed positively to performance, realizing its full potential requires continued investment in infrastructure, staff development, and innovation-friendly institutional cultures.

5.0 Recommendations

i. Strengthen ICT Infrastructure

Public universities should enhance their technological infrastructure to provide reliable internet connectivity and ensure the reliability of Learning Management Systems (LMS). Robust ICT systems are vital for uninterrupted access to digital resources, virtual classes, and online assessments. Improved infrastructure will enhance learning continuity and the overall efficiency of online programs.

ii. Intensify Capacity-Building Programs

Continuous training for academic and administrative staff, as well as students, is essential. These programs should focus on improving digital literacy, online pedagogy, and the effective use of LMS tools. Building technological competence will increase confidence in using online platforms and improve learning outcomes.

iii. Develop Clear Online Learning Policies

Universities need to establish clear policies that guide online instruction, assessment, and quality assurance. Such frameworks will ensure consistency, accountability, and the preservation of academic integrity across institutions.

iv. Foster Collaboration with the Ministry of Education

Partnerships between universities and the Ministry of Education are crucial to developing standardized online learning frameworks. Collaboration will promote equitable access to digital resources, align university practices with national education goals, and improve overall policy implementation.

v. Invest in Monitoring and Feedback Systems

Universities should implement continuous monitoring and feedback mechanisms to assess system performance and user satisfaction. Regular evaluations will help identify weaknesses in technology or pedagogy, enabling timely improvements.

vi. Promote a Culture of Innovation and Openness

Institutions should foster innovation, creativity, and openness in online learning. Embracing emerging digital tools and flexible teaching models will enhance student engagement, improve academic outcomes, and elevate Kenya's public universities to global competitiveness in higher education.

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