

PERCEIVED TECHNICAL, INFRASTRUCTURAL AND USER-SUPPORT CHALLENGES IN LEARNING MANAGEMENT SYSTEM USE AMONG NURSING STUDENTS AT THE NATIONAL OPEN UNIVERSITY OF NIGERIA, GUSAU STUDY CENTRE

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ABSTRACT

Learning management systems (LMS) are central to open and distance nursing education, but effective use depends on reliable technology, affordable connectivity and responsive learner support. This study described perceived technical, infrastructural and user-support challenges in LMS use among nursing students at the National Open University of Nigeria, Gusau Study Centre. A descriptive cross-sectional survey included all 133 nursing students in 200–500 Levels within the accessible population. Data were collected using a structured four-category questionnaire and analysed using frequencies, percentages, means and standard deviations. The overall challenge mean was 2.93 (SD = 0.36), indicating serious perceived barriers. Internet and infrastructure challenges were most prominent (mean = 3.28, SD = 0.49), followed by user-skill and support challenges (mean = 2.87, SD = 0.52) and technical challenges (mean = 2.74, SD = 0.41). Poor internet connectivity was the highest-rated item (mean = 3.48), followed by network-related inability to access the LMS (mean = 3.37), unstable electricity supply (mean = 3.23), inadequate technical support and slow page loading (mean = 3.08 each), and internet data cost (mean = 3.03). Although 66.2% reported previous LMS training, 75.2% still needed assistance and 66.1% considered the training insufficient. Access constraints, platform reliability and service-quality deficiencies were more prominent than difficulty locating course materials. Low-bandwidth optimisation, affordable connectivity, power-backed access, task-based training and responsive technical support are recommended. As the design was descriptive and cross-sectional, the findings represent perceived barriers and do not establish causal effects on LMS utilisation.

KEYWORDS: digital infrastructure; e-learning; learning management system; nursing education; technical support

INTRODUCTION

Learning management systems are web-based environments that integrate the organisation, delivery, administration and monitoring of educational content and learner activities.¹ In open and distance learning, an LMS functions not merely as a repository but as the principal interface through which geographically dispersed learners obtain course materials, communicate with instructors, submit assessments and participate in academic activities. This dependence is especially consequential in nursing education, where students must sustain access to theoretical and professionally oriented learning resources while coordinating study with clinical, employment and family responsibilities.

Across health-sciences education, the effectiveness of e-learning is not explained by platform availability alone. Systematic evidence indicates that usability, digital competence, learner motivation, meaningful interaction, accessibility and institutional readiness operate together in shaping students' learning experiences.^{2,3} Taken together, this literature frames LMS utilisation as a socio-technical process in which technological performance, learner capability and institutional support are mutually reinforcing. A platform may therefore be formally available while remaining difficult to use consistently where access, skills or support are inadequate.

Within this broader literature, LMS barriers can be organised into three related domains. Technical challenges concern the performance and usability of the platform, including slow loading, login difficulties, system errors, assignment-upload problems and navigation. Infrastructural challenges concern the external conditions required to reach and sustain access, particularly internet connectivity, data affordability, electricity supply and suitable devices. User-support challenges concern digital skills, training needs and access to timely assistance. This classification is consistent with the DeLone and McLean Information Systems Success Model, which links system quality and service quality with system use and user outcomes,⁴ and with the Technology Acceptance Model, which identifies perceived ease of use as a central influence on technology acceptance.⁵

Evidence from low-resource settings shows substantial convergence across these domains. Studies conducted during and after the rapid expansion of online learning have repeatedly identified unstable connectivity, poor system performance, limited technical skills, weak implementation support and wider digital inequalities as interdependent constraints.⁶⁻⁹ Although the studies differ in population and institutional setting, a common pattern emerges: learner willingness alone is insufficient where the underlying access environment and service infrastructure are unreliable. This consistency suggests that effective LMS use depends on the combined quality of the platform, the conditions under which students connect to it and the support available when difficulties occur.

Nursing-specific evidence reflects the same pattern but also highlights the distinctive requirements of professional education. Nursing students in Namibia reported connectivity problems, inadequate computer skills, limited interaction and assessment difficulties, while another Namibian study identified poor internet access, unreliable devices and insufficient preparedness for online learning.^{10,11} At Makerere University, only about one-quarter of medicine and nursing students reported high-quality internet access, and more than half lacked the skills needed to use the institutional e-learning platform.¹² These findings indicate that access and digital readiness may be particularly important where students require sustained engagement with detailed theoretical content, demonstrations and assessment activities. However, much of this evidence arose from emergency online-learning conditions or conventional campus-based institutions, which limits its direct transferability to an established open and distance study-centre context.

Nigerian research likewise points to persistent implementation constraints, although the available evidence remains broad rather than programme-specific. Eze, Chinedu-Eze and Bello identified inadequate internet facilities and insufficient training as barriers to the utilisation of e-learning facilities in a Nigerian university.¹³ Yakubu and Dasuki further showed that system quality, service quality and information quality were relevant to students' satisfaction, behavioural intention and actual use of an e-learning system.¹⁴ These studies establish the importance of institutional and system-level conditions, but they do not isolate the experience of nursing students within a particular open and distance study centre.

This gap is important in the National Open University of Nigeria, where the LMS supports digital content delivery, online facilitation, learner engagement and technical assistance across geographically dispersed study centres.¹⁵ A recent systematic review of undergraduate nursing students' perceptions of LMS use similarly identified digital literacy, prior technology experience, self-efficacy, accessibility, instructor support and interactive system features as recurring influences on acceptance and satisfaction.¹⁶ Nigerian studies involving medical students and medical educators have also reported high data costs, poor internet connectivity, irregular electricity, limited familiarity with assignment-management systems and differences in institutional provision and training.^{17,18} Collectively, the evidence suggests that LMS challenges in health-professions education arise from interacting technical, infrastructural and support conditions. Nevertheless, centre-level evidence concerning nursing students in a mature open and distance institution remains limited. The present study therefore assessed perceived technical, infrastructural and user-support challenges in LMS use among nursing students at the National Open University of Nigeria, Gusau Study Centre. Specifically, it determined the technical challenges experienced by students, assessed internet and infrastructure-related barriers, examined user-skill and support challenges, and established

the relative prominence of the three challenge dimensions. Because the analysis was descriptive, the study identifies perceived barriers but does not test causal effects or challenge–utilisation associations.

RESEARCH METHODOLOGY

RESEARCH DESIGN

A descriptive cross-sectional survey design was used to assess nursing students' perceived LMS utilisation challenges at one point in time. The design was appropriate for describing the distribution and severity of self-reported barriers. However, it did not establish temporal ordering or permit causal inference regarding the relationship between the identified challenges and LMS utilisation.

STUDY SETTING

The study was conducted at the National Open University of Nigeria, Gusau Study Centre, Gusau, Zamfara State, North-West Nigeria. The university operates an open and distance learning model in which the LMS supports access to course materials, communication, assignment submission, assessment and other academic activities. Nursing students from 200 to 500 Levels constituted the relevant programme population.

STUDY POPULATION AND CENSUS

The accessible population comprised 133 nursing students: 31 in 200 Level, 34 in 300 Level, 26 in 400 Level and 42 in 500 Level. All 133 students in the accessible population were included in the final analysis; consequently, the study used a census rather than a sampling procedure.

INSTRUMENT AND MEASUREMENT

Data were collected with a structured questionnaire organised around the study objectives and informed by the DeLone and McLean model and the Technology Acceptance Model. The challenge section comprised 14 items grouped into technical challenges (six items), internet and infrastructure challenges (four items), and user-skill and support challenges (four items). The completed analytical tables used four response categories: strongly agree, agree, disagree and strongly disagree, scored from 4 to 1.

A criterion mean of 2.50 was used. Item and domain means below 2.50 were interpreted as minor challenges, means from 2.50 to 3.24 as serious challenges, and means from 3.25 to 4.00 as very serious challenges. Higher scores represented greater perceived challenge severity.

VALIDITY, RELIABILITY AND DATA COLLECTION

Face and content validity were assessed through expert review. A pilot study involving approximately 10% of the study population was conducted at the Sokoto NOUN Study Centre. Reliability analysis produced an overall Cronbach's alpha coefficient of 0.80, indicating acceptable internal consistency. Data were collected within two weeks to using secure online google form. Completed questionnaires were checked for completeness before analysis.

DATA ANALYSIS

Data were summarised using frequencies, percentages, means and standard deviations. Agreement percentages were calculated by combining strongly agree and agree responses, while domain scores were obtained from the relevant item groups. Although individual Likert responses are ordinal, item and composite means were computed as a commonly applied descriptive procedure in educational survey research. Interpretation was based on the predefined response intervals stated under Instrument and Measurement.

ETHICAL CONSIDERATIONS

Ethical approval was obtained from ministry of health (approval number: ZSHREC03072026) on 9th July, 2026. Participation was voluntary, informed consent was obtained from each respondent, and confidentiality, anonymity and secure data management were maintained throughout the study.

RESULTS

Table 1: Sociodemographic and LMS-use characteristics of respondents (N = 133)

Variable	Category	Frequency	Percentage (%)
Gender	Male	28	21.1
	Female	105	78.9
Age	20–25 years	34	25.6
	26–30 years	55	41.4
	31–35 years	21	15.8
	36 years and above	23	17.3
Level of study	200 Level	31	23.3
	300 Level	34	25.6
	400 Level	26	19.5
	500 Level	42	31.6
Received LMS training	Yes	88	66.2
	No	45	33.8
Frequency of LMS use	Daily	27	20.3
	Weekly	23	17.3
	Occasionally	83	62.4

(Source: Completed analytical dataset, 2026)

Of the 133 students analysed, 105 (78.9%) were female and 28 (21.1%) were male. The largest age category was 26–30 years (41.4%), while 42 students (31.6%) were in 500 Level. Although 88 students (66.2%) reported receiving LMS training, most used the LMS only occasionally (62.4%); 20.3% used it daily and 17.3% used it weekly (Table 1).

Table 2: Technical, infrastructural and user-support challenge items (N = 133)

Code	Challenge statement	SA n (%)	A n (%)	D n (%)	SD n (%)	Mean ± SD
B1	Difficulty logging into the LMS	16 (12.0)	52 (39.1)	56 (42.1)	9 (6.8)	2.56 ± 0.79
B2	LMS pages are sometimes slow to load	46 (34.6)	52 (39.1)	35 (26.3)	0 (0.0)	3.08 ± 0.78
B3	System errors occur when using the LMS	21 (15.8)	83 (62.4)	21 (15.8)	8 (6.0)	2.88 ± 0.74
B4	LMS interface is difficult to understand	19 (14.3)	40 (30.1)	70 (52.6)	4 (3.0)	2.56 ± 0.77
B5	Difficulty locating course materials	13 (9.8)	45 (33.8)	66 (49.6)	9 (6.8)	2.47 ± 0.76
B6	Problems uploading assignments	36 (27.1)	49 (36.8)	48 (36.1)	0 (0.0)	2.91 ± 0.79
B7	Poor internet connectivity affects LMS use	74 (55.6)	49 (36.8)	10 (7.5)	0 (0.0)	3.48 ± 0.63
B8	Internet data cost limits regular LMS use	42 (31.6)	53 (39.8)	38 (28.6)	0 (0.0)	3.03 ± 0.78
B9	Unstable electricity affects LMS access	52 (39.1)	60 (45.1)	21 (15.8)	0 (0.0)	3.23 ± 0.71
B10	Network issues prevent LMS access	60 (45.1)	62 (46.6)	11 (8.3)	0 (0.0)	3.37 ± 0.63
B11	Insufficient training for effective LMS use	26 (19.5)	62 (46.6)	41 (30.8)	4 (3.0)	2.83 ± 0.77
B12	Difficulty downloading lecture materials	19 (14.3)	48 (36.1)	59 (44.4)	7 (5.3)	2.59 ± 0.80
B13	Assistance is sometimes needed	37 (27.8)	63 (47.4)	28 (21.1)	5 (3.8)	2.99 ± 0.80
B14	Technical support is inadequate	33 (24.8)	82 (61.7)	14 (10.5)	4 (3.0)	3.08 ± 0.69

SA = strongly agree; A = agree; D = disagree; SD = strongly disagree. Criterion mean = 2.50.

Table 3: Summary of LMS utilisation challenge dimensions

Challenge dimension	Items	Mean	SD	Interpretation
Technical challenges	6	2.74	0.41	Serious
Internet and infrastructure challenges	4	3.28	0.49	Very serious
User-skill and support challenges	4	2.87	0.52	Serious
Overall LMS utilisation challenges	14	2.93	0.36	Serious

(Source: Completed analytical dataset, 2026)

Technical challenges recorded a domain mean of 2.74 (SD = 0.41), indicating a serious challenge. Slow LMS page loading was the most highly rated technical item (mean = 3.08), followed by assignment-upload problems (mean = 2.91) and system errors (mean = 2.88). Difficulty logging in and difficulty understanding the interface each recorded a mean of 2.56, while difficulty downloading materials recorded 2.59. Difficulty locating course materials was the only item below the criterion mean (mean = 2.47), suggesting that content organisation was a less prominent concern than platform performance and access reliability.

Internet and infrastructure challenges produced the highest domain mean (3.28, SD = 0.49) and were classified as very serious. Poor internet connectivity was the leading challenge (mean = 3.48), with 123 students (92.4%) agreeing or strongly agreeing that it affected their LMS use. Network-related inability to access the LMS followed (mean = 3.37; 91.7% agreement). Unstable electricity supply recorded a mean of 3.23 and 84.2% agreement, while the cost of internet data recorded a mean of 3.03 and 71.4% agreement.

User-skill and support challenges recorded a serious domain mean of 2.87 (SD = 0.52). Inadequate technical support was the highest-rated item in this domain (mean = 3.08), with 86.5% agreement. The need for assistance recorded a mean of 2.99 and 75.2% agreement, while insufficient training recorded a mean of 2.83 and 66.1% agreement. The coexistence of previous training among two-thirds of respondents and continuing support needs suggests that one-off orientation may not be sufficient for sustained LMS competence.

The overall challenge mean was 2.93 (SD = 0.36), confirming that respondents perceived serious barriers to LMS use. Internet and infrastructure challenges were the most prominent dimension, followed by user-skill and support challenges and technical challenges (Table 3). The narrow overall standard deviation indicates that respondents' composite challenge scores were relatively clustered around the mean.

DISCUSSION

The findings reveal a clear hierarchy of perceived LMS barriers rather than a collection of isolated technical complaints. Internet and infrastructure challenges were rated as very serious, while technical and user-support challenges were rated as serious. This pattern suggests that students' experiences of the LMS were shaped by the interaction of access conditions, platform performance and the availability of assistance. The predominance of occasional LMS use occurred alongside these barriers, but the descriptive design does not establish that the challenges caused infrequent engagement. Course schedules, assessment periods, employment and clinical commitments, device ownership and individual study practices may also influence usage frequency. The observed convergence should therefore be treated as a basis for further participant-level investigation rather than as evidence of a causal relationship.

INTERNET AND INFRASTRUCTURE AS THE DOMINANT CONSTRAINTS

Internet and infrastructure constituted the dominant challenge dimension. More than nine in ten respondents identified poor connectivity and network-related access failure, while over four in five reported that unstable electricity affected access. This pattern is consistent with evidence from Ghana, Namibia and Uganda, where accessibility, connectivity and inadequate digital infrastructure repeatedly constrained online participation.⁸⁻¹² It also corroborates Nigerian studies showing that inadequate internet facilities, high connectivity costs and irregular electricity remain important barriers to e-learning among university and health-professions students.^{13,17} Comparable concerns have been reported by Nigerian medical educators, among whom lack of internet connectivity and poor power supply were the most frequently identified institutional barriers.¹⁸ Although the studies differ in design and population, their convergence across student and educator perspectives strengthens the interpretation that infrastructure is a structural constraint rather than a problem peculiar to one platform or programme.

The prominence of connectivity and electricity may be understood in relation to the open and distance learning context. Students who access the LMS away from institutionally provided facilities may depend on personal mobile devices,

commercial data and domestic electricity. Under unstable network conditions, a single academic task may require repeated logins, interrupted downloads or multiple upload attempts, increasing both the time and cost of participation. Power interruptions may further restrict opportunities to charge devices or complete time-bound activities. These mechanisms were not directly measured and should therefore be regarded as plausible contextual explanations rather than additional findings. Nevertheless, they clarify why nominal access to an LMS does not necessarily translate into reliable or equitable access.

The data-cost finding further indicates that accessibility has an economic as well as a technical dimension. In a system where course materials, communication and assessment are delivered online, recurrent connectivity expenditure may influence when, how often and for how long students engage with the platform. The finding therefore supports interventions that reduce the bandwidth and financial demands of participation, including compressed files, offline-compatible materials, power-backed study-centre access and institutionally negotiated educational data arrangements. These measures should be evaluated against actual LMS logs and completion outcomes rather than assumed to improve utilisation.

TECHNICAL PERFORMANCE AND USABILITY

Technical challenges were serious but less prominent than infrastructure-related constraints. Slow page loading, assignment-upload difficulties and system errors received higher ratings than interface comprehension or locating course materials. The contrast is analytically important: students appeared to know where content was located, but they could not always interact with the platform reliably. The principal technical difficulty therefore concerned performance-dependent tasks rather than basic information architecture. In an open and distance environment, unreliable loading and submission functions are particularly consequential because students may need to complete time-bound academic activities without immediate face-to-face assistance.

This pattern is consistent with broader e-learning research linking system quality and implementation support with students' experiences,^{6,7} and with Nigerian evidence showing that system and service quality are relevant components of e-learning success.¹⁴ It is also supported by the recent nursing LMS review, which identified ease of use, accessibility and interactive system features as important influences on students' acceptance and satisfaction.¹⁶ Taken together, the studies indicate that the availability of content is insufficient where page response, error control and submission functions are unreliable. The present study extends this evidence by showing that, within the Gusau Study Centre, performance-related difficulties were more salient than difficulty locating learning materials.

The theoretical models adopted in the study provide complementary interpretations of this pattern. From the Technology Acceptance Model perspective, recurrent technical failures increase the effort required to complete tasks and may reduce perceived ease of use.⁵ From the DeLone and McLean perspective, slow loading, system errors and unreliable upload functions represent limitations in system quality, while delayed assistance reflects limitations in service quality.⁴ These interpretations do not establish causal pathways in the present study, but they support treating platform reliability as an educational-quality issue rather than solely as an ICT maintenance concern. Accordingly, technical improvement should prioritise measurable task completion, successful uploads and reduced failure rates.

TRAINING AND USER-SUPPORT DEFICIENCIES

User-skill and support challenges were also serious. The coexistence of previous LMS training among 66.2% of respondents with continuing need for assistance among 75.2% indicates that exposure to training did not necessarily translate into sustained functional competence. One plausible explanation is that earlier training was introductory, infrequent or insufficiently aligned with specific tasks such as assignment submission, assessment access, file conversion and troubleshooting. Another possibility is that students' support needs changed as they progressed through different levels and encountered more complex platform functions. Because challenge scores were not compared by level of study, age or training status, these explanations remain tentative.

The finding aligns with nursing studies that identified limited digital skills and inadequate preparedness as barriers to online learning.¹⁰⁻¹² The systematic review of nursing students' LMS perceptions further showed that digital literacy, prior technology experience, self-efficacy and instructor support consistently shape perceived usefulness, ease of use and satisfaction.¹⁶ Nigerian evidence is similarly instructive: receipt of e-learning training and institutional encouragement were associated with utilisation among medical students, while educators reported gaps in familiarity with assignment-management systems and institutional readiness.^{17,18} The consistency across these studies suggests that one-off orientation is unlikely to be sufficient. Support should instead be continuous, task-based and responsive to students' changing academic requirements.

User support should therefore be understood as a service-quality function rather than an optional supplement to the platform. In an open and distance environment, a minor login, navigation or upload problem may develop into a missed deadline or an extended period of non-use when assistance is delayed. NOUN's institutional framework already identifies student training, technical support and online facilitation as core functions of its learning-content management system.¹⁵ The present findings indicate a need to translate these functions into visible reporting channels, defined response times, ticketing and

escalation procedures, and recurring task-based refresher sessions. Future evaluation should examine response time, resolution rate, repeated complaints and successful completion of LMS tasks, rather than relying exclusively on satisfaction ratings.

IMPLICATIONS FOR NURSING EDUCATION AND OPEN-DISTANCE DELIVERY

The implications extend beyond general platform convenience because nursing education depends on sustained access to detailed theoretical materials, diagrams, demonstrations, clinical guidance and assessment activities. Under low-bandwidth conditions, students may prioritise smaller text files, postpone multimedia content or compress their engagement into periods of better connectivity. Unreliable uploads may also create uncertainty about assessment completion. These consequences were not directly measured, but they explain why connectivity, platform reliability and user support should be addressed as interrelated educational-quality concerns tailored to nursing education rather than as generic ICT problems.

Institutional response should combine student reports with objective usage evidence. System logs can identify repeated login attempts, peak failure periods, incomplete uploads, underused course areas and changes in engagement after an intervention. Periodic surveys can then explain the student experience underlying those patterns. This combined approach is particularly important because rapid digital transitions in developing settings have exposed persistent gaps in infrastructure, pedagogical preparedness and institutional support.^{19,20} Pilot interventions should therefore be evaluated before wider implementation, with outcomes defined in terms of successful access, task completion, support resolution and equitable participation.

CONCLUSION

Nursing students at the National Open University of Nigeria, Gusau Study Centre perceived serious technical, infrastructural and user-support challenges in LMS use. Internet and infrastructure barriers were the most prominent, particularly poor connectivity, network-related access failure, unstable electricity and internet data costs. Technical difficulties centred on slow loading, system errors and assignment uploads, whereas user-support difficulties concerned inadequate assistance and insufficient practical training. The comparatively lower rating for locating course materials indicates that reliable access, platform performance and responsive support require greater priority than interface reorganisation alone. Because the study was cross-sectional, descriptive and based on self-reported perceptions from one study centre, it does not establish that the identified challenges caused patterns of LMS utilisation. The findings nevertheless provide a context-specific basis for improving low-bandwidth access, task reliability and learner support, subject to verification with authentic participant-level data and subsequent outcome evaluation.

RECOMMENDATIONS

- The university should optimise the LMS for low-bandwidth access by compressing files, reducing unnecessary page elements and providing downloadable or offline-compatible versions of essential learning materials.
- NOUN should assess the feasibility of negotiated educational data bundles, subsidised access or zero-rating arrangements for authenticated LMS traffic, with attention to affordability and equitable eligibility.
- The Gusau Study Centre should provide scheduled access to reliable, power-backed ICT facilities for students who cannot connect consistently from their homes or workplaces.
- A dedicated LMS help desk should provide telephone, email and messaging channels, operate against defined response standards, and maintain a ticketing and escalation system for recurrent login, upload and system-error complaints.
- Initial orientation should be supplemented by periodic, task-based refresher sessions covering course navigation, file downloads, assignment submission, assessments, discussion tools and basic troubleshooting.
- The university should combine LMS usage analytics with periodic student feedback to determine whether interventions improve successful access, task completion, support resolution and frequency of meaningful engagement.

STRENGTHS AND LIMITATIONS

A strength of the study was the inclusion of the entire accessible population of nursing students at the Gusau Study Centre and the separate assessment of technical, infrastructural and user-support domains. However, the study was conducted at one centre, which limits generalisation to nursing students across other NOUN centres. Its cross-sectional design captured perceptions at one point in time and could not establish temporal or causal relationships. Responses were self-reported and may have been affected by recall, acquiescence or social-desirability tendencies. The analysis was descriptive and based on aggregate results; consequently, associations between challenge dimensions, training status, level of study and frequency of LMS use could not be examined.

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