

ONLINE INTERACTION EXPERIENCES AND SATISFACTION WITH LEARNING MANAGEMENT SYSTEM USE AMONG NURSING STUDENTS AT THE NATIONAL OPEN UNIVERSITY OF NIGERIA, GUSAU STUDY CENTRE

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ABSTRACT

Background: Learning management systems (LMS) are central to open and distance nursing education, but their educational value depends on online interaction and student satisfaction. **Objective:** This study assessed nursing students' online interaction experiences and satisfaction with LMS use at the National Open University of Nigeria, Gusau Study Centre, and compared satisfaction by gender and level of study. **Methods:** A descriptive cross-sectional survey analysed 133 completed questionnaire records from nursing students in 200–500 Levels. Online interaction was measured with 12 items and satisfaction with 14 items on a four-point scale. Frequencies, percentages, means and standard deviations were calculated. Gender differences were tested with Welch's *t*-test, while level-of-study differences were tested with Welch's analysis of variance at $\alpha = 0.05$. **Results:** Overall online interaction was positive ($M = 2.98$, $SD = 0.62$), with student–student interaction rated highest ($M = 3.00$, $SD = 0.69$). Students were generally satisfied ($M = 2.95$, $SD = 0.63$), and usability and convenience recorded the highest domain mean ($M = 3.09$, $SD = 0.73$). Satisfaction did not differ by gender, $t(61.05) = 0.681$, $p = 0.499$, Hedges' $g = 0.12$. Satisfaction differed by level of study, Welch's $F(3, 68.19) = 4.308$, $p = 0.008$, $\omega^2 = 0.048$; 200-Level students reported higher satisfaction than 400- and 500-Level students. **Conclusion:** Students reported positive interaction and satisfaction, particularly for peer communication, flexibility and convenience. Lecturer feedback, clarification of difficult topics, content updating and learning effectiveness nevertheless require improvement.

KEYWORDS: e-learning, learning management system, nursing education, online interaction, student satisfaction

INTRODUCTION

Learning management systems have become a central component of contemporary higher education because they integrate course delivery, communication, assessment and learner support within a single digital environment. In open and distance learning, the LMS is more than a repository of course materials; it is the principal environment through which students encounter instructors, peers and academic resources. This function is particularly important in nursing education, where students must combine theoretical learning, clinical responsibilities and self-directed study across time and place.

The educational value of an LMS is partly determined by the quality of interaction it enables. Learner–instructor, learner–learner and learner–content interactions have been identified as important predictors of perceived learning and satisfaction in online environments (Alqurashi, 2019). Similarly, the Model for Online Learning Satisfaction indicates that interaction modes are interdependent, with student–teacher interaction shaping student–student interaction and the broader experience of online learning (Bervell et al., 2020). In nursing education, digital collaborative learning can support knowledge construction, peer exchange and engagement when online activities are pedagogically structured and actively facilitated (Männistö et al., 2020).

However, the presence of discussion forums and messaging tools does not necessarily guarantee meaningful interaction. Students may be able to communicate without receiving timely explanations, substantive feedback or adequate instructor presence. Qualitative evidence has shown that the quality of teacher–student and student–student interaction influences motivation, satisfaction and learners’ ability to manage online tasks, while insufficient facilitation may intensify isolation and weaken the perceived value of e-learning (Mojtahedzadeh et al., 2024). A global mapping review likewise identified interaction, communication and instructor support as recurrent concerns during large-scale transitions to online teaching (Bond et al., 2021).

Student satisfaction is therefore a useful indicator of how effectively an LMS responds to learners’ academic and practical expectations. Satisfaction reflects students’ overall evaluation of accessibility, ease of use, instructional support, information quality and perceived learning benefits. The DeLone and McLean Information Systems Success Model proposes that system quality, information quality and service quality influence system use, user satisfaction and net benefits (DeLone & McLean, 2003). The Technology Acceptance Model further explains that perceived usefulness and perceived ease of use influence technology acceptance and continued use (Davis, 1989). Applied to nursing education, these frameworks suggest that a convenient and accessible LMS may be positively evaluated, while inadequate feedback, weak content quality or difficult navigation may reduce satisfaction.

Recent nursing evidence supports this multidimensional interpretation. A systematic review found that undergraduate nursing students’ perceptions of LMS use were shaped by technology acceptance, instructor influence, access to technology, training and institutional support (Alkhuzaimi et al., 2025). Nursing students have also described system problems, ineffective learning, inadequate assessment processes and inexperienced online teaching as important constraints on e-learning (Araghian Mojarad et al., 2023). In a large cross-sectional study, nursing students’ satisfaction with blended learning was associated with sociodemographic, academic and environmental factors, including academic year, computer literacy, internet access and perceived institutional support (Hassan et al., 2024).

Evidence from resource-constrained settings further indicates that students may value online learning while simultaneously encountering conditions that limit regular participation. In Ghana, accessibility was identified as a major challenge to tertiary e-learning (Aboagye et al., 2021), while studies of African digital transformation have emphasised the consequences of unequal infrastructure and technological readiness (Adarkwah, 2021; Mhlanga & Moloi, 2020). Among Nigerian medical and health-science students, platform functionality, course of study and gender have also been associated with online learning experience and satisfaction (Enyoojo et al., 2024). Nevertheless, these findings cannot be assumed to represent nursing students in an established open and distance learning setting.

The National Open University of Nigeria relies extensively on LMS-mediated learning across geographically dispersed study centres. At the Gusau Study Centre, nursing students use the LMS to access course materials, communicate, participate in academic discussions and complete learning activities. Yet evidence remains limited regarding whether students experience these online interactions positively and whether the system satisfies their learning needs. Context-specific evidence is required because students’ evaluations may differ according to local support arrangements, level of study and the academic demands of nursing programmes.

Accordingly, this study assessed nursing students’ online interaction experiences and satisfaction with LMS use at the National Open University of Nigeria, Gusau Study Centre. Specifically, it examined the dimensions of student–lecturer interaction, student–student interaction and learning engagement; assessed accessibility, learning effectiveness, usability, convenience and overall satisfaction; and compared satisfaction by gender and level of study.

METHODS

STUDY DESIGN AND REPORTING

A descriptive cross-sectional survey design was used to assess online interaction experiences and satisfaction with LMS use at one point in time. This design was appropriate because the study sought to quantify students’ perceptions and compare satisfaction across demographic and academic groups without manipulating the learning environment. The manuscript was organised with reference to the Strengthening the Reporting of Observational Studies in Epidemiology guidance for cross-sectional studies (von Elm et al., 2007).

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, assignment submission, discussion forums, course updates and other academic activities. Nursing students in 200, 300, 400 and 500 Levels combine LMS-mediated learning with programme-specific academic and clinical responsibilities.

POPULATION, ELIGIBILITY AND FINAL ANALYTICAL SAMPLE

The accessible population comprised 133 nursing students enrolled in 200–500 Levels: 31 in 200 Level, 34 in 300 Level, 26 in 400 Level and 42 in 500 Level. Eligible records represented students who were enrolled in the nursing programme and used the LMS for academic activities. Although the original protocol calculated a minimum adjusted sample of 110 using Yamane's finite-population formula, the completed analytical file contained 133 records, corresponding to the full accessible population. Consequently, all available complete records were retained for analysis.

INSTRUMENT AND MEASUREMENT

Data were obtained with a structured questionnaire developed around the study objectives and the constructs of the DeLone and McLean Information Systems Success Model and Technology Acceptance Model. The questionnaire included sociodemographic and LMS-use characteristics, 12 online-interaction items and 14 satisfaction items. The online-interaction items covered student–lecturer interaction, student–student interaction and learning engagement. The satisfaction items covered accessibility of learning materials, learning effectiveness, usability and convenience, and direct overall satisfaction.

The completed dataset contained four ordered response categories—strongly agree, agree, disagree and strongly disagree—scored from 4 to 1. Therefore, the criterion mean was 2.50; item and domain means of 2.50 or above were interpreted as positive interaction or satisfaction. This scoring description reflects the analysed dataset rather than the five-point scale stated in the initial protocol. The three-item direct satisfaction composite (items D12–D14) demonstrated acceptable internal consistency (Cronbach's $\alpha = 0.771$). Full reliability coefficients for the 12-item interaction scale and the 14-item satisfaction scale were not available in the supplied analytical record and should be confirmed before submission.

VALIDITY, PILOT TESTING AND DATA COLLECTION

The study protocol specified expert review for face and content validity and a pilot study at another NOUN study centre. However, the supplied source document did not provide the completed expert-validation report, pilot results or final item-revision record. These records should be retrieved and reported in the final submitted version. The protocol further indicated that questionnaires were distributed electronically through the LMS or email, reminders were issued to improve completion, and responses were anonymised before analysis.

DATA ANALYSIS

Data were analysed using SPSS version 25 or an equivalent statistical package. Frequencies and percentages summarised participant characteristics and response distributions. Means and standard deviations summarised individual items and composite domains. For secondary comparisons, direct satisfaction was calculated as the mean of items D12, D13 and D14. Welch's independent-samples t-test compared male and female students because group sizes were unequal and Levene's test indicated unequal variances ($F = 4.844$, $p = 0.029$). Welch's one-way analysis of variance compared satisfaction across 200, 300, 400 and 500 Levels. Where the omnibus test was significant, the supplied analysis reported Games–Howell post-hoc comparisons. Hedges' g and omega-squared (ω^2) were used as effect-size indices. Statistical significance was assessed at $\alpha = 0.05$, and 95% confidence intervals were reported where available.

RESULTS

PARTICIPANT CHARACTERISTICS

A total of 133 records were analysed. Most respondents were female (78.9%), and the largest age group was 26–30 years (41.4%). Students were represented across all four academic levels, with 500 Level contributing the largest proportion (31.6%). Approximately two-thirds (66.2%) reported receiving LMS-use training. Nevertheless, 62.4% used the LMS only occasionally, whereas 20.3% used it daily and 17.3% used it weekly (Table 1).

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

Variable	Category	n	%
Gender	Male	28	21.1
	Female	105	78.9
Age (years)	20–25	34	25.6
	26–30	55	41.4
	31–35	21	15.8
	≥36	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

Note. Percentages may not total 100 because of rounding.

ONLINE INTERACTION EXPERIENCES

The overall online interaction mean was 2.98 (SD = 0.62), which exceeded the criterion mean and indicated generally positive experiences. Student–student interaction recorded the highest domain mean (M = 3.00, SD = 0.69), followed by learning engagement (M = 2.97, SD = 0.73) and student–lecturer interaction (M = 2.95, SD = 0.70).

At item level, participation in group discussions was rated highest (M = 3.15, SD = 0.79), with 82.7% agreeing or strongly agreeing. LMS discussions also motivated participation in learning activities (M = 3.13, SD = 0.91), and students reported comfort in expressing academic opinions online (M = 3.09, SD = 0.94). Communication with lecturers was rated positively (M = 3.08, SD = 0.91). However, assignment feedback from lecturers received a comparatively lower rating (M = 2.83, SD = 0.97), while the use of online discussions to clarify difficult topics recorded the lowest mean (M = 2.71, SD = 0.97) (Table 2).

Table 2: Online interaction experiences and domain summaries (N = 133)

Item	Statement/domain	Agree/SA (%)	Mean	SD
C1	Easy communication with lecturers	71.5	3.08	0.91
C2	Lecturers respond to questions	72.9	2.87	0.78
C3	Lecturers provide assignment feedback	63.1	2.83	0.97
C4	Academic guidance from lecturers	72.1	3.03	0.84
C5	Communication among students	68.4	2.95	0.86
C6	Interaction through discussion forums	79.7	3.03	0.77
C7	Participation in group discussions	82.7	3.15	0.79
C8	Sharing learning resources	63.9	2.89	0.90
C9	Interaction improves course understanding	77.4	2.96	0.85
C10	Discussions motivate learning participation	78.2	3.13	0.91
C11	Comfort expressing academic opinions	76.7	3.09	0.94
C12	Discussions clarify difficult topics	64.7	2.71	0.97
Domain	Student–lecturer interaction	—	2.95	0.70
Domain	Student–student interaction	—	3.00	0.69
Domain	Learning engagement	—	2.97	0.73
Overall	Online interaction experience	—	2.98	0.62

Note. Response options were scored from 1 (strongly disagree) to 4 (strongly agree). Criterion mean = 2.50. SA = strongly agree.

SATISFACTION WITH LMS USE

Students were generally satisfied with LMS use, as indicated by an overall 14-item mean of 2.95 (SD = 0.63). Usability and convenience recorded the highest domain mean (M = 3.09, SD = 0.73), followed by direct overall satisfaction (M = 3.05, SD = 0.72), accessibility of learning materials (M = 2.89, SD = 0.74) and learning effectiveness (M = 2.84, SD = 0.66).

The ability to learn at one's own pace was the highest-rated item (M = 3.23, SD = 0.79), followed by overall satisfaction with the LMS learning experience (M = 3.14, SD = 0.68) and convenient access to learning materials at any time (M = 3.11, SD = 0.86). Easy access to lecture materials was also positively rated (M = 3.09, SD = 0.92). In contrast, regular updating of course materials recorded the lowest mean (M = 2.69, SD = 1.02). Perceived improvement in academic performance (M = 2.75, SD = 0.88) and understanding of courses (M = 2.78, SD = 0.78) were also rated lower than flexibility and convenience (Table 3).

Table 3: Satisfaction with LMS use and domain summaries (N = 133)

Item	Statement/domain	Agree/SA (%)	Mean	SD
D1	Easy access to lecture materials	80.5	3.09	0.92
D2	Easy downloading of lecture notes	73.7	2.98	0.88
D3	Adequate learning resources	65.4	2.79	0.88
D4	Course materials regularly updated	60.1	2.69	1.02
D5	Supports academic learning activities	69.9	2.90	0.79
D6	Helps understanding of courses	60.9	2.78	0.78
D7	Improves academic performance	65.4	2.75	0.88
D8	Learning activities sustain engagement	76.7	2.92	0.84
D9	LMS is easy to use	66.9	2.95	1.00
D10	Allows learning at own pace	82.0	3.23	0.79
D11	Convenient anytime access	83.5	3.11	0.86
D12	Satisfied with LMS as a platform	78.9	2.98	0.87
D13	Would recommend LMS for future learning	71.5	3.05	1.01
D14	Overall satisfied with LMS learning experience	85.7	3.14	0.68
Domain	Accessibility of learning materials	—	2.89	0.74
Domain	Learning effectiveness	—	2.84	0.66
Domain	Usability and convenience	—	3.09	0.73
Domain	Direct overall satisfaction	—	3.05	0.72
Overall	LMS learning experience	—	2.95	0.63

Note. Response options were scored from 1 (strongly disagree) to 4 (strongly agree). Criterion mean = 2.50. SA = strongly agree.

SATISFACTION DIFFERENCES BY GENDER AND LEVEL OF STUDY

Male students recorded a slightly higher direct satisfaction mean ($M = 3.12$, $SD = 0.52$) than female students ($M = 3.03$, $SD = 0.76$). However, Welch's t-test showed that the difference was not statistically significant, $t(61.05) = 0.681$, $p = 0.499$. The mean difference was 0.08 (95% CI: -0.16 to 0.33), and Hedges' $g = 0.12$ indicated a negligible effect.

Satisfaction differed significantly across levels of study, Welch's $F(3, 68.19) = 4.308$, $p = 0.008$, $\omega^2 = 0.048$. Students in 200 Level recorded the highest mean ($M = 3.39$, $SD = 0.54$), followed by 300 Level ($M = 3.02$, $SD = 0.69$), 500 Level ($M = 2.92$, $SD = 0.79$) and 400 Level ($M = 2.91$, $SD = 0.73$). The supplied Games–Howell analysis indicated that 200-Level students were significantly more satisfied than students in 400 and 500 Levels, while the remaining pairwise differences were not statistically significant (Table 4).

Table 4: Direct satisfaction differences by gender and level of study

Comparison	Group	n	Mean	SD	Welch statistic	p	Effect
Gender	Male	28	3.12	0.52	$t(61.05) = 0.681$	0.499	$g = 0.12$
	Female	105	3.03	0.76			
Level	200 Level	31	3.39	0.54	$F(3, 68.19) = 4.308$	0.008	$\omega^2 = 0.048$
	300 Level	34	3.02	0.69			
	400 Level	26	2.91	0.73			
	500 Level	42	2.92	0.79			

Note. Direct satisfaction was the mean of items D12–D14. Gender mean difference = 0.08 (95% CI: -0.16 to 0.33). Games–Howell comparisons indicated that 200-Level students were more satisfied than 400- and 500-Level students.

DISCUSSION

This study found that nursing students at NOUN Gusau Study Centre generally reported positive online interaction experiences and satisfaction with LMS use. The findings were not uniformly strong across all dimensions. Interaction was most favourable for communication among students, while satisfaction was driven primarily by flexibility, convenience and access. Conversely, lecturer feedback, clarification of difficult topics, regular updating of learning materials and perceived learning effectiveness received comparatively lower ratings. This pattern suggests that the LMS functioned more effectively as an access and participation platform than as a consistently responsive instructional environment.

Student–student interaction was the strongest interaction dimension, and participation in group discussions was the highest-rated item. This finding indicates that peer communication may constitute a central source of academic connection in an open and distance learning context. Digital collaborative learning can enable nursing students to exchange explanations, share resources and construct knowledge collectively, particularly when students are geographically separated (Männistö et al., 2020). The result also corresponds with evidence that learner–learner and learner–instructor interaction contribute to satisfaction and perceived learning in online environments (Alqurashi, 2019).

However, the comparatively lower scores for assignment feedback and clarification of difficult topics require a cautious interpretation of the positive overall mean. Students appeared able to communicate and participate, but participation may not always have been accompanied by the depth of academic feedback required for complex nursing concepts. Mojtahedzadeh et al. (2024) similarly showed that students evaluate online interaction in terms of instructor responsiveness, feedback quality and the ability of interaction to prevent isolation and support learning. It may therefore be inferred that the present interaction experience was positive but partly peer-driven, with opportunities to strengthen the pedagogical contribution of lecturer-led discussion.

The overall satisfaction finding is consistent with research showing that accessibility, usability and perceived usefulness contribute substantially to favourable evaluations of online learning. In the present study, students particularly valued learning at their own pace and accessing materials at any time. These findings align with the Technology Acceptance Model, because flexibility and convenience reduce the effort associated with accessing learning activities and enhance perceived usefulness (Davis, 1989). They are also consistent with the DeLone and McLean model, in which system quality and information access influence user satisfaction and continued use (DeLone & McLean, 2003).

The result also accords with recent nursing evidence. Alkhuzaimi et al. (2025) concluded that technology acceptance, access, instructor influence, training and organisational support shape nursing students' perceptions of LMS use. Hassan et al. (2024) likewise found that nursing students' satisfaction with blended learning was associated with academic, technological and environmental conditions. Within Nigeria, Enyoojo et al. (2024) reported that the functionality and features of online learning platforms influenced medical and health-science students' satisfaction and learning experiences. Taken together, these studies support the view that satisfaction is not a single reaction to the platform; rather, it reflects the interaction among system performance, access, instructional design and learner characteristics.

A notable finding was that learning effectiveness recorded the lowest satisfaction-domain mean. Students were less positive about updated course materials, improved understanding and academic performance than about access and convenience. This distinction is analytically important because a usable platform is not necessarily an educationally sufficient platform. The finding suggests that students appreciated the logistical value of the LMS but were less convinced that every component translated into stronger academic understanding. Similar qualitative research among nursing students has identified ineffective learning, system problems and inappropriate online assessment as important concerns despite the acknowledged benefits of e-learning (Araghian Mojarad et al., 2023).

The insignificant gender difference indicates that male and female students reported broadly comparable satisfaction. Although the male mean was numerically higher, the confidence interval included zero and the effect size was negligible. Consequently, the result should not be interpreted as evidence of a meaningful gender advantage. This finding differs from studies in which gender contributed to satisfaction or online learning experience (Enyoojo et al., 2024; Hassan et al., 2024), but the inconsistency reinforces the view that gender effects are context-dependent and may reflect differences in access, computer literacy, programme structure or support rather than gender alone.

By contrast, satisfaction differed across levels of study, with 200-Level students reporting higher satisfaction than 400- and 500-Level students. The small but meaningful effect suggests that academic progression may alter how students evaluate the LMS. Junior students may place greater value on initial access, convenience and novelty, whereas senior students may expect specialised resources, prompt feedback, advanced academic guidance and stronger integration with clinical learning. The present design did not measure expectations or course complexity; therefore, this explanation remains interpretive rather than causal. Nevertheless, the finding is compatible with evidence that academic year and environmental conditions can influence nursing students' satisfaction (Hassan et al., 2024).

The coexistence of positive interaction and only moderate ratings for learning effectiveness has practical implications. NOUN should preserve peer discussion opportunities while increasing instructor presence and the academic structure of online interaction. Discussion prompts should be linked to difficult nursing concepts, clinical scenarios and assessment tasks. Lecturers should communicate expected response times and provide detailed, actionable feedback. Course teams should also review materials routinely to ensure currency, clarity and alignment with programme outcomes.

The study further illustrates the value of applying both the DeLone and McLean model and the Technology Acceptance Model. Positive ratings for convenience and access are consistent with perceived ease of use and system quality, while the lower ratings for updated materials and learning effectiveness point to potential limitations in information quality and net benefits. The findings therefore suggest that improving satisfaction requires more than maintaining technical access; it requires high-quality content, active facilitation and services that help students convert platform use into meaningful learning.

STRENGTHS AND LIMITATIONS

The study provides programme-specific evidence from nursing students in an open and distance learning study centre and includes representation across four academic levels. The use of domain-level summaries, confidence intervals and effect sizes strengthened the interpretation beyond item percentages alone.

Nevertheless, several limitations should be considered. The cross-sectional design does not establish causal relationships or show how experiences change over time. The study was conducted at one study centre, which limits generalisability to other NOUN centres and institutions. Self-reported responses may have been affected by recall, social desirability and differences in personal expectations. The gender groups were unequal, although Welch's t-test was used to address unequal group sizes and variances. The study did not include qualitative data that could explain why senior students reported lower satisfaction.

There were also documentation limitations. The protocol and completed analysis differed with respect to the planned sample, response scale and statistical tests. Full-scale reliability coefficients, completed validation records and final ethics approval details were not available in the supplied document. Most importantly, the source report stated that the completed analytical file contained modelled responses in addition to originally observed responses. Accordingly, all numerical estimates and inferential results in this manuscript are provisional and must be re-estimated from an entirely authentic participant-level dataset before the findings can be submitted or represented as definitive empirical evidence.

CONCLUSION

Nursing students at NOUN Gusau Study Centre reported positive online interaction experiences and general satisfaction with LMS use. Peer interaction, group discussion, flexibility, convenience and anytime access were the strongest aspects of the experience. However, lecturer feedback, clarification of difficult topics, updating of course materials and perceived learning effectiveness were comparatively weaker. Satisfaction was similar for male and female students but varied by level of study, with 200-Level students reporting higher satisfaction than 400- and 500-Level students. These findings suggest that the LMS provides a valued foundation for distance nursing education, but its educational benefit would be strengthened through more active lecturer facilitation, timely feedback, current course content and level-sensitive academic support. The conclusion remains provisional pending validation of the authentic participant-level dataset and completion of the required ethics and instrument documentation.

IMPLICATIONS AND RECOMMENDATIONS

- Lecturers should moderate LMS discussions regularly, respond to questions within defined periods and provide detailed feedback on assignments.
- Discussion activities should be structured around difficult nursing concepts, case studies and clinical reasoning tasks rather than general participation alone.
- Course materials should be reviewed and updated on a defined schedule, with particular attention to advanced content required by 400- and 500-Level students.
- Periodic satisfaction assessments should be analysed by academic level so that support can be tailored to changing learning demands.
- Future studies should examine the association between online interaction and satisfaction directly using validated multi-item scales and authentic participant-level data, and should incorporate qualitative interviews to explain observed differences.

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