



E-learning in the digital era: How e-learning system quality shapes student satisfaction in public universities in Kenya

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ABSTRACT

This study examines the influence of e-learning system quality on student satisfaction in selected public universities in Kenya. Although the adoption of digital learning platforms following COVID-19 expanded in most universities, empirical evidence on the relationship between the quality of the e-learning system and student satisfaction remains underexplored. The Resource-Based View (RBV) theory and Information Systems Success (ISS) models guided the study. This paper employed a convergent parallel mixed-methods design. The study targeted 364,998 undergraduate fourth-year students, 2,031 deans, 20,771 lecturers, and 31 system administrators in six universities. A sample size of 446 participants—400 students, 20 deans, 20 lecturers, and 6 administrators—participated. The data were collected using questionnaires and interview guides and analyzed using descriptive, inferential, and thematic analysis. The findings revealed that e-learning system quality positively and significantly influences student satisfaction ($B = 0.358$, $SE = 0.043$, $\beta = 0.415$, $t = 8.394$, $p = .001$, $p < .05$, 2-tailed). This implies that a unit change in e-learning system quality is linked to a change of 0.358 units in student satisfaction. This paper recommends that universities invest in efficient assessment systems and education accessibility through digital inclusiveness in affordable data, mobile access, and offline collaborative user-friendly platforms.

Keywords: Higher Education, Online Education, Public Universities, Student Satisfaction, System Quality

I. INTRODUCTION

Digital transformation has changed the structure of higher education in a manner that would have been considered impossible to envision in the last two decades. What started as a gradual application of online platforms has, over time, become an institution-wide learning ecosystem (Mabotha & Ngcamu, 2025; Klave & Cane, 2024). The e-learning system and other online platforms have been integrated into teaching and learning delivery as opposed to being peripheral assistance (Al Mulhem, 2020). Most universities are becoming more and more accustomed to using these



systems to arrange coursework, execute administrative tasks, assessments, communication and academic collaboration in flexible and convenient formats (Huang & Wang, 2023).

The COVID-19 pandemic significantly accelerated the adoption of e-learning system in higher education. The global crisis compelled many institutions to rapidly transition to online platforms at an unprecedented pace (Zheng et al., 2021). This rapid shift implied that during a crisis, it was possible to preserve instructional continuity with the aid of digital systems (Ramakgolo, 2024). Moreover, Akpen et al. (2024) underscored that platforms such as Microsoft Teams and Google Classroom enhanced student engagement, collaboration in learning and academic performance. This was particularly through self-directed and interactive learning. Similarly, Mwaniki et al. (2020) and Gavrus et al. (2025) stated that the digital assimilation may be used to alter conventional pedagogical systems into more accommodating and student-centered systems in line with the global education agenda.

However, this noticeable substantial progress in digital learning in developed nations is uneven in the context of low-income countries. For instance, in many African states, the efficiency of the e-learning system and other digital platforms is hampered by structural constraints and weak institutions. Recurrent issues, such as a lack of access to digital gadgets, unstable internet, and insufficient technical assistance, have complicated the sustained adoption and performance of digital learning (Kibuku et al., 2020).

In Kenya, although initiatives to implement digital learning programs at the university level began as early as 2005, progress was limited due to financial constraints and inadequate infrastructure (Mwaniki et al., 2020). The demand for university education has been increasing. For instance, public university enrolment increased from about 621,231 students in 2021/22 to 680,768 in 2023/24, representing approximately 11.7% growth (Ministry of Education [MoE], 2025). This increase in enrolment puts pressure on institutions to provide digital platforms that are scalable and efficient.

The reviewed literature shows that system usability and accessibility are important dimensions of system quality that determine student interaction and value generation of e-learning platforms. Although previous studies have focused on quality of the e-learning system, there has been limited focus on how e-learning system contribute to the overall student satisfaction in the context of low-income countries. This paper conceptualizes system quality as a composite measure of usability and accessibility as its main dimensions. The study sought to examine the extent to which the integrated measure of system quality determines the student satisfaction within the Kenyan public university setting.

1.1 Statement of the Problem

Despite the government of Kenya's continuous efforts to mainstream e-learning in higher education, there has been slow adoption attributable to poor access to broadband connections and limited technical support offered to both faculty and students (Mwaniki et al., 2020). Notably, concerns about the quality of e-learning systems are becoming increasingly evident. Banu et al. (2024) underscores that in many developing nations, the adoption of digital platforms was not accompanied by a corresponding pedagogical redesign, resulting in usability and accessibility challenges. Al-Fraihat et al. (2020) also asserts that students complain about complex navigation through the e-learning system, the slowness of the system, and limited access to learning materials.

The prior studies highlight barriers in infrastructure and adoption issues, yet less effort has been applied to examine the effect of e-learning system quality on student satisfaction. Therefore, this study fills the gap by empirically investigating the relationship between e-learning system quality and student satisfaction in selected public universities in Kenya, based on accessibility and usability of the system. The study offers evidence-based knowledge that would inform institutional decision-making processes and reinforce the relevance of e-learning in achieving the national educational goals.



1.2 Research Objective

The objective of the paper is to investigate the effect of e-learning system quality on student satisfaction in the selected public universities in Kenya.

1.3 Research Questions

To what extent does the quality of e-learning system affect student satisfaction in the selected public universities in Kenya?

1.4 Research Hypotheses

To guide the empirical analysis, the study tested the following hypothesis:

H₀: There is no statistically significant relationship between the quality of e-learning system and student satisfaction in the selected public universities in Kenya.

II. LITERATURE REVIEW

2.1 Theoretical Review

The paper is grounded on the Resource-Based View (RBV) theory and the Information Systems Success (ISS) model. This combination helps to explain the role of quality of e-learning system, to determine its influence on student satisfaction in selected public universities in Kenya.

2.1.1 Resource-Based View Theory

This study is anchored on the Resource-Based View (RBV) as coined by Jay Barney in 1991. RBV views an organization's assets as both tangible (e.g., infrastructure and computer hardware); and intangible (e.g., technical expertise and institutional reputation). These strategic resources, when effectively developed and utilized, can create sustained user satisfaction. In higher education, e-learning platform functions such as usability, accessibility, compatibility with multiple devices and resilience to connectivity issues, are among the features that enable students to leverage the platform for better learning outcomes. Investments in these specific attributes can thus foster greater engagement and improved satisfaction.

2.1.2 Information Success System Model

The study was based on the Information Systems Success (ISS) model developed by DeLone and McLean in 1992. The ISS model complements the Resource-Based View (RBV) by specifying causal relationships where system quality directly predicts user satisfaction, which then leads to net benefits. High system quality reduces interaction friction, which in turn facilitates task completion and enhances perceived usefulness. These factors collectively increase satisfaction in technology-mediated learning. By focusing on usability and accessibility as core aspects of system quality, the ISS model illustrates how improving these features leads to higher interaction quality and fosters positive perceptions among users.

Therefore, the integrated framework facilitates the hypothesis that the composite system quality measure will positively and statistically significantly influence student satisfaction, and also allow post-hoc disaggregation in the event that diagnostics reveals differentiated roles of usability and accessibility.



2.2 Empirical Review

2.2.1 E-learning System Quality and Student Satisfaction

One of the key determinants of student satisfaction is the quality of e-learning platforms. The evidence published in both developed and developing environments has a relative consistency; more stable systems are indicated to have positive learning experiences. To illustrate, Nguyen (2021) demonstrates that in Vietnam, the perception of e-learning effectiveness among the students is led by system reliability and functionality, which partially contributes to an increased student engagement and a lower learning barrier. On the same note, Huang et al. (2020) adds that in the case of emergency remote learning, the stability of the system was even greater. Even more recent research, such as that conducted by Rahman et al. (2025), proves this trend, showing that platforms that are reliable and user-friendly will always result in greater involvement and satisfaction in online education. Empirical evidence has been provided by Mbiuki et al. (2026) about the ability of information quality, in regard to clarity, relevance, accuracy, and accessibility, to predict the degree of student satisfaction at public universities in Kenya. The study leaves a conceptual gap regarding the role played by system quality in facilitating or hindering student satisfaction with digital learning.

System performance failures, including downtime, intermittent internet, and support services, have been identified to have a negative influence on learning progress and system trust. This is relevant as it proves that the user experience depends on the reliability and support infrastructure to handle remote learning (Sharif Nia et al., 2023). These findings are consistent even when comparing studies, though most of the evidence is obtained in well-resourced or stable digital spaces. This creates a significant context gap when it comes to the consideration of the quality of the e-learning system in resource constrained nations like most universities in Africa. In all contexts, ease of navigation, learnability, and intuitiveness in design were used to define usability, which repeatedly justifies why students are attracted to, and continue to use e-learning platforms. The overall process is relatively consistent in the literature: easy-to-use systems in question decrease cognitive load, simplify task completion, and augment time-on-task, which eventually leads to greater levels of satisfaction. This trend is extensively reported in IS success literature and empirical research in general (Limbu & Pham, 2023). Al-Fraihat et al. (2020) also states that the usability, which is manifested in the simplicity of interaction and clarity of navigation structures, directly enhances learning satisfaction through the reduction of both technical and cognitive obstacles. Yoon et al. (2024) builds upon this perspective by demonstrating that perceived user-friendliness reinforces student engagement, which consequently leads to better outcomes for student satisfaction.

African studies are becoming more and more indicative that usability is a question of not only interface design, but also a question of contextual fit. High-bandwidth desktop-based systems do not perform well in a mobile-first, low-bandwidth environment. Under these circumstances, usability largely depends on platform congruity with the availability of devices, the language preferences, and the actual teaching processes. Such an interpretation is more structural, as reflected in the evidence in Kenya. Ali et al. (2022) indicate that when the transition to online learning was rather rapid, most institutions utilized online platforms that were not user-friendly and did not match student requirements. In addition to design challenges, Banu et al. (2024) emphasizes that low levels of digital literacy and poor instructional facilitation further diminishes the utility of otherwise functional platforms.

Accessibility is a determinant of whether students are able to meaningfully interact with e-learning platforms or not. Notably, Sharif Nia et al. (2023) and Yoon et al. (2024), emphasized that, compatibility between devices, consistent internet connectivity, and flexible system design are of importance in enhancing student satisfaction, due to their ability to guarantee continuous access to learning resources. In this regard, accessibility is not only described in terms of availability, but in terms of continuity and reliability of access under normal learning conditions. Researchers like Mwaniki et al. (2020) indicate that although numerous policies have been introduced in e-learning, access still remains a challenge due to high cost of the internet, limited information technology facilities and poor broadband connectivity are a hindrance to student participation. Even well-crafted platforms can, in this case, scarcely provide meaningful satisfaction when the platform fails to satisfy the basic access conditions.

2.2.2 Adoption of E-Learning Systems in Kenya and challenges in Implementation

The Kenyan experience with e-learning adoption reflects a persistent gap between policy ambition and practical implementation. Although universities began introducing e-learning systems as early as 2005, full integration remains unrealized. The literature consistently attributes this to a combination of financial constraints, weak digital infrastructure, and resistance to technological change (Mwaniki et al., 2020).

Further studies reinforce that technical support limitations and the high cost of digital engagement continues to affect both students and instructors (Kibuku et al., 2020). These challenges are particularly pronounced in rural and low-income settings, where access to devices and reliable internet connectivity is inconsistent. In such contexts, student satisfaction tends to be shaped less by the quality of system design and more by the availability of basic access conditions. The reviewed literature shows a clear convergence in e-learning system quality, particularly through usability and accessibility, which is consistently linked to student satisfaction. However, there is also a notable divergence in how this relationship operates across contexts. While global studies tend to emphasize design quality and system functionality, Kenyan and broader African evidence highlights the stronger role of structural and infrastructural constraints in shaping outcomes.

During the review, three key gaps became evident. First, many studies examine usability and accessibility separately rather than integrating them into a single, analytically coherent construct of system quality suitable for empirical modeling. Second, there is limited localized evidence at finer administrative or institutional levels within Kenya, where variations in infrastructure and implementation conditions are more pronounced. Third, much of the existing work remains descriptive, with fewer studies applying rigorous statistical models to examine how system quality translates into student satisfaction in real implementation settings.

This study fills these gaps by conceptualizing e-learning system quality as a composite of usability and accessibility and empirically testing its effect on student satisfaction in selected public universities in Kenya. In doing so, it moves beyond broad adoption narratives to provide context-specific, evidence-based insight into how system quality shapes learner online experiences.

III. METHODOLOGY

3.1 Research Design

The study employed a convergent parallel mixed method design because there are measurable factors and personal experiences involved with student satisfaction in e-learning systems. The quantitative approach was used for assessing relations between system quality dimensions and satisfaction level by use of quantitative data, and the qualitative approach was used for capturing students' perception, opinion and lived experiences in digital learning environments. The design helped to blend various data together to compare and combine the data to gain a better understanding of the problem. The triangulation method also helped to enhance the credibility and validity of the study as it confirmed the statistical results and complemented them with the participants' experiences and views.

3.2 Study Area

The study was carried out in six public Universities in Kenya namely University of Eldoret, Technical University of Mombasa, Dedan Kimathi University of Technology, South Eastern Kenya University, University of Nairobi and University of Jaramogi Oginga Odinga of Science and Technology. The selection of these institutions was done to bring different aspects of; ICT infrastructure, geographical context, institutional size and enrolment of students. The study was conducted with fourth-year undergraduate students, because they have received much more exposure to the e-learning system, as well as deans, teaching staff and system administrators who are engaged in the implementation and management of digital learning.



3.3 Target population

The selected public universities were six (6) universities in Kenya, including the University of Nairobi, University of Eldoret, Technical University of Mombasa, Southeastern Kenya University, Jaramogi Odinga University and Dedan Kimathi University (KNBS, 2019). The choice of these institutions reflects diversity in the Information, Communication and Technology (ICT) landscape, geographical location, student enrolment, and size. A total of 364,998 undergraduate fourth year students were targeted since they long period of experience using online programs. The study further targeted key informants for interviews consisting of 2031 deans, 20,771 teaching staff and 31 system administrators who are the custodians of digital learning and implementation.

3.4 Sample Size and Sampling

Taro Yahame formula of 1967 was used to calculate the sample size with a margin of error of (\pm) 5%, and a confidence level at 95% to ensure statistical power in the study. As illustrated; where n =No of actual respondents, N =Total population, l =constant, e =margin of error.

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{364,998}{1 + 364,998(0.05)^2}$$

$$=399.560 \sim 400 \text{ students}$$

The stratified random selection was applied to select students, and purposive sampling was applied to select key informants. The study sampled 400 undergraduates' 4th-year students, semi-structured questionnaires were administered, while 46 key informants were interviewed. The instruments, semi-structured questionnaires and interview guides, were pre-tested using 10% of the total 446 (~45 respondents) to test for validity and reliability.

3.5 Data Collection Tools and Procedures

The data were collected by administering a semi-structured questionnaire to 400 undergraduate students in the fourth year and interview guides to 46 key informants, who consisted of deans, teaching staff, and system administrators. Students were sampled using stratified random sampling and key informants were identified by purposive sampling. Pre-testing of the instruments was carried out in order to determine the validity and reliability of the instruments by taking 10% of the sample before the data collection process.

3.6 Data Analysis

To establish how system quality in e-learning environment influences student satisfaction in higher education, the data analysis answered the specific research questions. The collected data was analyzed through three-fold; the quantitative data obtained from semi-structured questionnaires analyzed descriptively through measures of central tendency-mean, standard deviation, frequency, and percentages. Further, inferential statistics through a simple regression model were employed to establish whether there exists a relationship between e-learning system quality and e-learning student satisfaction in higher education. Further, the inferential analysis tested the study hypotheses, that is, H_0 and H_1 . The null hypothesis was tested at 5% significance level. To complement the quantitative data, the qualitative data obtained from interviews were analysed through thematic analysis. The obtained results were presented in tables, figures, and narrative approaches.

The assumptions of regression analysis confirmed through normality, linearity, autocorrelation and multicollinearity were satisfied. The inferential analysis of the obtained data was conducted through simple linear regression using SPSS version 25 to test the null hypothesis of the study. Descriptive statistics included frequency, percentages, means, and standard deviations. Further, thematic coding was reviewed on qualitative interview transcripts



to identify common themes and patterns derived from qualitative data. The triangulation of primary data with secondary data was used to improve the data validity and explanatory depth.

In the context of regression analysis, a diagnostic test was employed to accurately assess whether a specific parametric assumption outcome is present or absent, as determined by a defined reference standard (Islam, 2020). Further, the regression assumption was established through a normality test, where histogram findings showed a bell-shaped curve, and it supported the data on the assumptions of normal distribution. Further, this study verified that the assumptions of linearity on the independent and dependent variables are satisfied, as evidenced by the best fit in a straight line through the standard P-P plot.

The test of autocorrelation was determined based on the Durbin-Watson statistic of 1.827, which showed that there was no autocorrelation of the residuals as the value was within the range of 1.5 to 2.5. Also, the multicollinearity test was assessed via Tolerance and Variance Inflation Factor (VIF) values. The VIF values below 5 mean that there is little multicollinearity, whereas values between 5 and 10 can be a cause of concern. The values of tolerance and VIF in this analysis are all less than the acceptable levels, which is an indication that there was no multicollinearity. In addition, the homoscedasticity test was used to test whether there would be a similar variance between the data points around the regression line, whose results were found to be a good fit and reliable through a scatter plot. These results implied a good fit and reliable outcome in the dataset.

Further, reliability and validity for research instruments were computed. For questionnaires, the reliability test was assessed using the Cronbach alpha value; the threshold was set at 0.7. and above. In this case, e-learning system quality (No. of item, 5, $\alpha = 0.779$) and e-learning student satisfaction level (No. of item, 3, $\alpha = 0.700$), all the construct variables demonstrated highly reliable scores. For interviews, the content validity was tested through university expert judgment. While construct validity underwent statistical testing using exploratory factor analysis, the threshold was achieved at 0.5.

3.7 Ethical Considerations

The ethics approval was obtained from regulatory bodies in Kenya, the research permit was approved by the university review ethical board, and a research license was obtained, NACOSTI/P/24/36457 prior to data collection. Authority to collect data was sought from all the selected universities and consent were secured from all the respondents. Voluntary participation and confidentiality were adhered to. The subject and data protection were strictly observed, and the obtained data were only used for scholarly purposes and in accordance with research guidelines. The plagiarism and AI detection were assessed in adherence to research integrity.

IV. FINDINGS & DISCUSSION

4.1 Recruitment and Response Rates

The study administered 446 instruments within the selected public universities in Kenya, comprising 400 semi-structured questionnaires filled by students and 46 semi-structured interviews that were conducted with key informants (20 deans, 20 lecturers and 6 system administrators) (See Table 1).

Table 1

Recruitment and Response Rate

Respondent Category	Instrument Type	Administered Instruments	Dully Returned	Returned Rate	Non-Returned
Students	Questionnaires	400	340	85%	15%
Key Informants	Interviews	46	40	87%	13%
Total		446	380	86%	14%

Source: Researcher, 2025



Out of the student questionnaires, 340 questionnaires were returned, yielding a response rate of 85%. Similarly, 40 out of 46 key interviews were conducted, marking a response rate of 87%, which resulted in an average response rate of 86% from the students and the key informants. The non-response rate of 14% was linked to time limitations among the academic faculty’s duties and responsibilities. A response rate of more than 50% is often regarded as sufficient in survey research, and above 70% is considered statistically strong, which is less likely to have non-response bias as noted by Wu et al. (2022).

4.2 Digital Platforms and Tools used for E-learning in the Selected Public Universities

The quantitative data revealed that various digital platforms and tools such as KENET, Google Classroom, Microsoft Teams, Mtihani, and Google Meet, are utilized in the selected public universities in Kenya (see Table 2).

Table 2

Online Systems/Platforms used in the Sampled public Universities

Model System	Frequency	Percentage (%)
KENET	77	22.53%
Google Classroom	41	12.09%
Microsoft Teams	39	11.54%
Mtihanani	24	7.14%
Google Meet	22	6.59%
Odel	19	5.49%
Computer-Based Systems	15	4.40%
SOMAS	13	3.85%
E-Class	13	3.85%
MyLoft	7	2.20%
Moodle	7	2.20%
Zoom	7	2.20%
Register	6	1.65%

Source: Researcher, 2025

The findings reveal that KENET was most utilized with 22.53%, followed by Google Classroom with 12.09% and Microsoft Teams with 11.54%, implying that universities have been using a mix of national infrastructure and commercial solutions to aid in the delivery of e-learning. Key informants' insights support these findings through qualitative evidence. The institutional adoption of ICT-enabled learning systems was confirmed by key informants with the following statements:

“The universities had included ICT in their learning programs and used the KENET system. The universities utilized eLearning management systems and online platforms such as Zoom to deliver lectures” (Dean, interview on 4th February, 2025).

This view supports the quantitative findings among students by demonstrating the active nature of the identified platforms to be incorporated into teaching and learning activities at institutions.

Notably, qualitative findings reveal that functional aspects of these digital platforms play a role in determining student satisfaction outcomes in higher education.

“Digital equity and institutional adaptation are directly connected to the outcomes of e-learning student satisfaction.” (Dean, interview on 24th January, 2025).

The current findings highlight that an intuitive, user-friendly platform is of necessity to student satisfaction as it reduces cognitive load and generates engagement as highlighted by Benkhalfallah et al. (2024). The findings concurred with Qazi et al. (2021), who asserted that a user-friendly interface made a significant difference in the adoption and use of e-learning system quality in institutions of higher learning, which boosted the overall user experience and satisfaction.



4.3 E-Learning system quality and E-learning Student Satisfaction

The study sought to find out how e-learning system quality influenced e-learning student satisfaction. The study further evaluated students' opinions of the quality of the e-learning system and its correlation with student satisfaction, using a 5-point Likert scale from strongly disagree (1) to strongly agree (5). The findings provide insight into how students perceive the system's accessibility, usability, and engagement (See Table 3).

Table 3

Descriptive Statistics for E-Learning System Quality

Rate statement on e-learning system quality	SD	D	N	A	SA	M	SD	
e-learning platform is easy to use	19 (5.6%)	33 (9.7%)	85 (16.2%)	130 (38.2%)	103 (30.3%)	3.80	1.13	
e-learning platform is interactive	33 (9.7%)	53 (15.6%)	79 (23.2%)	120 (35.3%)	55 (16.2%)	3.32	1.34	
Examination platform is effective	46 (13.5%)	47 (13.8%)	73 (21.5%)	115 (33.8%)	59 (17.4%)	3.25	1.30	
Registration of courses is user-friendly	18 (5.3%)	23 (6.8%)	48 (14.1%)	131 (38.5%)	120 (35.3%)	3.90	1.12	
Examination results are easily accessible	64 (18.8%)	49 (14.4%)	40 (11.8%)	99 (29.1%)	88 (25.9%)	3.25	1.46	
Valid N							340	

Source: Researcher, 2025

As presented in Table 3, most students perceived the e-learning platform as easy to use, with 68.5% (A = 38.2%, SA = 30.3%) agreeing or strongly agreeing (M = 3.80, SD = 1.13). This shows that the system's design and navigation were intuitive, which increased student satisfaction. Ease of use is a major predictor of adoption, since past research shows that when platforms are simple to use, learners are more likely to endure and actively participate in online learning. The platform's interactivity received mixed reactions; while 51.5% of students agreed that the platform is participatory, a significant 25.3% disagreed (M = 3.32; SD = 1.34). This shows that while certain interactive elements may be there (such as discussion boards or chat options) they may still not match student expectations. In online learning literature, interactivity is intricately linked to learner engagement and perceived quality of the educational experience; thus, these findings suggest an area requiring system enhancement.

The results mirror Encarnacion et al., (2021), who emphasized the applicability of interactive learning elements to maintain student engagement and academic success. Similar results were observed by Kibuku et al. (2020) in the Kenyan universities, where e-learning platforms do not often offer sufficient interactive tools and do not meet the expectations of the students for academic assessment, impacting negatively the quality of the learning process.

The examination platform was rated moderately (M = 3.25, SD = 1.30). About half (51.2%) agreed or strongly agreed that it was effective, while 27.3% disagreed. This implies that although functional, the examination component of the platform may suffer from glitches, limited flexibility, or perceptions of inequity in assessment. Given that fair and seamless assessment is central to credibility, improvements in this area would directly influence satisfaction and trust in the system. In terms of course registration, students reported the highest satisfaction (M = 3.90, SD = 1.12, with three-quarters (73.8%) agreeing or strongly agreeing that it was user-friendly. This finding highlights that robust system efficiency in administrative processes reduces barriers to access and supports continuity in the learning cycle. The accessibility of examination results emerged as a weaker area (M = 3.25, SD = 1.46). While 55% of students reported ease of access, nearly one-third (33.2%) disagreed. The higher standard deviation also reflects greater variability in student experiences. This inconsistency can undermine perceptions of fairness, transparency, and overall satisfaction with the e-learning system.

The findings revealed an e-learning system that performs optimally in usability and accessibility efficiency. However, it shows gaps in interactivity, assessment effectiveness, and result accessibility. From a student satisfaction



perspective, these mixed perceptions suggest that while the e-learning platform enables access and continuity, it falls short in fostering deep engagement and confidence in evaluation processes.

4.4 Student Perceptions of e-Learning System Quality and its Influence on Student Satisfaction

The study sought student perceptions on whether e-learning system quality influences student satisfaction at selected public universities. The results indicated that most students (70.2%) perceived the quality of the e-learning system as a good enhancer of student satisfaction in higher education. However, 29.8% of students disagreed with the perception. The findings indicated that most students felt that e-learning system quality had a positive influence on e-learning student satisfaction, emphasizing the significance of e-learning system quality in online education at public universities. For instance, students stated that having unlimited access to the e-learning platform increased their learning experience, whereas limited access severely impacted their academic engagement and progression.

The qualitative results from students and the university staff present a balanced view on the effects of e-learning system quality on student satisfaction, which supports the quantitative results that demonstrated a positive correlation between system quality and satisfaction. From the perspective of the staff (deans, system administrators, and lecturers), enhancement of system infrastructure is at the center of defining user experience. One of the lecturers commented:

“The quality of the e-learning system affects the satisfaction of the students. To increase student satisfaction, the university has increased the capacity of the e-learning system server and invested in the availability of internet and power, thereby reducing the downtime.” (Lecturer, interviewed on 20th January 2025).

This perspective is consistent with the experiences of students who relate system reliability with enhanced engagement and satisfaction. Nevertheless, university staff reported that the structural limitations that curtail efficient system utilization among students can be used to rationalize differences seen in student reactions. The biggest problem that inhibited satisfaction, as one of the informants mentioned, was

“Poor connection, particularly to students in far parts of the country, since most students were in and out when participating in lectures.” (Lecturer, interviewed on 20th January 2025).

Further, some mentioned that:

“Weak institutional support in the form of internet connectivity, where staff reported that a poor Wi-Fi connection and high data charges limited regular connectivity, and other issues like power blackouts, low levels of digital literacy, and device accessibility.” (System administrator, interviewed on 15th January 2025).

These perspectives explain the rationale behind some student claims with regard to challenges in accessing or making full use of e-learning platforms. The experience of students reflects these observations and demonstrates how the quality of the systems is manifested at the user level. Many students reported that:

“Having unlimited access to e-learning tools positively influences the learning process and experience, whereas having limited access had a negative impact on their academic activity and development.” (Interviewed on 20th January, 2025).

Another female student noted that:

“The e-learning system should be available at any time to accommodate flexible study, but it is not reliable, and thus, it is difficult to access the study materials as and when required” (RESP001 on 20th January, 2025).

On the same note, access to learning materials came out as one of the primary contributors to satisfaction, and one respondent stated:

“Students can easily access learning materials, which makes studying easier, but some significant lecture notes and materials are not available, and students have to seek them elsewhere” (RESP024 on 20th January, 2025).



There was also an element of communication and interaction among students. Although students enjoyed the possibility of interaction, some said that they did not have enough interaction with instructors. As one of the students remarked,

“The system needs more communication channels so that we can interact with lecturers” (RESP214 on 20th January, 2025).

Another male student one reported that:

“There is no direct communication with lecturers; it is difficult to ask questions or get feedback” (RESP216 on 20th January, 2025).

These reports aligned with the complaints from the staff about the high number of students in a classroom and the restrictions from the platform that limit the process of interaction and feedback. Another dimension of the quality of e-learning systems was found to be flexibility. Some students appreciated the fact that they were able to obtain learning content remotely and study at their convenience. One of the respondents said:

“The e-learning system enables students to learn at any time, and learning is more flexible; however, at times, the system goes down when the student requires it the most, and this hinders student learning” (RESP015, 20th January 2025).

This is indicative of the benefits of online educational systems as well as the constraints created by system instability and infrastructure issues. Overall, the aggregation of students and university staff findings indicate that the quality of e-learning systems has a positive impact on student satisfaction. However, the effectiveness of this tool is determined by the interdependence of factors such as system reliability, accessibility, infrastructure, communication capabilities, and extrinsic factors such as connectivity, cost of data, and access to power. These insights help to explain the effectiveness of e-learning systems as a joint product of institutional capabilities and experiences at the student level.

4.5 Relationship between E-learning System Quality and E-learning Student Satisfaction

Table 4

Model Summary for the Relationship between E-learning System Quality and Student Satisfaction

Model	R	R ²	Adjusted R ²	Std. Error of the Estimate
1	.415	.173	.170	.71675

Note: Predictor: E-learning system quality. Dependent variable: Student satisfaction.

The regression analysis showed a moderate positive correlation between the e-learning system quality and student satisfaction with the selected public universities in Kenya, $r = .415$. The results also revealed that student satisfaction ($R^2 = .173$) explained 17.3% of the variation in the quality of e-learning system. This implies that, while the quality of the systems is an important determinant of students' satisfaction, the remaining factors in the model also explain a considerable amount of the variance in students' satisfaction. The adjusted coefficient of determination (Adjusted $R^2 = .170$) was close to the R^2 value, suggesting that the model was not overfitting. Further, the standard error of the estimate (.71675) indicated the average difference between actual and predicted satisfaction scores, suggesting that there are additional contextual and institutional factors besides system quality that affect satisfaction scores.

4.6 ANOVA of e-learning System Quality and Student Satisfaction

The significance of the linear regression model was investigated using the analysis of variance (ANOVA), which was used to analyse how the quality of the e-learning system influences the level of satisfaction experienced by students in public universities (see Table 5).



Table 5
ANOVA Results of E-learning System Quality on Student Satisfaction

Model		Sum of Squares	df	MS	F	Sig.
1	Regression	36.201	1	36.201	70.467	.000b
	Residual	173.641	339	.514		
	Total	209.843	340			

Note: Dependent Variable: e-learning student satisfaction, Predictors: Constant, e-learning system quality, df=degree of freedom, MS=Mean Square, F=F-statistics, Sig.=level of significance

The F-statistic shown by $F(1, 339) = 70.467$ and a p-value of .000 ($P = .001$) which is less than 0.5 2-tailed, indicated that the overall model was statistically significant. This significance suggests that there exists a meaningful and non-random association between the independent variable (e-learning system quality) and the dependent variable (e-learning student satisfaction) in public universities.

The statistical findings showed that the regression model effectively predicted the observed data, supporting the hypothesis that enhanced e-learning system quality will lead to greater e-learning student satisfaction. The regression sum of squares (36.201) indicated the percentage of variance in e-learning student satisfaction that can be explained by the e-learning system's quality. On the other hand, the residual sum of squares (173.641) revealed the portion of the variance that the model could not explain, an indication that this study contained other factors influencing e-learning student satisfaction. In the regression model, the coefficient findings indicated a link between the quality of the e-learning system and the level of student satisfaction. The regression coefficient findings are displayed in Table 6.

Table 6
Regression Coefficients Predicting E-Learning Student Satisfaction

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant	2.756	.155		17.792	.000
	e-learning system quality	.358	.043	.415	8.394	.000

Note: Dependent Variable: E-Learning Student Satisfaction

The findings in Table 6 demonstrate that the quality of the e-learning system positively and significantly influences the satisfaction of students ($B = 0.358$, $SE = 0.043$, $\beta = 0.415$, $t = 8.394$, $p = .001$, $p < .05$, 2-tailed). This implies that a unit change in e-learning system quality is linked to a unit change of 0.358 units in student satisfaction, other things held constant. Standardized coefficient ($\beta = 0.415$) in terms of effect size represents a moderate positive influence of quality of system on student satisfaction. This indicates that increases in the quality of the system are significantly related to the higher levels of satisfaction, and the effect is not substantial to suggest that system quality is the only factor that determines the student experience. The findings suggest that an improvement in e-learning system quality shows a positive relationship with e-learning student satisfaction levels among students, however other factors play a role.

The present findings on regression coefficients corresponds to prior studies, for instance, Uppal et al. (2018), who found the quality of the e-learning system as one of the most important factors of student satisfaction in online learning processes. Similarly, the current findings are supported by the work of Qazi et al., (2021) and Banu et al., (2024), which revealed that the e-learning system quality is key to the development of positive outcomes among students. This paper confirms that the quality of interactive aspects of digital system and performance of online platform are all essential in the improvement of satisfaction among students using e-learning systems.

Table 7*Hypothesis Testing*

Hypothesis	Statement	Decision
H ₀	There is no statistically significant relationship between e-learning system quality and student satisfaction in selected public universities in Kenya.	Rejected ($\beta = 0.415$, $t = 8.394$, $p = .001$, $P < .05$)
H ₁	There exists a statistically significant relationship between e-learning system quality and student satisfaction in selected public universities in Kenya.	Accepted

Note: The hypothesis was tested at $\alpha=0.05$ (2-Tailed)

4.7 Thematic Analysis of e-learning System Quality and E-learning Student Satisfaction

The study revealed that several key factors shape student satisfaction with regard to e-learning system quality. The analysis identified major themes, along with their definitions and the frequency of related student responses. The student responses are summarized in Table 8.

Table 8*Ways E-learning System Quality Influence e-learning Student Satisfaction*

Theme	Definition	Frequency (n)	Percentage (%)
Accessibility	Ease of access, availability, and system usability	142	41.70%
Learning Resources	Availability and quality of study materials	86	25.20%
Communication	Interaction, feedback, and support mechanisms	80	23.50%
Flexibility	Ability to access and use the system anytime, anywhere	35	10.40%
Assessment & Grading	Fairness, reliability, and effectiveness of online assessments	15	4.30%
System Efficiency	Performance, responsiveness, and reliability of the system	12	3.50%

Note: Students identified multiple themes, with percentages <100%

From Table 8, the central theme for students was accessibility, with 142 out of 340 students (41.7%) pointing out that it fundamentally affects their online learning process. The results showed students' ratings of system usability were mostly positive, and this was also echoed by a dean who said,

“The chance to access the platform freely facilitate the learning experience and engagement, but limited access has a detrimental impact on academic engagement and progress.” (Dean, interviewed on 20th January, 2025).

This is consistent with the quantitative trends indicated in the mean scores, with greater usability and accessibility, a sign that the key determinant of satisfaction is regular access to the system. These results show that the differences in the perceived system quality are also strongly related to the differences in the outcomes of satisfaction. Specifically, the aspects of accessibility and usability seem to be at the centre of user satisfaction among learners, lecturers and institutional administrators.

Furthermore, qualitative data provided by the university staff explains certain aspects of the performance of the system based on the quantitative results. Lecturers also emphasized that

“The e-learning system must be easy to use and enable easy accessibility of material even on gadgets that have low specifications.” (Lecturer, interviewed on 12th February, 2025).

On the other hand, a lecturer cited constraints in structure that hinder interaction, pointing out that

“Large cohorts of students enrolling in online learning platforms result in ineffective student-lecturer interaction” (Lecturer, interviewed on 20th January 2025).

The lecturer highlighted that the Zoom platform, which many universities are currently enrolling students on, has limitations on the number of students that can be enrolled. These perspectives explain the low ratings for system



interactivity among students, which means that the quality of interaction between students and instructors is affected by technical restraints and platform constraints.

On learning management systems, the deans and lecturers observed that developing a unique LMS specific to the university’s needs is expensive and recommended that some universities opt for open-source platforms such as Moodle, and tailor them to their specific needs. Additionally, management of examinations through the LMS remains a challenge due to the lack of software for management of assessments, which is equally expensive. There is also a lack of plagiarism software to detect cheating during assessment. The findings on e-learning system quality support the fundamental elements of DeLone and McLean's Information System Success Model, which suggests that system usability, reliability, and effectiveness influence user satisfaction.

The thematic analysis reveals the significance of the system reliability and the quality of navigation are aligned with the previous results by Hasani et al. (2020). Additionally, Zheng et al. (2021) states that the satisfaction among students with e-learning can also be determined by whether students have access to reliable internet, in addition to the quality of the platform. This points to the multi-dimensional aspect of e-learning satisfaction; the quality of the system is not enough to ensure a positive experience.

In addition, the qualitative open-ended responses were coded in a thematic analysis on students, lecturers, deans and administrators. Key dimensions of system quality and learning experience were formed, operationalized as a composite construct that represents accessibility and usability. All the responses were then determined as either satisfactory, unsatisfactory, or mixed in terms of satisfaction. The coded data was keyed into SPSS Statistics and a Chi-square test of association was used to explore how the quality of the system dimensions relates to the overall satisfaction with the online learning experience. The chi-square of association was conducted to support the qualitative insights see Table 9.

Table 9

Chi-Square Tests of Association between System Quality and Student Satisfaction

Variable	χ^2	df	p-value	Cramér's V	Effect Size Interpretation
System Quality Vs. Student Satisfaction	78.40	14	0.023	0.49	Moderate effect size

Note: χ^2 =Chi-Square Tests, P=Significance level, DF-degree of freedom, V= Cramér

The findings showed that there was a statistically significant association between the system quality and student satisfaction, as denoted by $\chi^2 (14) = 78.40, p = .023, p < .05, 2$ -tailed. The effect size, $V = 0.49$, indicated that there is a moderate to high association. These results support the qualitative data that accessibility and usability perceptions are strongly associated with student satisfaction outcomes, and favourable assessment with convenience and resource accessibility and unfavourable assessment with interaction restrictions and technical difficulties. This evidence shows that the differences in perceived system quality are strongly linked with the differences in satisfaction outcomes. Specifically, the aspects of accessibility and usability seem to be key factors in determining user satisfaction by learners, lecturers, and institutional administrators’ perspectives. The qualitative results drawn from deans, lecturers, and administrators further confirm that digital equity and institutional adaptation are essential in maintaining student satisfaction and institutional-level outcomes that are both more broad-based, including engagement and graduation in public universities.



4.8 Integration of Findings

The integration of quantitative and qualitative results provides a solid explanation into how e-learning system quality affects student satisfaction in the e-learning experience in selected public universities in Kenya. For instance, quantitative analysis demonstrate that the quality of the e-learning system positively and significantly influences the satisfaction of students ($B = 0.358$, $SE = 0.043$, $\beta = 0.415$, $t = 8.394$, $p = .001$, $P < .05$, 2-tailed). This indicates that an increase in the usability and accessibility of the system is connected with higher levels of student satisfaction among students. These quantitative data is in tandem with qualitative data, in which university staff identified the advancement of system infrastructure, such as more server capacity and less downtime, as a major factor in improving user experience.

However, quantitative results are enhanced by qualitative results, which show that system quality has an impact that is mediated by contextual constraints. The key informants highlight challenges like a lack of internet connectivity, expensive data, power, and device restrictions, that hinder the capacity of students to effectively use e-learning platforms. This is one of the reasons why the quality of systems only explains a part of the variance in student satisfaction. While quantitative results reveal the overall positive attitude towards the usability and functionality of the system, the qualitative insights reveal the differences in access and experience, especially among the students in remote or resource-limited environments. This divergence implies that survey data, when aggregated, can conceal significant disparities in digital educational experiences.

Collectively, the integrated results suggest that the quality of the e-learning system is a major factor that determines student satisfaction, but its effect depends on the wider infrastructural and socio-economic factors that define the real learning process of students. This implies that to enhance student satisfaction, it is necessary to incorporate digital systems in supportive access models, such as quality connectivity, cost-effectiveness and user capacity.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

This paper investigates the effect of e-learning system quality on student satisfaction in selected public universities in Kenya. The results conclude that the most widely used digital platforms in the delivery of online learning include: KENET, Google Classroom, Microsoft Teams and Google Meet. The high usage of KENET (22%) underscores that for students, the quality of a system is about connectivity. In Kenya, since internet data is expensive, students use KENET-supported platforms due to the discounted cost of data, making it a lifeline that makes online learning possible. From the findings, the usage of Google Classroom at (12.09%) compared to other platforms suggests that students choose simplicity. For the students, a high-quality system is simply one that makes life easier, not harder. In this regard, universities should invest in system usability and mobile accessibility.

From the findings, the e-learning system quality within Kenyan higher education institutions has been utilized in enhancing administrative processes, especially course registration and system navigation, which are critical components in higher education. Nevertheless, some issues on the quality of system interaction, the reliability of the assessment process, processing results, and accessibility to the platforms are of great concern. The findings indicate that students appreciate user-friendliness and reliable systems. Accessibility, especially unlimited access, proved to be one of the factors that contributed to user satisfaction and long-term academic engagement in the e-learning experience.

Inferential statistics revealed a moderate positive correlation ($r = 0.415$) between the quality of the e-learning system and student satisfaction in the e-learning experience. This verified that the development of the quality of the e-learning system directly correlates to the level of student satisfaction, though the quality of the e-learning system only explains 17.3% of the variance in satisfaction levels, which is less than full coverage of the variance in satisfaction.

Therefore, in this paper, the null hypothesis (H_0) was rejected in favor of the alternative (H_1), which stated that there is a statistically significant relationship between e-learning system quality and e-learning student satisfaction in the selected public universities in Kenya. By accepting the alternative hypothesis (H_1), the paper supports the explanation driven from resource-based view (RBV) theory that the institutional resources accessibility and usability lead to greater user satisfaction. Similarly, the ISS model places system quality as the key determinant of user satisfaction, which leads to an increase in student satisfaction.

5.2 Recommendations

The effectiveness of e-learning systems by universities can be improved by upgrading the server infrastructure, ensuring stable internet connection and optimizing digital resources like media files compression within the existing systems. Online assessment procedures should also be reinforced in institutions through the establishment of clear and transparent assessment criteria, timely feedback, efficient processing of results and easy access to academic results. Furthermore, universities should focus on user-centred e-learning platforms, which are intuitive, mobile, accessible and user-friendly. This improvement would contribute to the betterment of learning experiences for students, their satisfaction, and the effective implementation of digital learning systems in higher education institutions.

Declaration of Interest

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