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E-Learning Information Quality and Student Satisfaction in Kenyan Public Universities: A Mixed-Methods Investigation

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Abstract. Public universities have increasingly embraced e-learning following the shift to remote learning during the COVID-19 pandemic. While digital platforms have expanded access to teaching and learning, empirical evidence on the relationship between e-learning quality and student satisfaction in universities remains limited. This paper's objective was to establish the influence of e-learning information quality on student satisfaction in six public universities in Kenya. This paper sought to answer the following question: Does the quality of e-learning information influence student satisfaction? This study applied a mixed-methods research design – anchored in the Resource-Based View theory integrated with DeLone and McLean's Information System Success Model – to assess how information quality influences student satisfaction. A total of 446 respondents, consisting of 400 fourth-year students and 46 key informants, were selected using stratified random and purposive sampling. Data were collected using questionnaires and interview guides. Descriptive and inferential statistics were used to analyse quantitative data, using SPSS v. 25. Thematic analysis was applied to analyse qualitative data. The results reveal a strong positive correlation between e-learning information quality and e-learning student satisfaction ($r = 0.656$, $p < .05$). The study concluded that there is a statistical relationship between e-learning information quality and students' satisfaction. Moreover, multidimensional institutional strategies, including adequate learning resources, clear instructions, proper communication, and timely feedback, influence the effectiveness of the e-learning experience. The results suggest the importance of sound information quality systems and student-centred pedagogical approaches, such as self-paced and interactive learning, to enhance student satisfaction and facilitate scalable and high-impact e-learning models.

Keywords: information quality; information system success model; mixed methods; online learning; student satisfaction

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1. Introduction

Access to high-quality education is widely recognised as a critical driver of social and economic development, contributing to individual advancement and broader societal well-being. The United Nations, through Sustainable Development Goal 4 (SDG 4), emphasises the right to inclusive and equitable quality education for all, irrespective of background or circumstance (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2024).

Global higher education systems are experiencing a demand never witnessed before. Global enrolment in higher education in 1970 was 32.5 million, and in 2020, it reached 178 million – a significant growth in access to higher education (United Nations High Commissioner for Human Rights, 2022). This has been expanded by international efforts to make education universal, contributing to closing educational access gaps, notwithstanding the persistence of challenges to quality.

In sub-Saharan Africa, the rise in enrolment in higher education has mostly been caused by high population growth, especially youth population growth, which has overwhelmingly strained education systems. For example, in Kenya, the number of universities has increased from one in 1963 to over 60 in 2022, and student enrolment has increased dramatically, moving from 251,196 in 2013 to 530,000 by 2022 (Kenya National Bureau of Statistics, 2023). Nonetheless, this growth has put pressure on the available resources for higher education, necessitating a concern about the quality of educational delivery in most universities, particularly in the public sector. According to the World Bank, UNESCO and United Nations Children's Fund (2022), insufficient funding of education is one of the most obvious causes of its decline, especially in systems that are rapidly growing.

The introduction of e-learning in higher education is a considerable breakthrough in the process of meeting the growing demand for education. E-learning as a delivery method is highly flexible, scalable, and accessible through high-quality education outside the classroom (Alkabaa, 2022; Bakkar & Ziden, 2023). In the developed world, including the United States, the United Kingdom, and Australia, e-learning has been effectively implemented in the education system, leading to the enhancement of accessibility, quality, and accuracy of learning content (Wang et al., 2021). These countries have also hugely invested in digital infrastructure and pedagogy models; in addition to making digital learning resources accessible, this enables them to increase the level of engagement and academic achievement of students.

Conversely, most developing nations, especially in sub-Saharan Africa, started integrating e-learning only in response to the COVID-19 pandemic. The immediate transition to distance learning highlighted the huge differences in quality of content and access to technology, which has remained an issue since then. According to the report by UNESCO (2022), these challenges – including outdated content, instructors with limited experience in online pedagogy, and student dissatisfaction – are still being experienced by these nations. For example, in Kenya, although e-learning is becoming popular, students still experience

dissatisfaction with the poor design of learning content, the lack of learning material, and poor delivery of courses (Mboga, 2024).

A study by Dangaiso et al. (2022) reveals the importance of service quality in terms of information and digital platforms as key determinants of student satisfaction with the e-learning environment. Similarly, information quality, as identified in the DeLone and McLean Information System Success Model (2003), is a key factor in system adoption and user satisfaction. The key dimensions of information quality, including accuracy of content, relevance, clarity, and timeliness, shape students' overall satisfaction.

Although several studies have been conducted on e-learning in developed nations, a significant gap remains in empirical research to investigate the effects of information quality on student satisfaction within the African context, particularly in Kenya. Therefore, this study aimed to investigate the relationship between information quality and student satisfaction in e-learning contexts in selected public universities in Kenya: Technical University of Mombasa, the University of Nairobi, the University of Eldoret, the Southeastern Kenya University, the Jaramogi Oginga Odinga University of Science and Technology and the Dedan Kimathi University of Technology.

1.1 Problem Statement

The relevance, adequacy, and clarity of digital content and usability of e-learning platforms in public universities remains a critical challenge in public universities in Kenya. The government of Kenya, through the Commission of University Education (CUE) and Open, Distance and E-Learning (ODEL), has established e-learning frameworks and relevant quality standards. As a result of these frameworks and the onset of COVID-19, universities in Kenya embraced e-learning as a mode of delivery to address the need for flexible and inclusive learning.

It has been noted that the quality of content, its accessibility, and the design of the platform play a central role in shaping the learning experience of students (Alotaibi & Alshahrani, 2022; Magd et al., 2024). However, despite the introduction of e-learning as a mode of delivery to make access to university education flexible and inclusive, the current situation in Kenyan higher education is characterised by a remarkable gap at the empirical level, in the connection between the quality of information and the level of student satisfaction in an e-learning setting.

The absence of such empirical evidence calls for urgent attention to establish the linkage between the quality of information and students' satisfaction. Without such evidence, universities may heavily invest in digital platforms that fail to meet students' learning needs, potentially undermining the effectiveness of learning initiatives. This paper aims to generate evidence, inform policy, and enhance e-learning and better education in Kenya.

1.2 Research Objectives

The main objective of this paper is to establish the impact of e-learning information quality on student satisfaction in Kenyan public universities.
The specific objectives include:

- To assess how the adequacy of instructional materials influences e-learning student satisfaction.
- To evaluate how clarity of language in digital content influences e-learning student satisfaction.
- To determine how the design clarity of e-learning content influences e-learning student satisfaction.
- To examine the influence of the relevance of e-learning content on student satisfaction in the selected public universities in Kenya.

1.3 Research Questions

The study was guided by the following research questions:

- What is the effect of the adequacy of instructional materials on student satisfaction?
- How does clarity of language in digital content influence student satisfaction?
- How does the design clarity of e-learning content influence student satisfaction?
- How does the relevance of e-learning content influence students' satisfaction in selected public universities in Kenya?

1.4 Research Hypotheses

H_{01}: There is no significant relationship between information quality and e-learning student satisfaction in selected public universities in Kenya.

H_{a1}: There is a positive and statistically significant relationship between information quality and e-learning student satisfaction in selected public universities in Kenya.

1.5 Limitations of the Study

The limitations of the research included the busy schedules of the key informants, which led to frequent rescheduling of interview appointments, necessitating an extended timeframe for the collection of data. The other limitation encountered was getting students to fill out the questionnaires due to their busy academic schedule. To counter this, the researchers worked very closely with the class representatives, who facilitated reaching out to the students.

2. Literature Review

This section focuses on how the four dimensions of e-learning information quality, that is, adequacy of instructional materials, clarity of language, design clarity of e-learning content and the relevance of e-learning content, impact student satisfaction in the selected public universities in Kenya.

2.1 The Relevance and Adequacy of Instructional Material and Student Satisfaction

The relevance and adequacy of instructional materials have been cited as central predictors of student satisfaction in e-learning environments. The relevance of information is how much the instructional material of e-learning tools relates to students' learning needs and objectives; that is, whether information is useful to students. Relevant information is needed to keep students motivated. Cheng (2020) states that it is vital to have organised and connected material to increase the satisfaction of students when e-learning.

A study by Li and Chen (2025), which modelled student satisfaction in online learning using multidimensional data using a mixed method, established that well-organised multimedia content, interactive learning modules and digital lecture notes lead to students' satisfaction. Almomani et al. (2025) also used a quantitative cross-sectional survey design to examine the relationship between teaching quality dimensions and student satisfaction in higher education. This paper established that instructional content quality significantly shapes students' perceptions of the overall quality of e-learning systems, especially when learners interact with digital materials during online classes.

The fundamental aspects of information quality are reliability and accuracy in an e-learning environment. For instance, relevant information would offer all learners the exact information as their studies advances. Alzahrani (2020), DeLone and McLean (2016), and Pang (2021) present strong arguments to claim that the accuracy of information has been a decisive issue in student satisfaction in e-learning settings, presenting a consistently high and positive correlation between the two concepts. These studies established that students have more chances of relying on and engaging in e-learning systems when they believe the information is credible. The correct information also reduces the chances of misunderstanding and misperception, thus facilitating the learning process.

Similarly, the cognitive load of students is minimised, since they do not need to focus their attention on comprehending the meaning of what they are reading, as the information is understandable and simplified. In addition, timeliness is essential for delivering up-to-date information, so any course or programme creator must be aware of what is happening in the fast-changing sector of learning. As Cheng et al. (2023) argue, the satisfaction of students is ensured by the accessibility of timely information.

Shikokoti et al. (2025) also established that the use of AI to summarise content and clarify concepts enables students to gain faster access to information and have a clearer understanding of course materials. Matere and Oranga (2025) further emphasised the need for students to embrace technology enhanced learning platforms in order to improve access to up-to-date learning resources. To keep students interested and excited in the studying process, they should be able to access relevant and current information. As a result, timely information will provide students with sufficient opportunities to face real-life challenges and improve their educational and professional opportunities.

2.2 Language in Digital Content and Student Satisfaction

Sari et al. (2023) and Li et al. (2025) argue that poorly designed, inadequate instructional materials lead to students' confusion, limit engagement with the materials and cause cognitive overload, consequently lowering students' satisfaction with online learning platforms. These studies have established that the adequacy of online instructional materials is a predictor of students' learning experiences and satisfaction in digital learning environments. Al-Fraihat et al. (2020) emphasised the significance of providing information that is appealing to students and their career goals. One should ensure that the material is applicable to real-life situations so that the students can apply the learning obtained. Alterkait (2024) concluded that course design engagement is a major motivator of learners and improves their satisfaction.

In the Kenyan context, studies show that many universities mostly rely on uploading lecture notes rather than providing comprehensive, interactive learning resources. This limits the perceived usefulness of e-learning platforms among students (Hadullo et al., 2018; Owidi et al., 2023). Studies by Chege (2025) and Kamotho (2025), through a quantitative case study design and a desk review design, respectively, established that access to adequate instructional materials like updated learning resources, structured course modules and supportive digital content leads to significant improvement of students' engagement and satisfaction with online learning.

These studies point out that improving the adequacy and relevance of instructional materials is important in enhancing the overall effectiveness of e-learning information quality in universities, hence strengthening student satisfaction. Although there is a considerable amount of research that confirms the idea that information quality has a positive influence on student satisfaction in an e-learning setting, some current findings bring out a more subtle view. For example, according to Alotaibi and Alshahrani (2022), the quality of information is not a factor that would necessarily lead to student satisfaction. Their study emphasises that the experiences of the learners are conditioned by the quality of the entire system and the efficiency of the interaction with instructors.

2.3 Theoretical Framework

This paper was anchored in the Resource-Based View (RBV) theory, which posits that an institution's competitive advantage stems from its ability to use unique and valuable internal resources effectively. In the context of this paper, higher education institutions are expected to use their internal resources, such as technological infrastructure, skilled faculty, and administrative systems, to deliver high-quality e-learning services. The RBV theory is particularly relevant to this study, as it provides a lens to understand how universities can strategically deploy these particular resources to improve service quality and ultimately enhance student satisfaction in e-learning environments.

In addition, this study adopted and contextualised e-learning information quality through the frameworks of DeLone and McLean's updated Information Systems Success model (2016) and Cheng's (2020) e-learning evaluation model. These

models collectively emphasise key quality dimensions, including language clarity, as crucial factors in evaluating e-learning information quality.

2.4 Conceptual Framework

The paper examined how e-learning information quality influences student satisfaction at public institutions in Kenya (conceptual framework shown in Figure 1). Building on DeLone and McLean's Information System Success Model (2016), this study conceptualises the relationship between information quality of e-learning and student satisfaction and experience. The operationalisation of the construct was achieved through using indicators including adequacy of instructional materials, language clarity, design clarity and content relevance. Further, the 5-point Likert scale was used to test these dimensions, where higher scores reflect higher levels of perceived satisfaction. The conceptual model is based on the notion that the satisfaction of e-learning students is greatly influenced by compliance with ODEL standards and information quality.

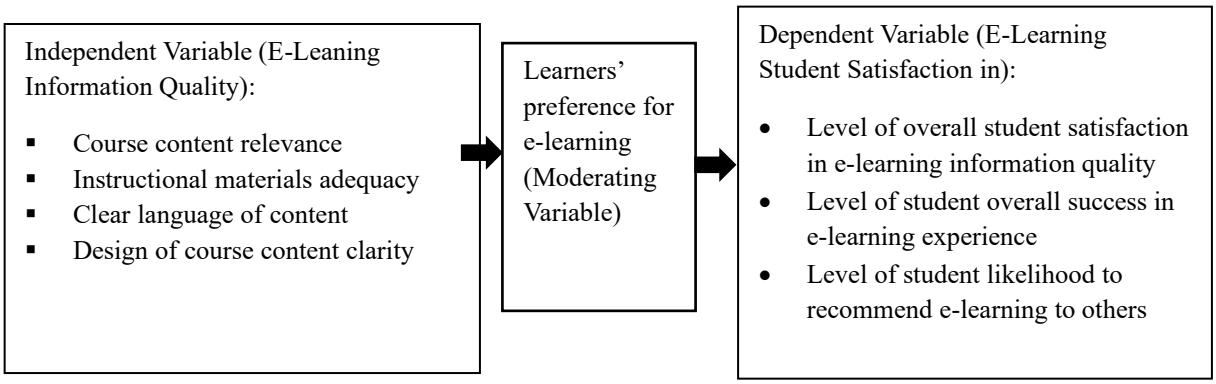

Figure 1: Conceptual Framework

3. Research Methodology

3.1 Research Design

This study employed mixed-methods research, both qualitative and quantitative approaches, to establish the quality of information and student satisfaction at six public universities in Kenya. Dehalwar and Sharma (2023) highlight the need to integrate various techniques to obtain reliable and broadly applicable outcomes.

The use of mixed methods was guided by studies that emphasise the need to combine quantitative and qualitative approaches to deepen understanding of educational phenomena and improve the validity of findings (Creswell & Creswell, 2024; Johnson & Christensen, 2025). The study used a pragmatic research philosophy paradigm, which focuses on real-world applications and practical solutions, as noted by Saunders et al. (2016). The pragmatic philosophy was chosen as it integrates both quantitative and qualitative research approaches in a practical setting, enabling a comprehensive examination of the nexus between information quality and student satisfaction in the e-learning context.

3.2 Target Population

The study focused on six public universities in Kenya: The University of Nairobi, the Technical University of Kenya, the University of Eldoret, Southeastern Kenya University, Jaramogi Oginga Odinga University, and Dedan Kimathi University.

The target population included fourth-year undergraduate students and university staff responsible for implementing e-learning. The major target of this study was 364,998 fourth-year undergraduate students at these public universities. This group was chosen because they had experienced a longer period of using online programmes compared to first, second, and third-year students.

Public universities were selected based on the Kenyan government's significant annual budgetary allocation to these institutions. Thus, it was crucial to assess the value for money by determining the learners' educational experiences in terms of satisfaction. The study targeted 2,031 deans who oversee and lead their institutions/faculties and implement operational policies for online courses: 20,771 teaching staff are responsible for organising and delivering online instructions, and 31 system administrators are accountable for supporting the efficient functioning of IT services in their respective institutions.

3.3 Sample Size

The study used the Yamane formula of 1967, with a 5% margin of error. A 95% confidence interval was calculated with a confidence level of a p-value of 0.05. Below is the research formula:

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

Where:

n is the sample size.

N is the target population

e is the margin error **=** ± 5%

The study sample size for fourth-year students is illustrated below.

$$n = \frac{364998}{1 + 364998(0.05)^2}$$

n = 400 respondents **(**fourth-year university students).

A representative sample of 400 fourth-year undergraduate students was randomly selected from these universities by using a stratified random sampling method. This sampling method allowed a variety of student groups from different schools and disciplines to be part of the study. To achieve a broader view of the implementation process of the e-learning approach, 46 key informants were chosen: 20 Deans, 20 instructors and six system administrators.

3.4 Data Collection Methods

The data was collected in April 2025 using questionnaires and a semi-structured interview guide. Both tools were developed by the researchers with the support of the supervisor and other faculty members who are education experts. Later, the validity and reliability of the questionnaires were tested as discussed in the subsequent section. The questionnaires were used to collect data from 400 fourth-year students, while semi- structured interviews were used to collect data from the 46 key informants (20 Deans, 20 instructors and six system administrators).

The participants were asked to give their informed consent before the in-person interviews. The responses were then recorded, and the themes were derived by analysing the responses in detail. The responses were coded, and the themes were developed to identify the overarching themes, which provided the researchers with an understanding of the responses and the relationship between information quality in e-learning and student satisfaction.

3.5 Validity and Reliability

To increase the face validity of the study, research instruments were pre-tested on a small sample of respondents at universities that were not part of the final sample. This assisted in the development of questions for clarity and relevance. The reliability of the instruments was determined using Cronbach's alpha; 0.7 or more was taken to indicate acceptable reliability. Cross-checking of primary data was done with secondary data derived from institutional reports and previous studies to validate and strengthen the findings.

3.6 Data Analysis Techniques

Descriptive and inferential statistics were used to analyse quantitative data with the aid of SPSS v.25. Descriptive statistics, such as means, standard deviations and frequencies, were used to describe and understand overall student satisfaction and quality of e-learning materials. The relationship between information quality and student satisfaction was tested using the regression analysis. The qualitative data was thematically analysed by organising the responses into themes (dimensions). Verbatim quotations were used to complement the qualitative data in the analysis section.

3.7 Ethical Considerations

The researchers acquired an introduction letter from the faculty of education postgraduate office and then applied for the research permit from the National Commission for Science, Technology and Innovation (NACOSTI). Before data collection, the researchers sought permission from the Vice-Chancellors of the six public universities in Kenya and consent from the students who were targeted for data collection.

3.8 Response Rate

Out of the 400 questionnaires administered to students, 340 were returned, representing a response rate of 85%. In addition, 40 out of 46 semi-structured interviews were conducted, giving a response rate of 87%. This resulted in an overall average response rate of 86%. Such a response rate is considered strong and reduces the likelihood of non-response bias (Wu et al., 2022).

4. Results and Findings

4.1 Students' Views on the Role of E-Learning Information Service Quality in Student Satisfaction

The satisfaction levels of e-learning students are contingent upon the quality of information provided, as illustrated in Table 1, which presents data regarding student perspectives.

Table 1: Students' Views on E-Learning Information Quality

Response	*Frequency*	*Valid Per cent*
Yes	256	75.3
No	84	24.7
Total	**340**	**100.0**

The study examined the degree to which the quality of e-learning information influences e-learning student satisfaction. Out of the 340 valid responses, a considerable majority of 256 students (75.3%) confirmed that high-quality e-learning content markedly improved their overall learning experience. The findings highlight the essential importance of precise, systematically arranged, and educationally robust material in influencing students' views on the efficacy of e-learning platforms. In contrast, 84 respondents (24.7%) did not see a significant correlation between the quality of e-learning content and their satisfaction levels.

The findings suggest that students often encounter outdated, unclear, or inadequate educational materials, which could indicate differences in content delivery across different programmes or institutions. These students may struggle with content organisation, contextual relevance, or limited engagement in educational resources. The findings suggest that while most students appreciate the impact of information quality on their satisfaction, a significant minority face obstacle that undermine their e-learning results. Therefore, universities and instructional designers must continuously improve the clarity, precision, accessibility, and pertinence of online learning materials.

4.1.1 Linearity test

Linearity tests are essential in linear regression analysis to ascertain the link between independent and dependent variables. This entails comparing residuals against anticipated values and noting a horizontal cluster of points. The standard Q-Q plot is employed to evaluate these assumptions, where a horizontal aggregation of data points signifies a linear relationship across all variables, and most data points align along a straight line. In this study, the data points' best fit was a straight line, indicating that both independent and dependent variables adhered to linearity assumptions, as depicted in the results (see Figure 2).

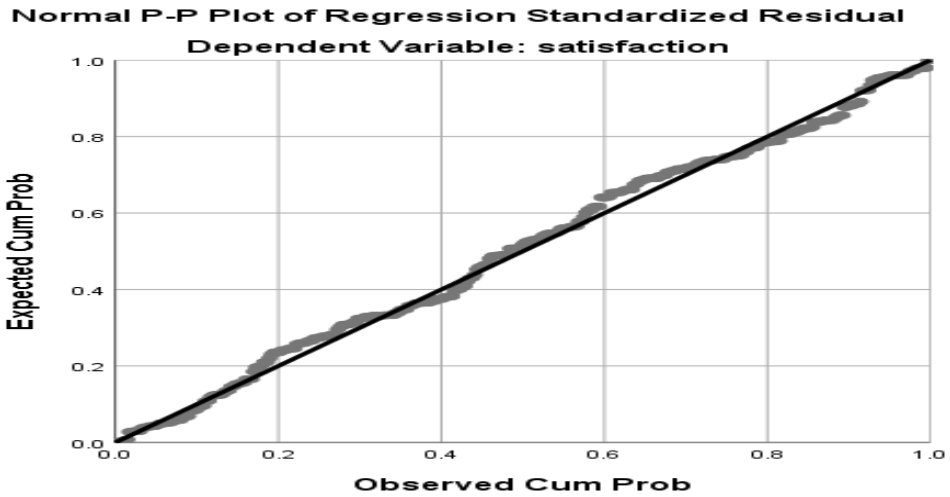

Figure 2: Linearity Test

4.2 Simple Linear Regression for E-Learning Information Quality and E-Learning Student Satisfaction

Simple linear regression analysis was conducted to establish the relationship between e-learning student satisfaction and e-learning information content at public universities. Table 2 provides a summary of the results.

Table 2: Model Summary for Regression of E-Learning System Quality on E-Learning Student Satisfaction

Model	R	R Square	Adjusted R-Square	SE of the Estimate
1	.656[a]	.431	.428	.59811

***Note**: a. Predictors: Constant, e-learning system quality, R^2 = coefficient of determination, SE = Standard Error of the Estimate*

The findings in Table 2 indicated a strong positive link between the quality of e-learning content and e-learning student satisfaction, evidenced by a correlation coefficient (R) of 0.656. This significant correlation indicates that when the quality of e-learning content is enhanced, including factors such as relevance, clarity, correctness, and accessibility, students demonstrate markedly increased satisfaction with their learning experiences. Furthermore, the coefficient of determination ($R^2 = 0.431$) signifies that 43.1% of the variance in e-learning student satisfaction is attributable to variations in the quality of e-learning content. This ratio indicates that over 50% of students reported that satisfaction levels are directly affected by the quality of information provided via e-learning platforms.

The model's Adjusted R^2 value of 0.428 reinforces the stability and trustworthiness of these findings, particularly after considering the number of variables and the sample size. This indicates that the impact of e-learning information quality on e-learning student satisfaction persists even after accounting for any statistical biases related to sample variance. The Standard Error of the Estimate (0.59811) indicates the average extent to which actual satisfaction scores diverge from those forecasted by the regression model. This

degree of dispersion is moderate, indicating that the model accounts for a substantial percentage of the variability in satisfaction; however, some variations persist, affected by unmeasured variables.

These findings highlight the crucial importance of information quality in influencing e-learning student satisfaction in e-learning settings. They emphasise the paramount significance of providing well-organised, pertinent, accessible, and pedagogically effective information. Improving these qualities might significantly increase the perceived value of e-learning programmes and lead to more productive and rewarding academic experiences for students. The findings highlight the essential role of content relevance in enhancing student satisfaction within e-learning environments. Content relevance refers to the extent to which information provided through e-learning platforms meets students' educational needs and objectives, specifically regarding the perceived value and applicability of the material. Engaging and motivating learners necessitates content that connects with their academic and personal aspirations.

4.3 Analysis of Variance (ANOVA) for E-Learning Information Quality and E-Learning Student Satisfaction

The study investigated the influence of e-learning information quality on student satisfaction, using ANOVA to evaluate the significance of this relationship. The ANOVA test is computed in Table 3.

Table 3: ANOVA Results for Regression of E-Learning System Quality on E-Learning Student Satisfaction

Model		Sum of Squares	df	MS	F	Sig.
1	Regression	58.508	1	58.508	163.554	.000[b]
	Residual	77.270	339	.358		
	Total	135.778	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. = significance level

The ANOVA results demonstrate that the quality of e-learning information significantly affects e-learning student satisfaction. The substantial F-statistic of 163.554 and a p-value below 0.05 (Sig. = 0.000) emphatically indicate that the correlation between the independent variable, e-learning information quality, and the dependent variable, e-learning student satisfaction, is statistically significant. Additional variance breakdown in the model indicates that the regression Sums of Squares (SS = 58.508) accounts for the segment of total variability in e-learning student satisfaction elucidated by the quality of e-learning content.

Conversely, the residual Sums of Squares (SS = 77.270) represents the unexplained variance, potentially arising from external or individual-level variables not included in the existing model. The aggregate of these components resulted in a total sum of squares of 135.778, including the complete variance in e-learning student satisfaction outcomes. The comparatively larger regression total relative

to the residual sum indicates that a significant percentage of e-learning student satisfaction is attributable to the quality of material presented in the e-learning environment. The results underscore the view that well-organised, pertinent, clear, and accessible instructional material is essential for cultivating favourable student experiences.

The data highlights the essential importance of high-quality e-learning content in impacting student views and outcomes. Improving material correctness, enhancing linguistic clarity, assuring instructional relevance, and facilitating ease of access are achievable measures that can increase student engagement and satisfaction in digital learning systems. Institutions that invest in these domains are likely to observe quantifiable enhancements in academic achievement and overall student well-being.

4.4 Regression Coefficients for E-Learning Information Quality and E-Learning Student Satisfaction

The study's regression coefficients for e-learning information quality and e-learning student satisfaction, and the results of the regression analysis, offer definitive empirical evidence about the impact of e-learning information quality on e-learning student satisfaction (See Table 4).

Table 4: Regression Coefficients Predicting E-Learning Student Satisfaction

Model		Unstandardised Coefficients		Standardised Coefficients		
		B	Std. Error	Beta(β)	T	Sig.
1	Constant	1.826	.175		10.449	.000
	e-learning system quality	.579	.045	.656	12.789	.000

Note: Dependent Variable: e-learning student satisfaction, B = Unstandardised Coefficients, (β) = Standardised Coefficients, T = T-statistics, Sig. = significance level

The unstandardised coefficient (B = 1.826, p <. 05) indicates that when the quality of e-learning material is zero, the baseline level of e-learning student satisfaction is 1.826 on the measurement scale. This intercept value suggests that additional factors beyond information quality influence e-learning student satisfaction, underscoring the complex nature of the e-learning process. The results indicate that for each one-unit improvement in e-learning information quality, e-learning student satisfaction rises by 0.579 units (B = 0.579, p <. 05), assuming all other factors remain constant. This positive linear correlation indicates that enhancements in the accuracy, clarity, and relevance of digital material are linked to increased e-learning student satisfaction.

The standardised beta coefficient (β = 0.656) underscores the robustness of this association, signifying that e-learning information quality is a strong predictor of e-learning student satisfaction compared to other alternative variables in the model. The t-statistic value of 12.789 (p <. 05) further substantiates that the observed impact is significant and unlikely due to random chance. These findings emphasise the crucial importance of high-quality information in influencing students' perceptions and experiences in e-learning settings. By investing in the

ongoing refinement of digital instructional resources, including enhancements in structure, accessibility, and pedagogical relevance, educational institutions may markedly elevate e-learning student satisfaction**.** The results show a significant association between e-learning information quality and student satisfaction in the selected public universities. The null hypothesis H_{01}, which states there is no significant relationship between the two variables, is thus rejected. The alternative hypothesis (hypothesis H_{a1}) that states a significant relationship exists between e-learning information quality and e-learning student satisfaction is accepted.

4.5 Students' Views on the Roles of E-Learning Information Quality in E-Learning Student Satisfaction

E-learning student satisfaction analysis, using the thematic method, examines what factors affect e-learning information quality. The analysis revealed the vital themes of usefulness in learning, relevance and accuracy, accessibility, engagement and presentation, and comprehensiveness, as these factors play the largest role in delivering satisfying e-learning experiences. The students' views are thematically summarised in Table 5.

Table 5: Thematic Analysis of Students' Perceptions of E-Learning Information Quality

Theme	*Definition*	*f(n)*	*Per cent (%)*
Usefulness for Learning	The extent to which e-learning content enhances knowledge and understanding.	134	39.50%
Relevance & Accuracy	The degree to which e-learning information is up-to-date and reliable.	86	25.40%
Accessibility	The ease of accessing learning materials on the platform.	72	21.10%
Engagement & Presentation	The structure and interactivity of the e-learning content.	12	3.50%
Comprehensiveness	The extent to which content is detailed and thorough.	6	1.80%

Thematic analysis highlights key aspects of e-learning content that influence e-learning student satisfaction. Most students (n = 134, 39.5%) emphasised that well-structured, informative content enhances learning. One student shared:

> "*The content is well-structured and helps in learning effectively.*" (RESP 321)

This suggests that clarity and logical organisation play a crucial role in facilitating understanding. Another group of students (n = 86, 25.4%) stressed the importance of accurate, updated content, noting that it directly impacts their satisfaction. One student stated:

> "*The information provided is relevant and updated, which improves my satisfaction.*" (RESP 300)

This response underscores the need for current and reliable materials in an e-learning environment. In addition, accessibility emerged as a key factor, with 72

students (21.1%) highlighting how easily available content contributes to a smoother learning experience. One student explained:

> *"Easy access to learning materials anytime makes studying convenient."* (RESP 330)

This response suggests that flexibility in accessing course materials can significantly improve engagement and retention.

A smaller proportion of students (n = 12, 3.5%) pointed out that engaging, interactive content enhances satisfaction, making learning more enjoyable. As one student noted:

> *"Engaging content makes learning more enjoyable and less stressful."* (RESP 340)

One key informant also indicated the following:

> *"Digital equity, usability, Moodle engagement, has boosted student satisfaction."* (RESP 04)

Another respondent also said*:*

> *"Content delivery and system administration lead to student satisfaction."* (RESP 08)

This highlights the value of incorporating interactive elements to sustain interest and motivation. Lastly, a few students (n = 6, 1.8%) emphasised the importance of detailed and comprehensive content. One student remarked:

> *"Comprehensive content ensures that no important topics are left out."* (RESP 338)

The view was an indication that the depth of information is critical for effective learning.

Overall, the thematic analysis revealed that the most influential factor in e-learning student satisfaction is the perceived usefulness of the learning content. These insights emphasise the importance of delivering high-quality, structured, accessible, and engaging educational materials in e-learning environments to enhance student experience and academic outcomes.

5. Discussion

This paper established a positive correlation between e-learning information quality and e-learning student satisfaction, consistent with the findings of Pang (2021), who discovered the existence of a strong correlation between educational content quality and the overall well-being of the students. These results indicate that the more information is relevant to their personal and academic lives, the higher the chances that the students will view the information as valuable. This sense of relevance will make them more motivated and more interested in the content, and thus more satisfied with their learning experience.

Moreover, the findings correlate with the results of Dangaiso et al. (2022), which revealed that the quality of information in online learning can be characterised as a student's assumption that the knowledge obtained with the help of such media is more valuable in comparison with other materials used in learning. This mirrors the study by Kibuku et al. (2020), who established a relationship between the availability of relevant and well-structured digital learning materials and students' satisfaction with e-learning systems in Kenyan universities. However, Al-Fraihat et al. (2020) had a contradictory finding, which shows that while information quality contributes to the success of e-learning systems, system quality and service quality were stronger predictors of student satisfaction than information quality itself.

The perception of key informants is incredibly vital because the opinion of students regarding the information they receive may significantly influence their satisfaction and the overall learning process. The quality of information used in an e-learning setting is determined by the following important aspects: Relevance that deals with the level at which the information used meets the objectives and interests of students, and accuracy, an important factor that ensures the material presented is true and reliable. All these elements are the cornerstones of a successful digital education, making learning experiences trustworthy.

Using Cheng (2020) as an example, it was affirmed that properly structured and contextually oriented materials were a key determinant of student satisfaction. In the same manner, Al-Fraihat et al. (2020) emphasised the role of ensuring that content is relevant to the interests and future career paths of students, noting that the real-life applicability of course materials is a factor that encourages increased learner engagement. In agreement with this idea, Alterkait (2024) demonstrated that well-considered, interactive course designs are important in motivating learners and enhancing their overall satisfaction in online courses.

These findings imply that e-learning student satisfaction can be greatly enhanced through enhancing the quality of the information used in e-learning, in terms of its applicability, readability, and availability of the information in the online learning environment. The quality of e-learning information chosen as a predictor of e-learning student satisfaction met the requirements suggested by CUE (2014) and the model, developed by DeLone and McLean (2016). As has been emphasised by DeLone and McLean (2016), the quality of information provided in e-learning depends on the overall performance of evaluation by the users.

As suggested by CUE (2014), the important variables to consider when determining the efficiency of e-learning information are availability, relevancy, delivery, accessibility, and the way the content is organised. The study has also determined the performance and functionality of the e-learning platform and information quality as key determinants of e-learning student satisfaction. The descriptive, inferential, and thematic results of the study correspond with existing reviewed literature on the relevance of a structured design in e-learning. To illustrate, Al-Fraihat et al. (2020) revealed that students are more engaged and satisfied with the content of their courses when it is properly designed and easily

accessible. This is supported by Cheng (2020), who discovered that structured, learner-centred materials assist students to focus and achieve their academic objectives.

An additional detail is elaborated on by Zhang et al. (2024), who point out that the quality of content is paramount, but that other extrinsic variables, such as student motivation and access to the internet, also define satisfaction. These knowledge bases provide practical solutions for universities to maximise the results of the study. First, the quality of the content is a top priority of institutions because it is highly associated with positive student feedback. It involves investment in digital tools that combine the elements of multimedia (e.g., instructional videos) and interactive elements like online assessment and group workspaces. Second, higher learning institutions should have guidelines that assist instructors to simplify course designs, ensuring that course materials are logically organised, concise, and consistent with the learning goals.

6. Conclusion

This paper was limited to selected public universities in Kenya and relied largely on self-reported perceptions of students, suggesting the need for future research to incorporate broader institutional contexts, longitudinal designs and the measurement of learning outcomes. The paper concludes that e-learning information quality is a dominant factor in determining student satisfaction with e-learning in the selected public universities.

This study concluded that learners find the content of courses taught on e-learning platforms satisfactory, especially when the content is relevant to academic and professional training objectives. Nevertheless, the use of outdated materials and inconsistencies in content hindered the capability of students to find, comprehend, and apply the learning materials efficiently. Both the availability of research materials and instructional content were rated at 3.77, which indicated that although students were content with the available educational materials, they felt that outdated materials restricted the efficiency of the materials used in satisfying course requirements.

The inferential statistics provided more understanding of the relationship between e-learning information quality and e-learning student satisfaction. The regression analysis established a statistically significant positive correlation ($R = 0.656$, $p < .05$), implying that there is a statistically significant relationship between e-learning information quality and e-learning student satisfaction, as evidenced by the p-value less than 0.05. This supports the fact that high-quality information, such as quality, clarity, relevance, organisation, and timeliness, plays a significant role in determining the efficacy of e-learning platforms as perceived by the students.

The results suggest that content quality is important in student engagement and outcomes. The results confirm the assertions of instructional design theorists that properly structured, modern, and student-centred resources improve cognitive activities, thereby increasing learning satisfaction and performance. Thus, it is

clear that institutions should enhance the efficient delivery of online resources and emphasise regular content updates, uphold integrity in instructional design, and comply with evolving academic requirements and the needs of learners. This paper contributes to the theory by reinforcing the role of information quality as a core determinant of students' satisfaction in e-learning environments, while demonstrating that universities should prioritise regular content updates, improve instructional design, and strengthen digital infrastructure to enhance the learning experience.

7. Implications of the Findings

The study reinforces DeLone and McLean's Information Systems Success Model and resource-based theory in explaining e-learning in higher education. It provides empirical evidence from public universities in Kenya, expanding the application of e-learning satisfaction models in the sub-Saharan context.

8. Recommendations

- Universities should prioritise high-quality learning materials that are correct, relevant, up-to-date, well-structured and aligned with course objectives.
- Institutions should invest in capacity building for instructors focusing on digital pedagogy, instructional design and effective communication.
- Continuous monitoring and quality assurance mechanisms should be implemented to ensure that regular updating and improvement of e-learning is achieved.
- Regulatory bodies such as the CUE should strengthen the national quality assurance framework for open distance and e-learning.

Competing Interests

The authors declare that no conflicts of interest are associated with this study.

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