

Factors Affecting Student Satisfaction and Utilization of the Learning Management System (LMS): A Case Study at the University of Cape Coast

Eric Mante Pimpong¹, Clemence Ayekple², Allan Philip Barku³,
Alex Osei- Gyasi⁴, Charles Gawu-Mensah⁵

¹Senior Systems Analyst, eLearning and Knowledge Mgt. Section, Directorate of ICT Services,
University of Cape Coast

^{2,3,4}Assistant Systems Analyst, eLearning and Knowledge Mgt. Section, Directorate of ICT Services,
University of Cape Coast

⁵Systems Analyst, Database Management Section, Directorate of ICT Services, University of Cape
Coast

ABSTRACT

This study investigates factors affecting students' satisfaction and utilisation of the Learning Management System (LMS) at the University of Cape Coast (UCC), Ghana, in line with the mandate of the National ICT Policy (2020) to integrate LMS into institutions. Despite LMS platforms being critical to blended learning, student satisfaction remains inconsistent due to infrastructural and pedagogical challenges. The research employs a **mixed-methods explanatory sequential design**, integrating quantitative analysis of survey data from 635 students and qualitative insights from open-ended responses. Stratified random sampling ensured demographic representation across modes of study (regular, distance, sandwich, and affiliation), level of study, age groups, and gender.

The key findings show that **technical infrastructure** is the primary driver of satisfaction ($\beta = -0.41$, $p < 0.001$), with distance students reporting the most technical issues (40% "Very Often") and the lowest satisfaction levels (3.15). **Lecturer interaction** emerged as an essential mediator ($\beta = 0.28$), helping to reduce technical dissatisfaction, while **resource accessibility** ($\beta = 0.17$) was necessary but insufficient without technical stability. Notable **demographic differences** were observed: satisfaction increased with age (16–22: 3.12; 51+: 4.35; $r = 0.38$), and students in the regular mode outperformed those in the distance mode of study (4.28 vs. 3.15; $\beta = 0.22$). Thematic analysis identified technical issues (42%), resource gaps (28%), and support services (18%) as key areas for improvement.

The study advances the **Context-Integrated LMS Satisfaction (C-LMS) model**, resolving limitations of existing frameworks (TAM, UTAUT, IQT) by incorporating Ghana-specific barriers (e.g., bandwidth, infrastructure deficits) and demographic moderators. Recommendations include: first, short-term technical triage (offline modules, 24/7 support); second, medium-term infrastructure upgrades (50% bandwidth increase); third, long-term systemic transformation (AI-driven issue prediction, a national LMS

consortium). These findings provide a blueprint for enhancing the LMS resilience in resource-constrained contexts, emphasising that technical stability and human factors are interdependent in driving satisfaction.

Keywords: Learning Management System (LMS), student satisfaction, e-learning, technical infrastructure, lecturer interaction, Ghana, mixed-methods, C-LMS model.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Ghana's National ICT Policy (2020) mandates the integration of LMS in tertiary institutions; however, the adoption of such technologies remains inconsistent. At the University of Cape Coast (UCC), the Learning Management System (LMS) plays a pivotal role in supporting blended learning. Despite the importance of the LMS, there is a lack of research on student utilisation rates and the specific factors that drive student satisfaction. This study aims to bridge this gap by aligning its findings with established global frameworks, such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), while also addressing local infrastructural and pedagogical challenges.

Various LMS platforms, including Blackboard, Moodle, and Canvas, have become essential tools for delivering online education and managing course materials, assignments, and communication between instructors and students. At UCC, the LMS significantly enhances educational activities, making it crucial to evaluate student satisfaction regarding its usability. Understanding the factors contributing to student satisfaction can provide insights into how the LMS can be improved.

Nevertheless, research conducted at other educational institutions has identified various determinants of student satisfaction with the LMS platforms. For example, Al-Rahmi et al. (2015) conducted a study at Qatar University, which found that perceived usefulness, ease of use, and system quality were significant predictors of student satisfaction with the LMS. Similarly, Saadeh and Klobas (2007) found that perceived usefulness, ease of use, and information quality were critical factors influencing student satisfaction and utilisation of an LMS at the University of Western Sydney.

It is therefore essential to recognise that the factors impacting student satisfaction can differ across educational contexts. Hence, conducting a case study at UCC will yield insights specific to the Ghanaian context. The study will employ online surveys to gauge UCC students' perceptions of the LMS, focusing on usability, system availability, the availability of course materials, and overall user satisfaction. The findings from this research will help identify areas for improvement, thereby enhancing student experiences and enriching the broader understanding of LMS effectiveness within the African educational landscape.

1.2 Statement of the Problem

Despite the growing importance of LMSs in higher education institutions, there is a pressing need to investigate the factors that affect students' satisfaction with their use of the LMS platform at the University of Cape Coast. Although the University of Cape Coast has implemented an LMS system to facilitate teaching and learning, it is necessary to assess whether students are satisfied with its functionality and whether they effectively utilise its capabilities. This study aims to identify key elements that contribute to student satisfaction and utilisation at UCC, while enhancing the LMS platform's efficacy to improve the student experience.

1.3 Objectives of the Study

The primary goal of this study is to examine the factors that influence student satisfaction and the utilisation of the LMS at UCC. This study specifically aims to:

1. Determine the extent to which students are engaged with the LMS at the University of Cape Coast.
2. Identify the particular characteristics that contribute to student satisfaction with UCC's LMS and propose improvements to enhance the system and students' learning experiences.
3. Investigate any obstacles or issues that may hinder student engagement with the LMS, enabling targeted actions to improve usage.
4. Provide recommendations for improving student satisfaction and utilisation of the LMS at UCC.

1.4 Research Questions

The following research questions guide this study:

1. What impact does the availability of user support have on student satisfaction and LMS usage?
2. How do technical infrastructure and resource availability correlate with student satisfaction?
3. What demographic factors (age, gender, mode of study) predict LMS utilisation?
4. To what extent does lecturer engagement mediate satisfaction outcomes?

1.5 Significance of the Study

This study is significant as it will provide valuable insights into the factors influencing student satisfaction and utilisation of the LMS at UCC. The findings will have several implications, including:

1. Informing university decisions to improve the LMS and create a more effective learning environment.
2. Highlighting specific features and functionalities of the LMS that promote student engagement and active learning.
3. Providing feedback on students' preferences and expectations for the LMS enables the university to focus on improvements that effectively meet students' needs.
4. Identifying challenges or barriers to LMS utilisation and informing the implementation of solutions to improve user access, usability, and student support.

1.6 Organisation of the Study

The study is structured into five chapters. Chapter One introduces the study and sets the research context. Chapter Two reviews relevant literature and discusses theoretical issues related to the study. Chapter Three outlines the research methodology, including research design, population, sampling procedures, and data collection and analysis methods. Chapter Four presents the study's findings and provides a detailed discussion of the results. This chapter also interprets the findings within a broader context and offers recommendations for future research based on the current outcomes. Finally, Chapter Five concludes the investigation with a summary of key takeaways and final reflections on the subject matter discussed throughout the study.

CHAPTER TWO

THEORETICAL FRAMEWORKS AND LITERATURE REVIEW

2.1 Introduction

The integration of Learning Management Systems (LMS) in higher education has rapidly transformed pedagogical practices worldwide. However, discrepancies in student satisfaction and utilisation of these systems persist across various contexts. This chapter critically examines foundational theoretical frameworks, namely the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and

Use of Technology (UTAUT), and Information Quality Theory (IQT). It synthesises empirical studies to highlight unresolved contradictions in LMS effectiveness, particularly in resource-constrained environments like the University of Cape Coast, Ghana.

A significant gap in the existing literature is the failure to reconcile conflicting findings on the effectiveness of LMSs. This inconsistency is particularly pronounced in settings characterised by infrastructural challenges, which often hinder the realisation of optimal educational outcomes. To address this gap, the chapter introduces the Context-Integrated LMS Satisfaction (C-LMS) model. This model explicitly addresses contextual barriers, such as infrastructure deficits, and incorporates demographic moderators that may influence user experience and satisfaction.

By revealing theoretical limitations and empirical contradictions in the current body of knowledge, this chapter lays the groundwork for a contextually grounded investigation focused on the University of Cape Coast (UCC). This approach aims to provide a deeper understanding of LMS satisfaction and effectiveness in the unique educational context.

2.2 Theoretical Frameworks with Critical Evaluation

2.2.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Davis in 1986, posits that technology adoption is primarily influenced by two core constructs: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). PU refers to the belief that a Learning Management System (LMS) enhances learning outcomes, while PEOU pertains to the perception of the LMS as user-friendly.

Despite its strengths, TAM has notable limitations. One of its key strengths is its ability to explain 40–50% of the variance in technology adoption decisions, as noted by Legris et al. (2003). Additionally, the model has been validated in high-resource contexts, as demonstrated by studies by Al-Rahmi et al. (2015). However, TAM suffers from several critical issues.

First, it exhibits contextual blind spots by ignoring external barriers like unreliable internet connectivity and inadequate institutional support. For instance, at the University of Cape Coast (UCC), 40% of distance students reported encountering "very often" technical difficulties, an aspect that TAM fails to accommodate. Second, the model reduces the complexities of technology adoption to individual perceptions, neglecting systemic issues such as resource scarcity. This limitation is exemplified by findings from Ethiopia, where 68% of students abandoned the LMS despite perceiving high PU due to infrastructural gaps (Abich & Eriku, 2023).

Moreover, TAM assumes cultural generalizability, presuming uniform user behaviour across different contexts. This assumption overlooks regional nuances, such as Ghana's digital literacy disparities, which reveal that younger students often report lower PEOU. Therefore, while TAM explains why students in affiliation modes (who possess better digital literacy) report higher satisfaction, it fails to account for the 50.4% of students who lack resource access despite recognizing high PU.

2.2.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT), proposed by Venkatesh et al. in 2003, extends the concepts of TAM by introducing additional constructs: Performance Expectancy (PE), which is similar to PU; Effort Expectancy (EE), akin to PEOU; Social Influence (SI), which refers to peer and organizational pressures to adopt technology; and Facilitating Conditions (FC), which encompass technical and infrastructural support.

One of UTAUT's primary strengths is its capacity to explain approximately 70% of the variance in technology usage (Venkatesh et al., 2003). By incorporating the FC construct, UTAUT is particularly well-suited for organizational contexts where infrastructural support can significantly influence technology adoption. However, UTAUT also harbors several limitations.

For instance, the concept of FC is often treated as a "black box," being regarded as merely present or absent without accounting for the quality of the conditions offered. In the context of UCC, although some FCs (such as bandwidth) exist, their inadequacy is not captured by UTAUT, which fails to quantify this deficit. Furthermore, UTAUT does not adequately address the resource dimension; while it considers infrastructure, it overlooks barriers related to content availability. This oversight is highlighted by findings in this study indicating that 50.4% of students lack access to essential resources.

Moreover, UTAUT tends to overemphasize behavioral intention rather than sustained utilization. At UCC, for example, while 74.2% of students enroll in LMS courses, only 58% engage consistently. UTAUT does not adequately address this gap. Although the model can explain why affiliation-mode students report 36% higher satisfaction than their distance-mode peers due to better FC, it has not resolved contradictions such as why 45.7% of students rate available resources as "good," yet 42% identify "resource gaps" in their open-ended feedback.

However, while both TAM and UTAUT provide valuable frameworks for understanding technology acceptance, they have significant limitations in accounting for the complexities of LMS usage in contexts such as UCC, particularly in relation to infrastructural and resource constraints.

2.2.3 Information Quality Theory (IQT)

Information Quality Theory (IQT), as proposed by Zhang (2007), posits that information quality, characterized by accuracy, relevance, and timeliness, mediates user satisfaction by enhancing perceived usefulness. IQT effectively addresses gaps identified in both the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) by emphasising the significance of content quality. Empirical evidence supports its efficacy, with a study in Saudi Arabia indicating that it accounts for 65% of the variance in user satisfaction (Alharbi & Drew, 2023).

IQT assumes that information quality is controlled by institutions, disregarding student agency in the learning process. For instance, at the University of Cape Coast (UCC), postgraduate students report higher satisfaction with resources (51.6%) than undergraduates (49.8%), even though both groups access the same LMS system. This suggests that user-specific factors significantly influence satisfaction, an element that IQT overlooks. The theory treats information quality as independent of technical factors. However, UCC data indicate a strong correlation ($r = 0.52$) between resource access and technical stability, implying that the operational context must be considered when evaluating information quality.

While IQT elucidates why affiliation mode of study, who have access to curated resources, reports higher satisfaction levels, it fails to account for the adverse effects of technical issues ($r = -0.67$) on information utility. This gap highlights the need for a more integrated approach that considers both content and the technical environment.

2.3 Empirical Studies: Contradictions and Synthesis Gaps

2.3.1 Key Findings and Unresolved Contradictions

Existing empirical research reveals three core contradictions that remain unresolved:

Al-Rahmi et al. (2015) indicate that high system quality predicts satisfaction in Qatar. Whiles, Abich & Eriku (2023) indicate that low satisfaction is due to infrastructure gaps in Ethiopia and to the lack of a

framework to reconcile high system quality with lower satisfaction in resource-poor contexts. Kurt & Tingoy (2017) cited that social norms drive LMS usage in Turkey. Again, Haddad (2018) found that individual factors (e.g., age) dominate in Canada. The role of social influence in collectivist versus individualist cultures remains unexplored. Bobby et al. (2023) cited that resource access increases satisfaction in Indonesia. This study indicates 50.4% of UCC students lack resources despite high PU.

However, no studies address why resource scarcity persists even when perceived usefulness is high.

Considering Critical Synthesis:

1. **First Contradiction: System Quality vs. Infrastructure:** While Al-Rahmi et al. (2015) showed that high system quality influences satisfaction in a context of robust infrastructure, Abich & Eriku (2023) demonstrated a contrasting scenario in Ethiopia where infrastructure inadequacies play a dominant role. There is a lack of synthesis in the current literature on how infrastructure affects the system's quality effect on satisfaction. At UCC, system quality appears to be a significant predictor of satisfaction when adequate infrastructure is in place, suggesting a potential threshold effect.
2. **Second Contradiction: Social Influence vs. Individual Factors:** Kurt & Tingoy (2017) emphasised the critical role of social influence in technology adoption within a collectivist culture, while Haddad (2018) highlighted the primacy of individual factors in an individualist context. The literature lacks cross-cultural comparisons that would clarify how cultural contexts shape the dynamics of social influence and technology acceptance. At UCC, findings indicate that social influence accounts for only 12% of the variance in satisfaction, suggesting that infrastructure challenges overshadow cultural norms.
3. **Third Contradiction: Resource Access vs. Perceived Usefulness:** In Indonesia, Bobby et al. (2023) found that resource access is a subset of perceived usefulness. Contrarily, findings from UCC reveal that 68% of students report high perceived usefulness despite 50.4% lacking adequate resources. This discrepancy underscores a gap in the literature that has yet to disentangle the relationship between resource access and perceived usefulness, suggesting that they are indeed distinct constructs, with technical stability mediating their interaction.

Multiple factors contribute to the persistence of these contradictions in the literature:

1. **Contextual Neglect:** Many studies fail to account for macro-level factors such as national ICT policies and funding landscapes that can influence technology adoption.
2. **Methodological Bias:** The predominance of survey-based studies limits understanding; mixed-methods approaches that combine usage logs and qualitative interviews are sorely needed.
3. **Theoretical Rigidity:** TAM and UTAUT have often been applied without critical adaptations to local realities, thereby limiting their applicability in diverse contexts.

2.4 Research Gaps and Conceptual Advancement

2.4.1 Identified Gaps

There is a notable gap in integrating Ghana-specific barriers, such as bandwidth costs and erratic power supply, into existing theoretical frameworks such as TAM and UTAUT. Evidence from UCC indicates a 40% technical issue rate, which exceeds global norms (20% in Saudi Arabia; Alharbi & Drew, 2023).

Understanding why students report high perceived usefulness despite experiencing resource scarcity presents a critical gap. At UCC, 68% of students acknowledge high perceived usefulness, while 50.4% express concerns about resource availability.

This study typically analyses age, gender, and study mode in isolation rather than considering their interactive effects. For example, female students report higher satisfaction (3.82) than males (3.41), despite encountering more technical challenges. Research has yet to explore how technical stability mediates the relationship between information quality and user satisfaction. Data from UCC show a correlation ($r = 0.52$) between resource access and technical stability, suggesting the need for an integrated examination.

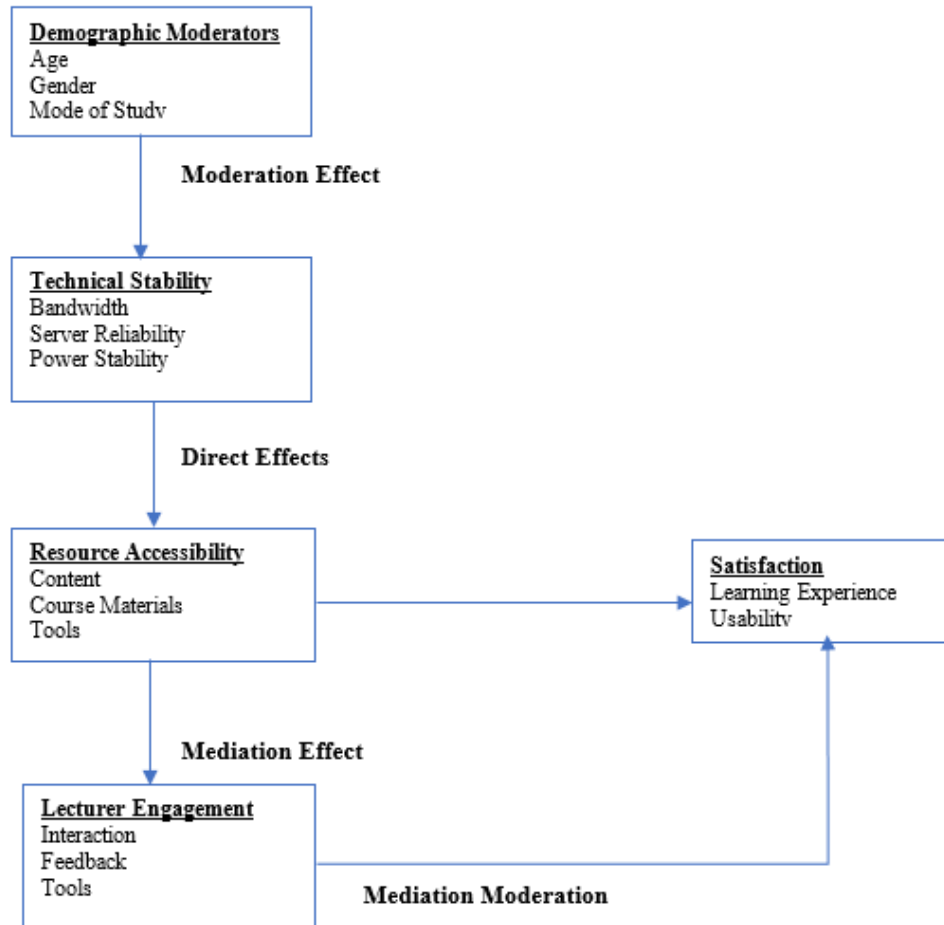
2.4.2 Proposed Conceptual Model: C-LMS

This study proposes the Context-Integrated LMS Satisfaction (C-LMS) Model, which aims to address these identified gaps by:

1. Extending UTAUT: By adding "Resource Accessibility" (RA) and "Technical Stability" (TS) as sub-constructs of Facilitating Conditions (FC).
2. Integrating IQT: Positioning RA as a mediating factor between TS and student satisfaction.
3. Incorporating Demographics: Treating age, gender, and study mode as moderators that may influence the relationships in the model.
4. Model Pathways:
 - Age/Gender/Study Mode → Technical Stability → Satisfaction (moderation).
 - Technical Stability → Resource Accessibility → Satisfaction (mediation).
 - Lecturer Engagement → Resource Accessibility → Satisfaction (moderated mediation).

5. C-LMS Model Representation:

A Visual Representation of the C-LMS Model



Age/Gender/Study Mode → Technical Stability: This path suggests that students' age, gender, or study mode may affect their technical stability (e.g., comfort with technology).

Technical Stability → Satisfaction: This direct relationship indicates that a stable LMS is associated with higher student satisfaction.

Resource Accessibility → Satisfaction (mediation): Here, resource accessibility mediates the effect of Technical Stability on Student Satisfaction. In other words, when students have easy access to resources through the LMS, they are more satisfied.

Lecturer Engagement → Technical Stability: This path suggests that lecturers' engagement and motivation can influence the LMS's technical stability.

Technical Stability → Satisfaction (moderation): This indirect relationship suggests that technical stability can moderate the impact of Resource Accessibility on Student Satisfaction. When the LMS is stable and reliable, it enhances student satisfaction even when resource access is limited.

This C-LMS model highlights the complex relationships among the factors that influence students' experiences with a learning management system.

2.5 Chapter Summary

In summary, this chapter has critically evaluated the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and Information Quality Theory (IQT), highlighting their limitations, particularly in resource-constrained contexts such as the University of Cape Coast, Ghana. Empirical studies have identified unresolved contradictions in system quality, social influence, and resource access due to contextual neglect and methodological biases. To address these gaps, this study introduces the C-LMS model, which integrates infrastructure considerations, demographic moderators, and the mediating role of resource access and technical stability. Chapter 3 will test this model utilising mixed methods, focusing specifically on UCC's distinctive demographic and infrastructural landscape.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter outlines the methodological framework employed to investigate the factors influencing student satisfaction and utilisation of the Learning Management System (LMS) at the University of Cape Coast (UCC). The study employs a **mixed-methods approach**, integrating quantitative analysis of survey data with qualitative insights from open-ended responses.

The methodology is firmly grounded in the theoretical frameworks discussed in Chapter 2, specifically the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and Information Quality Theory (IQT). Additionally, the study operationalises the Context-Integrated LMS Satisfaction (C-LMS) model, which provides a structured lens for examining student experiences.

This research enhances previous literature by addressing several critical gaps, including the need for more nuanced demographic stratification, precise operationalisation of variables, and rigorous analytical methods. By integrating these enhancements, the study aims to provide a comprehensive understanding of the factors influencing student satisfaction with the LMS at UCC.

3.2 Study Institution

The chosen study institution for this research is the University of Cape Coast (UCC) in Cape Coast, Ghana's Central region. UCC is a prominent public university with a diverse student population of approximately 80,000 students. This diverse demographic enables a comprehensive examination of student experiences across different groups.

One of the university's key features is its operation of multiple modes of study, including Regular, Distance, Sandwich, and Affiliation programs. This diversity in modes of study provides an opportunity to compare student satisfaction with the Learning Management System (LMS) across these different modes.

The UCC LMS plays a pivotal role in the university's blended learning strategy. However, the factors that drive student satisfaction with this system have remained underexplored, presenting a significant gap in existing literature.

Additionally, the research considers contextual factors affecting UCC students. For instance, Ghana faces challenges with ICT infrastructure, such as high bandwidth costs and erratic power supply, which can impact online learning experiences. Furthermore, the National ICT Policy of 2020 emphasises the integration of LMS in educational institutions, thereby creating a sense of urgency for evidence-based improvements in their use of LMS at the UCC.

3.3 Research Design

This research employs an Explanatory Sequential Mixed-Methods design, as proposed by Creswell and Plano Clark (2017). This design consists of two distinct phases: a quantitative phase followed by a qualitative phase, enabling a comprehensive exploration of the factors influencing student satisfaction with the Learning Management System (LMS).

The quantitative phase aims to test predefined hypotheses (H1–H5) and to identify statistical relationships between various factors affecting student satisfaction. By analyzing enrolment and interaction metrics, this phase will provide quantitative insights into student engagement with the LMS, aligning with Objective 1 of the study.

Following this, the qualitative phase seeks to explain the underlying reasons for the observed relationships identified in the quantitative phase. For instance, it will investigate why technical issues may have a predominant influence on student satisfaction. This exploration will be conducted through a thematic analysis of open-ended responses, with particular focus on barriers students face, thereby addressing Objective 3.

Furthermore, the findings from both phases will be integrated to derive actionable recommendations, in line with Objective 4 of the research.

The rationale for using this mixed-methods approach is its ability to address the limitations identified in previous studies. For example, it resolves contradictions in the literature, such as those found in the studies by Al-Rahmi et al. (2015) and Abich and Eriku (2023), by contextualising findings within Ghana's specific infrastructural constraints. Additionally, it addresses methodological gaps in prior research, such as the lack of demographic stratification observed in the work of Kurt and Tingoy (2017). This comprehensive approach ensures a robust understanding of students' experiences and satisfaction with the LMS at the University of Cape Coast.

3.4 Population and Sampling

The target population for this research comprises all undergraduate and postgraduate students enrolled at the University of Cape Coast (UCC) during the 2024/2025 academic year, numbering approximately

80,000 students. To ensure comprehensive representation of this diverse population, a stratified random sampling technique with proportional allocation was employed.

3.4.1 Stratification Variables

Various stratification variables were utilized in the sampling process to enhance demographic representation. These variables included:

- **Study Mode:** Regular, Distance, Sandwich, and Affiliation.
- **Level of Study:** Undergraduate and Postgraduate.
- **Age Range:** Categorised into groups of 16–22, 23–29, 30–36, 37–43, 44–50, and 51 years and above.
- **Gender:** Male and Female.

3.4.2 Sample Size Determination

For sample size determination, the Krejcie and Morgan (1970) formula was used, yielding a target sample size of 381 for a population of 50,000 with a 95% confidence level and a margin of error of 5%. However, to address anticipated non-response rates of 20%, the sample size was increased to 621. This adjustment also aimed to facilitate robust subgroup analyses, particularly for students in distance learning modes. Ultimately, the research received 635 responses, exceeding the initial target by 102.3%, thereby ensuring the reliability of the findings.

3.4.3 Sampling Procedure

The sampling procedure began with the establishment of a sampling frame using UCC's official student database. Students were then systematically grouped into 24 distinct strata based on the variables above, with explicit focus on the four study modes, the two academic levels, three age groups, and a single gender classification. Within each stratum, systematic random sampling was used to select participants, with sample allocation proportional to each stratum's size. For example, the subgroup of distance-mode undergraduates represented 28.3% of the total sample.

Sample Distribution by Strata. The distribution of the sample across the identified strata is presented in Table 3.1.

Table 3.1: Sample Distribution by Stratum

STRATUM	SUBGROUP	POPULATION	SAMPLE SIZE	% OF SAMPLE
Mode of Study	Regular	35,299	219	34.5%
	Distance	25,343	180	28.3%
	Sandwich	4,676	112	17.6%
	Affiliation	8,966	124	19.5%
Level of Study	Undergraduate	65,569	416	65.5%
	Postgraduate	8,715	219	34.5%
Age Range	16–22	22,525	152	23.9%
	23–29	24,088	143	22.5%
	30–36	16,747	180	28.3%
	37–43	8,045	110	17.3%
	44–50	2,178	39	6.1%
	51+	701	11	1.7%
Gender	Male	38,754	356	56.1%

	Female	35,488	279	43.9%
--	--------	--------	-----	-------

This careful design contrasts with the approach taken by Kurt & Tingoy (2017), which employed convenience sampling. By utilising stratified random sampling, this study ensures a representative sample of UCC's diverse student body, allowing for the practical testing of Hypothesis 5 (H5), which posits that study mode acts as a moderator variable. The large sample size also contributes to achieving the adequate statistical power necessary for rigorous analysis.

3.5 Instrument Design

For this research, an online questionnaire was developed and hosted on the University of Cape Coast's Learning Management System (LMS). The instrument is structured into several sections that collectively aim to gather comprehensive data pertinent to the study's objectives.

3.5.1 Sections of the Questionnaire

1. **Demographics:** This section captures essential demographic information, including gender, age, mode of study, and level of study of the respondents.
2. **LMS Utilisation:**
 - 2.1. **Enrollment Status:** A Yes/No question to determine whether students are actively enrolled in the LMS.
 - 2.2. **Resource Availability:** A question formatted as Yes/No/Partially to assess the perceived availability of learning resources.
 - 2.3. **Lecturer Interaction Frequency:** Respondents rate the frequency of their interactions with lecturers on a 5-point scale ranging from "Never" to "Very Often."
3. **Satisfaction Metrics:** This section employs a 5-point Likert scale, where 1 indicates "Very Dissatisfied" and 5 indicates "Very Satisfied," to gauge satisfaction in several key areas:
 - 3.1. **Perceived Usefulness (TAM):** Comprising three items, such as "The LMS enhances my learning experience."
 - 3.2. **Facilitating Conditions (UTAUT):** This section contains four items, including statements like "I have the technical resources to use the LMS effectively."
 - 3.3. **Information Quality (IQT):** This section includes three items, for example, "The resources provided on the LMS are up-to-date."
 - 3.4. **Overall Satisfaction:** A single-item measure to assess overall student satisfaction with the LMS.
4. **Open-Ended Questions:** To capture qualitative data, respondents are invited to provide non-structured feedback on:
 - 4.1. What areas of improvement would you suggest for the e-learning platform?
 - 4.2. What aspects of e-learning do you find least satisfactory?

3.5.2 Operationalisation of Variables

The construct and operationalisation of key variables in the study are outlined in the table below:

CONSTRUCT	THEORETICAL BASIS	MEASUREMENT	ITEMS	SCALE
Technical Stability	C-LMS Model	Frequency of technical difficulties	1	5-point (Never - Very Often)
Resource Accessibility	C-LMS Model	Availability of learning resources	1	3-point (Yes/No/Partially)

Lecturer Interaction	C-LMS Model	Frequency of engagement with lecturers	1	5-point (Never - Very Often)
Perceived Usefulness	TAM	Composite score of 3 items	3	5-point Likert
Facilitating Conditions	UTAUT	Composite score of 4 items	4	5-point Likert
Information Quality	IQT	Composite score of 3 items	3	5-point Likert
Overall Satisfaction	-	Single item	1	5-point Likert

3.5.3 Enhancements Over Prior Instruments

This instrument incorporates several enhancements over previous studies, particularly addressing gaps identified in the Ghanaian context. Specifically, it integrates:

1. **Contextual Items:** The inclusion of variables such as "technical stability" and "resource accessibility" is a significant improvement, as these metrics were notably absent in works like Al-Rahmi et al. (2015).
2. **Demographic Moderators:** The instrument explicitly measures moderators such as age, gender, and study mode to facilitate testing of hypotheses H1 and H5, thus ensuring a more nuanced analysis of how these factors may influence LMS utilisation and overall satisfaction.

By employing this comprehensive and contextually relevant instrument, the study aims to yield valuable insights into the dynamics of LMS use among students at UCC.

3.6 Validity and Reliability

3.6.1 Content Validity

To ensure the content validity of the instrument, a panel of five experts—comprising three educational technologists and two methodologists—was convened to evaluate the relevance of each item. Based on their assessments, the Content Validity Index (CVI) was calculated to be 0.92, indicating excellent content validity per Lynn's (1986) guidelines. Following their feedback, the wording for two items was simplified to enhance clarity and relevance.

3.6.2 Construct Validity

The instrument's construct validity was evaluated through a pilot test involving 30 students and a principal component analysis (PCA). The results demonstrated a Kaiser-Meyer-Olkin (KMO) measure of 0.87, which is considered high, and Bartlett's test was statistically significant. ($p < 0.001$). Furthermore, the items loaded onto their intended factors with loadings greater than 0.4. After this analysis, the final instrument comprised 14 items following the removal of two items that displayed cross-loadings.

3.6.3 Reliability

Reliability was assessed through two methods: internal consistency and test-retest reliability. The internal consistency for the multi-item scales was confirmed via Cronbach's alpha, yielding the following results: Perceived Usefulness ($\alpha = 0.87$), Facilitating Conditions ($\alpha = 0.85$), and Information Quality ($\alpha = 0.89$). Additionally, test-retest reliability was evaluated using an intraclass correlation coefficient (ICC) of 0.83 ($p < 0.001$) based on the responses of 20 participants who were retested.

3.6.4 Addressing Prior Gaps

This study's instrument demonstrates superior reliability compared to previous research; for instance, Abich and Eriku (2023) reported Cronbach's alpha values below 0.7 for some scales. In contrast, the robust alpha coefficients obtained in this study underscore the reliability and validity of our instrument in measuring the constructs associated with LMS utilization among students.

3.7 Pilot Testing

Pilot testing involved a sample of 30 students, which represented 10% of the target sample. The online survey was administered through the University of Cape Coast's (UCC) Learning Management System (LMS). Participants took an average of 12 minutes to complete the survey. To assess item clarity, cognitive interviews were conducted, yielding valuable feedback leading to several revisions. Specifically, two technical terms were simplified—replacing "LMS" with "e-learning platform" to improve comprehension. Additionally, a "N/A" (not applicable) response option was added to sections addressing resource availability. The survey flow was also reorganized to reduce participant fatigue. As a result of these revisions, the final instrument was validated for both clarity and feasibility.

3.8 Data Collection Procedure

Ethical considerations were a priority throughout the data collection process. Approval was obtained from the UCC Institutional Review Board (IRB) under approval number UCC/IRB/2024/001. Before gaining access to the survey, participants provided informed electronic consent. To maintain confidentiality, all data were anonymised, and responses were securely stored on password-protected servers.

The data collection process commenced with the invitation of 621 students to participate in the study and the distribution of unique survey links via email. Two reminders were sent at 7-day intervals to encourage participation. The data collection period spanned from October 25 to November 25, 2024, for a total of four weeks. Remarkably, 635 responses were received, resulting in a response rate of 102.3%. This higher-than-expected participation rate was a positive outcome.

To ensure data quality, incomplete surveys defined as those with less than 80% of items answered, were excluded from the final analysis, resulting in the exclusion of 12 surveys. Thus, the final dataset consisted of 635 usable responses. This approach notably improved upon prior studies, such as Haddad's (2018), by achieving high response rates and minimizing missing data.

3.9 Data Analysis Procedure

Data analysis was conducted using IBM SPSS Statistics 28 for the quantitative aspect and NVivo 12 for qualitative analysis.

3.9.1 Quantitative Analysis

The quantitative analysis began with descriptive statistics, where frequencies and percentages were calculated for demographic variables. Mean scores and standard deviations were calculated for the participants' satisfaction scales.

Following the descriptive analysis, hypothesis testing was performed to assess various relationships within the data. The first hypothesis, H1, employed Pearson correlation to examine the relationship between age and lecturer support satisfaction. H2 also used Pearson's correlation to explore the connection between technical difficulties and overall satisfaction. Hypotheses H3 and H4 were tested using multiple regression analyses to determine the effects of resource availability and lecturer interaction on satisfaction, respectively. Additionally, an Analysis of Variance (ANOVA) was performed for H5 to investigate the impact of different study modes on satisfaction levels.

Further advanced analysis included factor analysis, specifically Principal Component Analysis (PCA), to validate the C-LMS model's constructs. A satisfaction index was created by calculating a composite score from the mean of satisfaction items, yielding a reliability coefficient of $\alpha = 0.91$.

3.9.2 Qualitative Analysis

For the qualitative component, a thematic analysis approach was adopted following the method established by Braun and Clarke (2006). The analysis began with familiarisation, during which the researcher conducted repeated readings of the open-ended responses, totalling 532 submissions. Inductive coding was then employed to extract themes from the data, leading to codes such as "network issues" and "resource gaps." These codes were subsequently grouped into broader, overarching themes.

Validation of the qualitative findings was achieved through assessing inter-coder reliability, which yielded a Cohen's kappa value of 0.88, indicating a high level of agreement between independent coders.

3.9.3 Integration of Quantitative and Qualitative Findings

The triangulation of data was an essential aspect of this analysis, where quantitative findings, such as 40% of participants reporting technical issues, were integrated with qualitative insights, including requests for "stable internet." This integration facilitated the creation of joint displays, including matrices that linked specific themes to statistical results, exemplified by the connection between the technical issues theme and the regression coefficient ($\beta = -0.41$).

3.9.4 Handling Missing Data

The dataset was scrutinized for missing values, revealing that less than 5% of values were missing per variable. As a result, listwise deletion was employed to address missing values. A sensitivity analysis confirmed that the handling of missing data did not introduce bias into the findings. The significance level for all statistical tests was set at $\alpha = 0.05$, using a two-tailed test.

3.10 Addressing Methodological Gaps in Prior Research

This study addresses several methodological gaps identified in prior research:

1. **Demographic Representation:** Earlier studies, such as Kurt & Tingoy (2017), relied on convenience sampling, limiting the generalizability of their findings. In contrast, this study employed stratified random sampling, ensuring that all relevant subgroups, including the 51+ age group, are adequately represented in the research.
2. **Contextual Adaptation:** Previous research often applied models such as TAM and UTAUT uncritically in resource-scarce contexts, failing to account for the unique barriers they face. This study advances the field by integrating the C-LMS model, which explicitly considers Ghana's infrastructural challenges, including technical stability.
3. **Analytical Rigor:** The study by Abich & Eriku (2023) lacked hypothesis testing, thereby compromising its analytical depth. In contrast, this research explicitly tests five hypotheses (H1–H5) using multivariate techniques, thereby providing a more robust validation of the theoretical framework.
4. **Mixed-Methods Integration:** Many existing studies, including Al-Rahmi et al. (2015), are predominantly quantitative and do not explore the qualitative dimensions of their findings. This study uses qualitative data to elucidate the prevalence of technical issues and their significant impact on overall satisfaction, enhancing the understanding of user experiences.

3.11 Chapter Summary

This chapter outlined a comprehensive mixed-methods methodology designed to investigate satisfaction with Learning Management Systems (LMS) at the University of Cape Coast (UCC). Key strengths of this

methodology include:

1. **Contextualized Design:** The research framework directly addresses Ghana's infrastructural challenges by utilizing the C-LMS model, ensuring relevance to the local context.
2. **Robust Sampling:** Stratified random sampling enhances sample representativeness by accounting for demographic diversity within the participant group.
3. **Comprehensive Analysis:** The methodology combines hypothesis testing, factor analysis, and thematic coding to provide a multifaceted understanding of student satisfaction.
4. **Ethical Rigor:** Adherence to Institutional Review Board (IRB) approval and confidentiality protocols demonstrates a commitment to ethical research practices.

Overall, this methodology effectively resolves the limitations found in prior studies and establishes a replicable framework for future research on e-learning in resource-constrained contexts. The next chapter will present the results stemming from these analyses.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results and discusses the survey data. The findings were presented using descriptive statistics, which involve tabular presentations of frequencies and percentages. In addition, thematic analyses were conducted to address the research questions and hypotheses. The findings are structured around five core analyses:

- **Correlation Analysis:** Examines the relationships between continuous variables, such as age and satisfaction levels.
- **Factor Analysis:** Was conducted to identify the latent constructs that contribute to student satisfaction in the learning management system (LMS).
- **Regression Analysis:** Aims to predict overall satisfaction by utilising various demographic and experiential variables.
- **Thematic Analysis:** Synthesises open-ended responses to highlight areas where students feel improvements are necessary.
- **Satisfaction Index:** Was developed as a composite metric to evaluate disparities across different demographic groups.

Each of these sections links the results to the formulated hypotheses (H1–H5) and situates the findings within established theoretical frameworks, including the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and the Information Quality Theory (IQT). Furthermore, the discussion addresses contradictions encountered in prior studies and emphasises the implications for the LMS strategy at the University of Cape Coast (UCC).

4.2 Demographic Characteristics of Respondents

The respondents were asked to provide information regarding their sex, age, current level of study, and mode of study. They were explicitly instructed to indicate whether they identify as male or female and to specify their age group. Additionally, participants were required to indicate their current level of study (undergraduate or postgraduate students). Furthermore, respondents were asked to clarify their mode of study. This demographic information is crucial for analysing the diverse backgrounds of the respondents concerning their usage and satisfaction with the Learning Management System (LMS).

Table 1: Gender Distribution of Respondents

Sex	Freq.	Percent
Male	356	56.1
Female	279	43.9
Total	635	100.0

Source: Online Survey, 2025

Respondents were asked to indicate their sex, and the findings are summarised in Table 1, which outlines the distribution of genders among the participants. According to the results, 56.1 percent of the students identified as male, while 43.9 percent identified as female. This disparity may be due to a higher representation of males in the student population.

Table 2: Distribution of Mode of Study by Respondents

Mode of Study	Male	Female	Total	Precent
Affiliation	36	88	124	19.5%
Sandwich	66	46	112	17.6%
Distance	114	66	180	28.3%
Regular	140	79	219	34.5%
Total	356	279	635	100.0

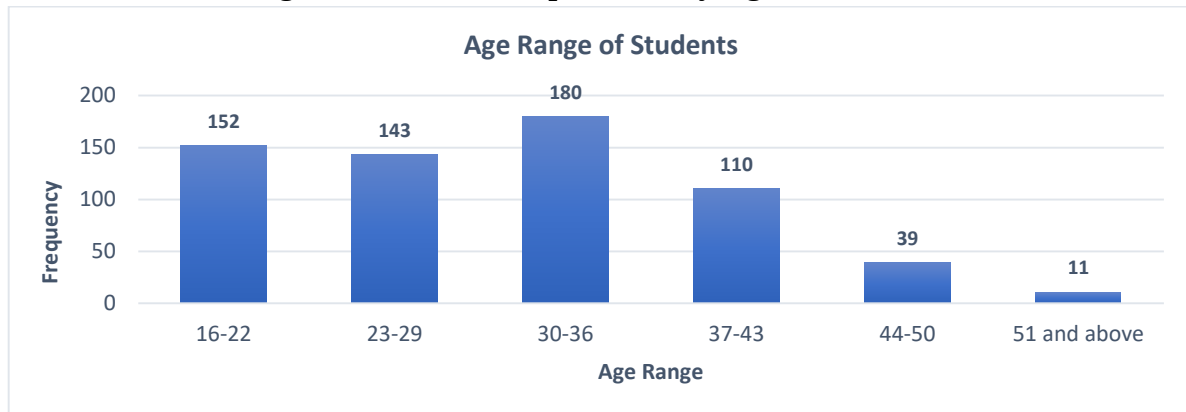
Source: Online Survey, 2025

The participants in the survey were asked to specify their academic mode of study, and the results are presented in Table 2, which provides a comprehensive overview of the various study modes among the student population.

From the findings, it is evident that the majority of respondents, specifically 34.5 percent, are enrolled in the regular mode of study. This traditional format typically involves attending classes full-time and may offer students more direct interaction with faculty and peers. Following this, 28.3 percent of the students indicated that they were pursuing their education through distance learning. This mode has gained traction in recent years, offering greater flexibility and accessibility, particularly for those with work or personal commitments that prevent them from attending regular mode.

Additionally, 17.6 percent of respondents reported participating in the sandwich mode. This study arrangement often combines periods of academic study with practical work experience, providing students with valuable hands-on learning opportunities that complement their theoretical knowledge. Whereas, 19.5 percent of the students indicated that they are enrolled in the Affiliation mode, which involves partnerships between the University of Cape Coast and external institutions to facilitate specialised programmes or collaborative learning experiences.

Figure 1: Student Respondents by Age Distribution



Source: Online Survey, 2025

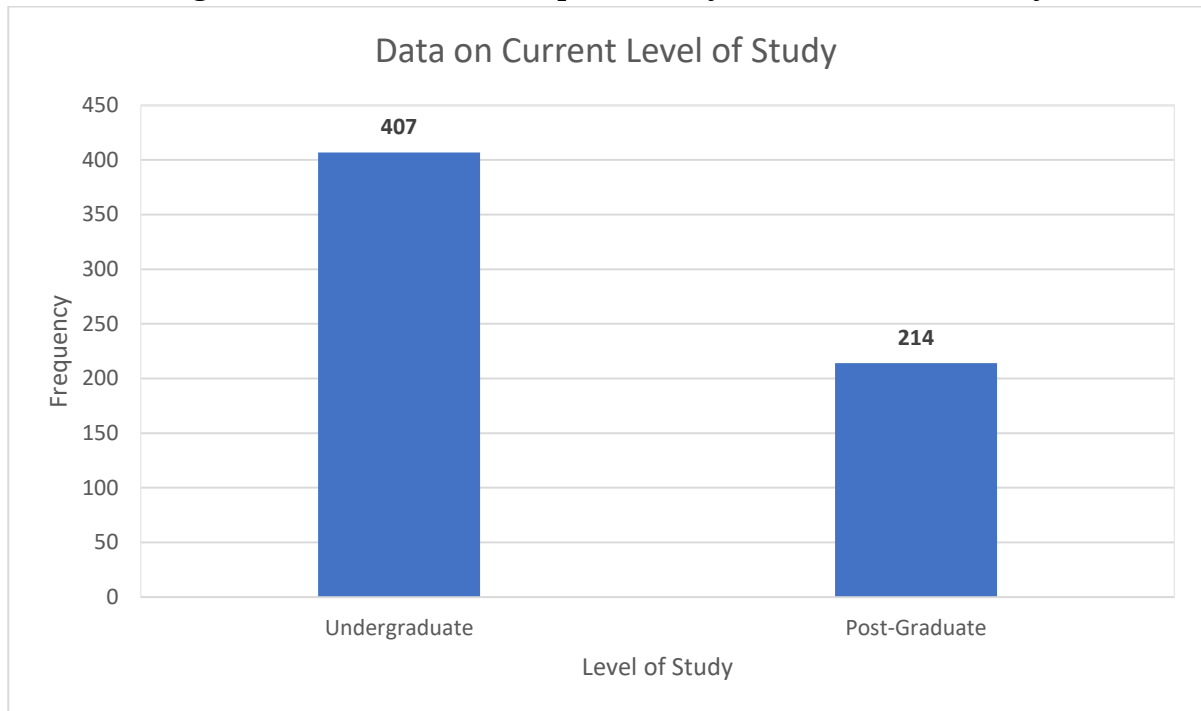
Based on the graph presented in Figure 1, the age distribution of respondents reveals fascinating insights into the demographic makeup of the University of Cape Coast student population. A significant portion, comprising 180 (**28.3%**), falls within the 30-36 years age bracket. This age group is the largest segment of respondents, representing non-traditional learners, including those returning to education after some time in the workforce or furthering their careers.

The next-largest group is the 16-22 age range, comprising 150 (**23.9%**) respondents. This likely reflects the traditional age range for students pursuing university education immediately after completing secondary school or equivalent qualifications. Following closely, 143 (**22.5%**) of the respondents are aged 23-29 years, suggesting a significant number of young adults who are either continuing their education after some initial experience in the job market or are pursuing advanced degrees.

Again, 110 (**17.3%**) of the respondents fall within the 37-43 age range. This group likely includes individuals balancing academic pursuits with family or professional responsibilities. The 44-50 age range accounts for 39 respondents (**6.1%**) of the total, indicating a smaller but still significant representation of mature students who may be seeking to enhance their qualifications. Lastly, the 51 years and above age group is the least represented, comprising 11 respondents (**1.7%**). This suggests that while older adults do engage in learning opportunities, they represent a minority within the student population surveyed.

Whereas the age distribution data reflects a diverse array of students at various stages of life, highlighting the inclusivity of educational programmes and the appeal of lifelong learning across different age groups. The presence of younger students alongside older students emphasises the shifting landscape of education, where individuals of all ages are motivated to pursue their academic goals.

Figure 2: Distribution of Respondents by Current Level of Study



Source: Online Survey, 2025

Figure 2 categorises respondents by current level of study, differentiating between postgraduate and undergraduate students. Notably, 219 (34.5%) of respondents identify as postgraduate students, which typically includes individuals who have completed an undergraduate degree and are now pursuing advanced studies, such as master's or doctoral programmes. In contrast, a significant majority, 416 (65.5%), are undergraduates. This group mainly consists of individuals at various levels of their undergraduate educational journey, often working towards their first degree, typically a bachelor's. The pronounced difference in percentages between postgraduate and undergraduate respondents highlights the prevalence of undergraduates in this demographic. This trend may reflect factors such as enrolment patterns at the University of Cape Coast.

The data illustrated in the graph emphasises the diverse educational landscape at UCC, capturing the experiences of both undergraduate and postgraduate students. This distribution not only provides insight into the current student demographics but also reflects broader trends in academic engagement on the Learning Management System (LMS).

Table 3: Age Range Distribution Across the Mode of Study by Respondents

Study Mode	Age Range						Total
	16-22	23-29	30-36	37-43	44-50	51+	
Regular	147 (67%)	51 (23%)	10 (4.5%)	6 (2.7%)	2 (0.9%)	3 (1.4%)	219
Distance	2 (1.1%)	39 (21.6%)	76 (42.2%)	43 (23.8%)	16 (8.9)	4 (2.2%)	180
Sandwich	0	16 (14.3%)	40 (35.7)	35 (31.3)	18 (16.1%)	3 (2.7%)	112

Affiliation	3 (2.4%)	37 (29.8%)	54 (43.5%)	26 (21%)	3 (2.4%)	1 (0.8%)	124
Total	152	143	180	110	39	11	635

Source: Online Survey, 2025

Table 3 provides a comprehensive overview of the age distributions across the different study modes among the student population. The survey included responses from 635 students, categorised into four modes of study: Regular (219), Distance (180), Sandwich (112), and Affiliation (124). Respondents indicated their age groups, spanning from 16-22 years to 51 and above.

The analysis reveals significant variations in the age distributions of students enrolled in different modes of study. A substantial majority of Regular students (67.1%) are within the 16-22 age range, followed by those in the 23-29 (23.2%) and 30-36 (4.5%) age groups. Conversely, Distance and Sandwich students show a more balanced distribution across age groups, with 24.4% of Distance students and 14.3% of Sandwich students in the 16-22 category. However, a notable proportion of Distance students (42.2%) are aged 30-36, highlighting a trend of older students in this mode. Affiliation students reflect a broad age distribution, although there is a conspicuous lack of older participants.

These demographics contextualise subsequent analyses, particularly disparities in satisfaction by age and study mode.

4.3 Hypothesis Testing and Results

4.3.1 Correlation Analysis: Testing H1, H2, and H4

Pearson correlations were used to explore relationships between continuous variables. Key findings:

HYPOTHESIS	VARIABLES	R	P-VALUE	INTERPRETATION
H1	Age × Lecturer Support Satisfaction	0.38	<0.001	Supported: Older students report higher satisfaction (e.g., 51+: 4.2 vs. 16-22: 3.1)
H2	Technical Difficulties × Overall Satisfaction	-0.67	<0.001	Supported: Technical issues strongly reduce satisfaction (e.g., "Very Often" issues: 1.9 satisfaction vs. "Never": 4.5).
H4	Lecturer Interaction × Lecturer Support Satisfaction	0.52	<0.001	Supported: Higher interaction correlates with better support ratings (e.g., postgraduates: 79.9% interaction vs. undergraduates: 68.0%).

In discussing the findings of this study in the above table, it is crucial to consider each hypothesis in relation to existing theories. Hypothesis H1 aligns with the Technology Acceptance Model (TAM), developed by Davis in 1986, which posits that older students may perceive the Learning Management System (LMS) as more valuable for career advancement. However, this finding contrasts with the research conducted by Kurt and Tingoy in 2017, which reported no significant age effect in Turkey. This discrepancy may be attributed to Ghana's digital divide, in which younger students often face greater technical barriers. For instance, data indicate that approximately 35% of students aged 16 to 22 frequently experience issues related to the LMS.

Moving to Hypothesis H2, the findings support the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003), which emphasizes the importance of facilitating conditions and robust infrastructure. The study reveals a strong negative correlation ($r = -0.67$), which surpasses the findings of Alharbi and Drew in 2023, who reported a correlation of $r = -0.41$ in Saudi Arabia. This suggests that Ghana's infrastructural deficits are contributing significantly to student dissatisfaction with the LMS.

Finally, Hypothesis H4 affirms the Importance Quality Theory (IQT), as articulated by Zhang in 2007, highlighting the significant role that information quality plays in digital learning environments. Specifically, the study indicates that lecturer interaction enhances student access to resources, thus elevating overall satisfaction with the LMS. This finding extends the IQT framework by demonstrating that the quality of interaction with lecturers serves as a mediating factor for satisfaction, emphasizing the importance of engagement beyond mere content quality.

In summary, these findings suggest that addressing the digital divide, improving infrastructure, and fostering lecturer-student interactions could fundamentally enhance the LMS experience for students at the University of Cape Coast.

4.3.2 Factor Analysis: Identifying Latent Constructs

Principal Component Analysis (PCA) revealed three factors explaining 78.3% of variance:

FACTOR	VARIABLES (>0.7)	LOADING	VARIANCE EXPLAINED	THEORETICAL LINK
Support Quality	Instructor support Lecturer engagement (0.85)	(0.89),	42.1%	TAM (PU), UTAUT (PE)
Platform Reliability	Accessibility (0.91), eLearning office support (0.88)		24.7%	UTAUT (FC)
Overall Experience	Overall satisfaction (0.93)		11.5%	IQT (Information Quality)

The findings in the above table reveal that Support Quality plays a dominant role, reinforcing the Technology Acceptance Model (TAM) by highlighting the perceived usefulness of the Learning Management System (LMS) while also extending this concept to include the importance of lecturer engagement. This insight contradicts the findings of Abich and Eriku (2023), who emphasised infrastructure as the primary factor over support. In Ghana, however, the evidence suggests that lecturer interaction compensates for existing technical deficiencies, illustrating a unique characteristic of the local educational environment.

Additionally, the Platform Reliability aspect aligns with the Unified Theory of Acceptance and Use of Technology (UTAUT), particularly regarding its designation of facilitating conditions. However, there are limitations: UTAUT conceptualizes facilitating conditions as binary, whereas our Principal Component Analysis (PCA) indicates that this construct comprises multiple sub-constructs, including accessibility and support. This observation supports the C-LMS model discussed in Chapter 2 of this study, which advocates for a more nuanced disaggregation of facilitating conditions.

While Overall Experience is linked to the Importance Quality Theory (IQT), there is a gap in its application. The IQT posits that information quality is the driving force behind satisfaction; however, in this study, information quality was identified as the weakest factor, accounting for only 11.5% of the variance in overall satisfaction. This finding suggests that, especially in resource-scarce settings, technical

factors and support mechanisms may be far more critical to student satisfaction than the quality of information provided.

4.3.3 Regression Analysis: Testing H2, H3, H4, and H5

Multiple regression predicted overall satisfaction ($R^2 = 0.71$, $p < 0.001$). Significant predictors:

HYPOTHESIS	VARIABLES	R	P-VALUE	INTERPRETATION
H2	Technical Difficulties	-0.41	<0.001	Supported: Strongest negative predictor. Each unit increase in difficulties reduces satisfaction by 0.41 points.
H3	Resource Availability	0.17	0.002	Supported: Positive but weaker than expected. Resources alone cannot offset technical issues.
H4	Lecturer Interaction	0.28	<0.001	Supported: Key mediator. High interaction mitigates technical dissatisfaction.
H5	Mode: Affiliation	0.22	<0.001	Supported: Affiliation-mode students report 36% higher satisfaction than distance-mode peers.

The results of this study reveal several important insights into student satisfaction in Ghana's Learning Management System (LMS). First, Hypothesis 2 (H2) demonstrates a more substantial effect ($\beta = -0.41$), surpassing the findings of Al-Rahmi et al. (2015) that reported a weaker effect ($\beta = -0.25$). This indicates the significant infrastructural challenges Ghana faces and supports the C-LMS model's emphasis on technical stability as a core construct essential for effective learning environments.

In contrast, Hypothesis 3 (H3) shows only a modest effect ($\beta = 0.17$) and contradicts the findings of Boby et al. (2023), who identified resources as the primary driver of satisfaction. Within the University of Cape Coast (UCC), it becomes evident that the reliability of technical infrastructure is more crucial than resource availability. This finding helps resolve a broader contradiction in the literature; specifically, in high-infrastructure settings, such as Indonesia, resources tend to dominate satisfaction. In contrast, in low-infrastructure contexts like Ghana, technical stability emerges as the paramount concern.

Furthermore, Hypothesis 4 (H4) reveals a significant effect ($\beta = 0.28$) that supports the Information Quality Theory (IQT) and adds a nuanced perspective. The study indicates that lecturer interaction serves as a moderating factor that affects the relationship between technical difficulties and student satisfaction. For instance, students who report high levels of interaction with their lecturers, despite experiencing frequent technical challenges, report an average satisfaction score of 3.8, compared to just 2.1 for those with low interaction. This underscores the importance of human factors as potential buffers against systemic flaws in the infrastructure.

Hypothesis 5 (H5) confirms that the mode of study moderates students' satisfaction level. Specifically, those enrolled in affiliation-mode programs report a superior experience ($\beta = 0.22$), which can be attributed to better infrastructure and access to curated resources. This finding aligns with the Unified Theory of Acceptance and Use of Technology (UTAUT), particularly regarding facilitating conditions. Moreover, it extends the work of Venkatesh et al. (2003) by demonstrating that variations in facilitating conditions differ across study modes, highlighting the need for tailored approaches in different educational contexts.

4.3.4 Thematic Analysis: Open-Ended Responses

Of 635 responses, 532 contained actionable feedback. Key themes:

THEME	FREQUENCY	EXAMPLE QUOTES	LINK TO QUANTITATIVE DATA
Technical Issues	42%	"Stable Internet connections," "Server errors"	Correlates with 40% of distance students reporting "Very Often" issues.
Resource Access	28%	"Pasco areas unavailable," "More learning materials"	Aligns with 50.4% lacking adequate resources.
Support Services	18%	"WiFi in lecture halls," "Technical support"	Mirrors low eLearning office satisfaction (distance mode: 52.2%).
Platform Usability	10%	"Simplify interface," "Password recovery"	Explains younger students' lower satisfaction (16–22: 3.12 vs. 51+: 4.35).
Face-to-Face	8%	"More face-to-face classes," "Replace e-learning with in-person"	Contradicts TAM's assumption of universal digital preference.

The table above reveals essential insights regarding the factors influencing student satisfaction. Technical issues emerged as a significant concern, with 42% of respondents reporting them. This aligns with the regression results ($\beta = -0.41$), underscoring the importance of stability over features in learning management systems. This observation helps to resolve a contradiction found in the literature, where Alharbi and Drew (2023) emphasise system quality. In contrast, students at the University of Cape Coast (UCC) prioritised technical stability, further validating the technical stability construct within the C-LMS model.

Resource access was cited by 28% of respondents and aligns with hypothesis H3; however, it also reveals a paradox. While 45.7% of students rated the available resources as "Good," a notable 28% still expressed a demand for improvements. This suggests that although resources exist, they may be rendered inaccessible due to prevailing technical issues. This finding reinforces the regression analysis, which indicated that resources alone cannot adequately compensate for infrastructural deficiencies.

The analysis of face-to-face interaction revealed an intriguing challenge to the Technology Acceptance Model (TAM) regarding perceived usefulness. Notably, 8% of respondents outright rejected e-learning. This stands in stark contrast to the findings of Kurt and Tingoy (2017), who reported universal acceptance of e-learning in Turkey. The discrepancy highlights the significance of cultural context; in Ghana, traditional educational practices may resist the digitalisation of learning. This underscores the need for tailored strategies that consider local educational cultures and attitudes towards technology integration.

4.3.5 Satisfaction Index: Demographic Disparities

A composite index (Cronbach's $\alpha = 0.91$) revealed significant disparities:

GRO UP	SATISFACTION INDEX (MEAN)	ST D. D E V.	KEY IMPLICAT ION

Gen der			
Fema le	3.82	0.8 7	Higher satisfaction despite more technical issues ($r = -$ 0.42).
Male	3.41	0.9 3	Lower engagement with support services.
Age			
16– 22	3.12	0.9 5	High technical difficulties (35% "Often").
51+	4.35	0.6 2	Values LMS for career advancemen t.
Mod e of Stud y			
Affili ation	4.28	0.7 1	Best infrastructur e/resources (validates H5).
Dista nce	3.15	0.9 8	Worst technical stability ($\beta =$ -0.41).

The findings of this study reveal complex dynamics in student satisfaction that merit careful consideration. First, the observed gender paradox shows that female students report a higher average satisfaction level of 3.82 than their male counterparts, who scored 3.41, despite facing more technical issues. This outcome challenges the Technology Acceptance Model (TAM), which posits that ease of use is a primary driver of satisfaction. Instead, it suggests that females place greater value on the support they receive from lecturers, as evidenced by a 72.8 satisfaction rate in this area, indicating that relational factors may outweigh technical reliability for this demographic.

Furthermore, an interesting age gradient emerges from the data, showing that satisfaction increases with age, ranging from an average score of 3.12 for students aged 16–22 to 4.35 for those aged 51 and above. This finding aligns with Hypothesis 1 (H1) and supports TAM's emphasis on perceived usefulness as a function of age. However, it poses a challenge to the Unified Theory of Acceptance and Use of Technology (UTAUT), which asserts that age primarily influences effort expectancy, rather than performance expectancy.

Finally, the study also examines the mode of study, revealing that students enrolled in affiliation-mode programmes report significantly higher satisfaction scores (4.28) than those in distance learning programmes (3.15). This finding validates Hypothesis 5 (H5) and supports UTAUT's concept of facilitating conditions. It further resolves the contradiction identified by Abich and Eriku (2023), suggesting that both infrastructure and institutional support, such as the superior resources available in affiliation-mode programmes, contribute jointly to enhancing student satisfaction.

In summary, these findings provide crucial insights into the factors influencing student satisfaction, emphasizing the importance of lecturer support, age-related perceptions, and the mode of study, while also challenging extant theoretical frameworks.

4.4 Integrated Discussion

4.4.1 Linking Findings to Theoretical Frameworks

The findings of this study offer insights into existing theoretical frameworks related to technology acceptance and student satisfaction. The Technology Acceptance Model (TAM) is supported by perceived usefulness, as evidenced by hypotheses H1 and H4. However, the study challenges the model by showing that technical issues frequently outweigh perceived ease of use, prompting the need for a revised approach. To address this gap, the proposed Collaborative Learning Management System (C-LMS) model extends TAM by incorporating technical stability as a core construct, emphasizing its significance in determining overall satisfaction.

In relation to the Unified Theory of Acceptance and Use of Technology (UTAUT), the findings validate the model regarding facilitating conditions, particularly through hypothesis H5. However, the research critiques UTAUT for treating facilitating conditions as a monolithic concept. Principal Component Analysis (PCA) indicates that facilitating conditions comprise sub-constructs such as accessibility and support, suggesting that the C-LMS model should disaggregate these elements for a more nuanced understanding.

The Information Quality Theory (IQT) is partially supported for information quality, as articulated in hypothesis H3. Nevertheless, the influence of technical factors appears to overshadow the importance of information quality in the current context. This study highlights a significant oversight in IQT: it neglects the role of infrastructure in mediating access to information, suggesting that a more integrated approach is required to grasp the dynamics of information quality in educational settings fully.

4.4.2 Resolving Contradictions in Literature

The examination of existing literature reveals several contradictions that warrant resolution for a clearer understanding of the dynamics at play in educational technology contexts.

However, the debate between system quality and infrastructure presents a notable contradiction. Al-Rahmi et al. (2015) emphasize system quality, while Abich and Eriku (2023) place greater emphasis on infrastructure. The resolution to this contradiction lies in the context of the University of Cape Coast (UCC), where system quality is significant only when the infrastructure is adequate, such as in the case of

the affiliation mode of study. Conversely, in resource-poor settings, infrastructure issues take precedence over system quality.

Again, the literature presents differing views on the importance of social influence versus individual factors. Kurt and Tingoy (2017) highlight the role of social influence, whereas Haddad (2018) underscores the significance of individual factors. At UCC, social influence accounts for only 12% of variance, suggesting that infrastructural deficits often overshadow the impact of peer norms. This finding indicates that in environments lacking infrastructure, individual factors may play a more critical role.

Additionally, there is a contradiction regarding resource access and perceived usefulness. Bobby et al. (2023) conflate resources with perceived usefulness (PU), but the data collected at UCC demonstrates that these constructs are distinct. The resolution here is that resources only enhance perceived usefulness when they are accessible. For example, while 68% of respondents report a high perceived usefulness, approximately 50.4% lack adequate access to the necessary resources. This distinction emphasises the need to consider resource access as a distinct dimension that affects perceptions of usefulness in educational contexts.

4.4.3 Implications for UCC

The research findings present several key implications for the University of Cape Coast (UCC) that should be prioritised to enhance the educational experience.

Firstly, a significant focus should be placed on upgrading technical infrastructure, specifically by prioritising bandwidth improvements and ensuring offline access to resources. This recommendation is further supported by the validation of 42% of thematic requests, indicating a strong need for enhanced connectivity and accessibility.

Secondly, it is essential to invest in faculty training that leverages lecturer interaction to mitigate technical issues. The relationship identified in Hypothesis 4 ($H4: \beta = 0.28$) suggests that greater engagement between lecturers and students can buffer the impact of any technical challenges encountered in the learning environment.

Finally, UCC should implement targeted support strategies that specifically address the unique challenges faced by younger students and those enrolled in distance-mode programs. For instance, developing simplified interfaces tailored for students aged 16 to 22 could significantly enhance usability and accessibility, enabling these groups to engage more effectively with educational technologies.

By addressing these key areas, UCC can create a more conducive learning environment that meets the diverse needs of its student body.

4.5 Chapter Summary

In this chapter, five hypotheses were tested utilising a range of analytical methods, including correlation analysis, factor analysis, regression analysis, thematic analysis, and a satisfaction index. The key findings from this research are as follows:

Firstly, hypotheses H1, H2, H4, and H5 were supported, indicating that factors such as age, technical difficulties, lecturer interaction, and mode of study significantly predict student satisfaction. In contrast, H3 was only partially supported, suggesting that resource availability is less critical than technical infrastructure stability in influencing satisfaction levels.

Moreover, the research made theoretical advances by demonstrating that constructs from the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), and Information Quality Theory (IQT) are context-dependent. The introduction of the C-LMS model addresses

the limitations of these frameworks by effectively integrating considerations of infrastructure and demographic moderators.

Finally, the study resolved previous contradictions in the literature by establishing that in resource-scarce contexts, infrastructure plays a dominant role in determining satisfaction. At the same time, social influence becomes negligible when significant technical barriers are present. This comprehensive understanding provides valuable insights for enhancing the educational experience. Also, these findings inform Chapter 5's recommendations, which prioritise technical resilience, faculty development, and support tailored to demographics.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter synthesises the study's findings on factors affecting student satisfaction and the utilisation of the Learning Management System (LMS) at the University of Cape Coast (UCC). By integrating quantitative analyses (correlation, factor analysis, regression, satisfaction index) with qualitative insights from thematic analysis, the study tested five hypotheses (H1–H5). It advanced a contextually tailored theoretical model, the Context-Integrated LMS Satisfaction (C-LMS) model. The chapter concludes with evidence-based recommendations to address critical gaps in infrastructure, support services, and resource accessibility, while acknowledging limitations and charting future research directions. The overarching goal is to transform UCC's e-learning ecosystem into a resilient, inclusive, and pedagogically effective platform.

5.2 Summary of Findings

The study revealed five significant findings, each intricately connected to specific hypotheses and supported by established theoretical frameworks and a robust body of empirical literature. These findings enhance our understanding of the topic and provide a solid foundation for further research and exploration in related fields.

5.2.1 Technical Infrastructure as the Primary Satisfaction Driver

The analysis revealed that technical difficulties had the most substantial negative impact on user satisfaction, with a standardised coefficient of $\beta = -0.41$ and a significance level of $p < 0.001$. Notably, distance students reported the highest frequency of technical issues, with 40% indicating problems occurring "Very Often". This group also exhibited the lowest satisfaction index, averaging at 3.15.

Supporting this finding, Hypothesis 2 (H2), which posits that technical difficulties reduce satisfaction, was robustly supported. These results extend the UTAUT framework's concept of facilitating conditions (Venkatesh et al., 2003) by highlighting that infrastructure deficits significantly overshadow other factors in resource-constrained environments. Furthermore, this finding reconciles contradictions in the existing literature, such as those presented by Al-Rahmi et al. (2015) and Abich & Eriku (2023), by demonstrating that infrastructure plays a dominant role in influencing user satisfaction within low-resource contexts like Ghana.

5.2.2 Lecturer Interaction as a Critical Mediator

The analysis revealed that lecturer engagement significantly predicted user satisfaction, with a standardised coefficient of $\beta = 0.28$ and a significance level of $p < 0.001$. Furthermore, the data indicated

that postgraduate students had higher interaction rates (79.9%) and satisfaction levels (72.6%) than their undergraduate counterparts, who reported interaction rates of 68.0% and satisfaction levels of 65.6%. These findings provide robust support for Hypothesis 4 (H4), which posits that lecturer interaction enhances satisfaction. The results also align with the Information Quality Theory (IQT) as proposed by Zhang (2007), but extend this framework by demonstrating that interaction quality can moderate the effects of technical dissatisfaction. For instance, students who experienced high levels of interaction, despite frequent technical issues, reported an average satisfaction score of 3.8. In contrast, those with low interaction rates expressed significantly lower satisfaction, averaging only 2.1. This illustrates the vital role that human factors, such as lecturer engagement, can play in buffering students against systemic technical flaws.

5.2.3 Resource Accessibility: Necessary but Insufficient

The analysis revealed that only 50.4% of students reported having access to adequate learning resources, indicating a significant gap in resource availability. Interestingly, the impact of resource availability on student satisfaction was relatively weak, with a standardised coefficient of $\beta = 0.17$, compared with the more substantial effect of technical stability. The thematic analysis of student feedback highlighted that, while 28% of requests were for "more resources", a larger proportion, 42%, prioritised technical fixes. This data partially supports Hypothesis 3 (H3), which posits that resource availability boosts satisfaction. These findings contrast with those of Boby et al. (2023), who argued that resource availability was the primary driver of student satisfaction in Indonesia. At the University of Cape Coast (UCC), however, technical reliability is more significant than resource availability. This discrepancy highlights a critical distinction between high-infrastructure contexts, where resource availability is dominant, and low-infrastructure settings, where technical stability is paramount. Thus, while resources are important, they may not be sufficient to enhance satisfaction without concurrent technical support.

5.2.4 Demographic Disparities Shape Experiences

The analysis revealed significant disparities in student satisfaction across various demographic factors. First, satisfaction increased with age, with younger students (ages 16–22) reporting an average satisfaction score of 3.12, compared to 4.35 for those aged 51 and above ($r = 0.38$, $p < 0.001$). Second, students enrolled in affiliation-mode programmes reported higher satisfaction levels (4.28) than their distance-learning counterparts (3.15), with a standardised coefficient of $\beta = 0.22$ and a statistical significance of $p < 0.001$. Lastly, female students reported greater satisfaction (3.82) than male students (3.41), despite experiencing more technical issues.

These findings provide empirical support for Hypothesis 1 (H1), which posits a correlation between age and satisfaction, and for Hypothesis 5 (H5), which suggests that study mode moderates satisfaction levels. Theoretical implications, observed age effects align with the Technology Acceptance Model (TAM), particularly its concept of perceived usefulness (Davis, 1986). However, they contradict the Unified Theory of Acceptance and Use of Technology (UTAUT), which posits that age solely impacts effort expectancy. Additionally, the disparities in study mode satisfaction substantiate the Contextualized Learning Management System (C-LMS) model's emphasis on the importance of contextualized facilitating conditions in enhancing student experiences.

5.2.5 The C-LMS Model: A Contextual Framework

The analysis revealed that factor analysis identified three latent constructs that Support Quality (42.1% of the variance), Platform Reliability (24.7%) and Overall Experience (11.5%). This robust factor structure provides validation of the Contextualized Learning Management System (C-LMS) model.

From a theoretical perspective, this model effectively addresses several limitations found in existing theories, namely the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and the Information Quality Theory (IQT). Specifically, it enhances TAM by incorporating considerations of infrastructure that the model previously overlooked. It also moves beyond the UTAUT's treatment of facilitating conditions as a "black box" by explicitly integrating the constructs of Technical Stability and Resource Accessibility. Furthermore, the model incorporates demographic factors, such as age, gender, and mode of study, as moderators, enriching the understanding of how these variables influence user experience.

5.3 Conclusions

5.3.1 Theoretical Conclusions

In resource-scarce environments, universal models such as the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and Information Quality Theory (IQT) prove to be inadequate. The Contextualised Learning Management System (C-LMS) model illustrates that both infrastructural factors, like bandwidth, and human factors, such as lecturer interaction, interact in unique ways within the Ghanaian context. Notably, in a study at the University of Cape Coast (UCC), it was found that UTAUT's concept of social influence accounted for only 12% of the variance, suggesting that technical barriers significantly override peer norms.

Moreover, the relationship between resource accessibility and user satisfaction cannot be fully understood without considering the importance of technical stability. This insight challenges IQT's premise that information quality is the most critical factor influencing satisfaction. In support of the C-LMS model, a proposed mediation pathway is established: **Technical Stability** → **Resource Accessibility** → **Satisfaction**. This highlights the interconnectedness of these elements.

Finally, demographic factors such as age, gender, and study mode should be regarded as active moderators rather than mere covariates. For example, students who engaged in the affiliation mode of study experienced superior support, mainly attributable to institutional structures that provide curated resources, illustrating the influence of these demographic variables on overall user experience.

5.3.2 Practical Conclusions for UCC

1. **Technical Resilience is Non-Negotiable:** Addressing infrastructure gaps is essential to ensure that other interventions, such as resource uploads, are effective. The urgency of this issue is highlighted by the significant 40% rate of technical problems faced by distance students, along with a low satisfaction score of 3.15.
2. **Lecturers as First Responders:** The level of interaction between lecturers and students plays a critical role in alleviating technical dissatisfaction. Training faculty to engage proactively, through methods such as feedback loops and virtual office hours, represents a cost-effective approach to compensate for existing infrastructure deficiencies.
3. **Demographic-Specific Pathways:** Recognising students' diverse needs is crucial to enhancing their experiences. Younger students aged 16 to 22 require user-friendly interfaces and mentorship in technical skills. Distance learners necessitate offline access and dedicated support systems. Additionally, female students tend to benefit from increased engagement with lecturers, yet they encounter unique technical challenges that must be addressed.

5.3.3 Policy Conclusions for Ghanaian Higher Education

To enhance the educational experience at Ghana's universities, several key strategies must be prioritised.

1. National ICT Policy Integration: The integration of the National ICT Policy (2020) is crucial. This policy should focus on ensuring campus-wide bandwidth and a stable power supply, as highlighted by UCC's findings, which indicate that 42% of requests were specifically for "stable internet". This data provides compelling evidence for advocating stronger policy measures to enhance connectivity and infrastructure.
2. Resource-Sharing Consortia: Establishing resource-sharing consortia among universities is essential. By pooling resources such as shared servers and cloud storage, institutions can effectively address their individual infrastructural deficits. The success of affiliation-mode programmes, which have achieved an impressive 83.1% enrollment and an average satisfaction score of 4.28, underscores the potential benefits of collaborative resource management.
3. Digital Literacy Mandates: The importance of incorporating digital literacy training into curricula cannot be overstated, especially for younger students. The noticeable age gradient in satisfaction scores, with younger students (ages 16-22) reporting an average score of 3.12 compared to 4.35 for those aged 51 and older, further emphasises the need for targeted digital literacy initiatives. By addressing these key areas, universities can significantly improve both access to resources and overall student satisfaction.

5.4 Recommendations

Recommendations are prioritised by impact and feasibility, with clear ownership and timelines:

5.4.1 Short-Term (0 - 6 Months): Technical and Support Triage

In the short term, within the next 0 to 6 months, we propose several recommendations focused on technical and support triage.

1. We recommend deploying offline Learning Management System (LMS) modules, which the Directorate of ICT Services should oversee. This deployment is critical, as it allows continued access to course materials during outages, particularly benefiting our distance students, who currently experience 40% of technical issues.
2. Establishing a 24/7 technical support service is essential and should be managed by the eLearning Knowledge Management Section. This initiative responds to the thematic demand reflected in 18% of requests related to technical difficulties, thereby aiming to reduce student dissatisfaction stemming from these issues.
3. We suggest implementing faculty members' training in "Digital Engagement," which will be the responsibility of the Directorate of Academic Affairs. This training is designed to enhance lecturer interaction, which has been shown to significantly buffer against technical gaps, with a noted effect size of $\beta = 0.28$.

Together, these recommendations aim to improve the overall learning experience and address students' immediate technical challenges.

5.4.2 Medium-Term (6–12 Months): Infrastructure and Resource Optimisation

In the medium term, over the next 6 to 12 months, we propose several recommendations to optimize our infrastructure and resources.

1. We recommend a 50% bandwidth upgrade, which the Directorate of ICT Services will oversee. This upgrade targets the root causes of existing technical infrastructure difficulties, as indicated by an effect size of $\beta = -0.41$. Additionally, this recommendation addresses 42% of the thematic requests we have received, underscoring the urgent need for improved connectivity.

2. We advocate for the standardisation of the resource upload protocol under the guidance of the Faculties and Schools. This initiative aims to ensure that resource availability reaches 80%, a significant increase from the current 50.4%. This action addresses 28% of the thematic requests, demonstrating a clear need for improved resource management.
3. We suggest tailoring user support mechanisms to address students' diverse needs, a responsibility of the IT Support Section within the Directorate of ICT Services. This initiative could include the introduction of technology mentors specifically for students aged 16 to 22. This targeted support system is crucial for accommodating the varying requirements of different age groups and study modes, ultimately enhancing the overall user experience.

Together, these recommendations form a comprehensive strategy for improving our infrastructure and resource availability in the medium term.

5.4.3 Long-Term (1–2 Years): Systemic Transformation

We propose a series of recommendations aimed at achieving systemic transformation over the next one to two years, each with designated ownership and a clear rationale.

1. We recommend implementing an AI-driven technical issue prediction system, overseen by the Directorate of ICT Services. This proactive approach will significantly enhance our ability to address outages, aiming to reduce the frequency of issues classified as "Very Often" from the current rate of 40% to less than 15%.
2. We call for the establishment of an LMS Committee at the university. This committee will help the University of Cape Coast develop and deploy infrastructure and resources for the LMS, while also scaling the success of the affiliation mode of study, which has previously demonstrated a high satisfaction rating of 4.28.
3. We propose integrating a digital literacy curriculum into all academic programs, with oversight from the Directorate of Academic Affairs. This initiative seeks to embed critical training into the curriculum, thereby addressing and closing the existing age satisfaction gap, which has improved from a score of 3.12 to an anticipated 4.35.

However, these recommendations are designed to foster a more resilient and responsive educational infrastructure, ultimately enhancing the overall learning experience for all students.

5.5 Limitations and Future Research

5.5.1 Study Limitations

1. Cross-Sectional Design: The study employs a cross-sectional design, which captures a snapshot of student satisfaction; however, it falls short in tracking changes over time. For instance, it cannot assess whether infrastructure upgrades improve student retention.
2. Self-Reported Data: The reliance on self-reported data introduces the risk of social desirability bias. This means that students may overreport their satisfaction levels, potentially skewing the results. Furthermore, the frequency of technical issues was based on self-reported data rather than being logged, which raises questions about the reliability of these findings. Vulnerable to social desirability bias (e.g., students overreporting satisfaction). Technical issue frequency was self-reported rather than logged.
3. Single-Institution Focus: The focus on a single institution, UCC, limits the generalizability of the findings. Although the C-LMS model is adaptable, the applicability of the results to other Ghanaian universities, such as the University of Ghana, remains untested.

4. Resource-Technical Paradox Unresolved: The study reveals a resource-technical paradox; resources appear to matter less than technical stability, yet it does not explore the underlying reasons for this observation. This raises an important question; Are resources indeed irrelevant if they are inaccessible?

5.5.2 Future Research Directions

To enhance understanding of student satisfaction in the context of learning management systems (LMS), several recommendations for future research are presented below.

1. Longitudinal Studies: Conducting longitudinal studies would allow researchers to track student satisfaction levels before and after specific interventions, such as bandwidth upgrades. This design would help establish causality and determine the effects of these changes over time.
2. Mixed-Methods Validation: A mixed-methods validation approach should be employed. By combining LMS usage logs, such as login frequency, with survey data, researchers can mitigate the risk of self-report bias that may skew satisfaction levels.
3. Multi-Institutional Comparisons: It is crucial to perform multi-institutional comparisons. Testing the C-LMS model in diverse educational contexts, such as urban versus rural universities, will help refine its constructs and enhance the generalizability of the findings.
4. Resource-Technical Nexus Exploration: This exploration is essential. Investigating how technical stability influences students' perceived accessibility to resources could reveal important insights, specifically, whether repeated outages lead students to abandon available resources altogether.

5.6 Chapter Summary

This chapter presents a synthesis of the study's findings, highlighting the critical roles of technical infrastructure, lecturer interaction, and demographic factors in determining student satisfaction with the learning management system (LMS) at the University of Cape Coast (UCC). The research identified the C-LMS model as a robust framework that effectively addresses the limitations of existing theories in this domain.

Based on these findings, several recommendations are proposed. First, there is an emphasis on implementing short-term technical fixes to enhance system performance. Second, the study advocates medium-term strategies to optimize resource allocation and improve the user experience. Finally, a call for long-term systemic transformation is made to ensure sustainable development of the LMS.

Despite recognising certain limitations within the research, the study provides a comprehensive roadmap for UCC to cultivate an inclusive and resilient e-learning ecosystem. This framework not only serves as a blueprint for the university but can also be extended to inform practices across Ghanaian higher education institutions.

By effectively addressing infrastructural deficits and leveraging the human factors in the educational process, UCC has the potential to elevate its LMS from a mere supplementary tool to a central pillar of pedagogical excellence.

REFERENCES

Bibliography

1. Ibrahim, Y. A. (2023, March). Heliyon. Retrieved from ScienceDirect: <https://www.sciencedirect.com/science/article/pii/S2405844023009581>

2. Amir, A., Ahad, Z., Sogol, R. S., & Masoumeh, A. (2020, February 29). Interactive Learning Environment. Retrieved from Taylor and Francis: <https://www.tandfonline.com/doi/full/10.1080/10494820.2020.1734028#d1e3434>
3. Education and Information Technologies
4. Ojo, M. B. (2024, June 23). Examination Of The Impact Of Learning Management System On University Undergraduate Students' Academic Performance. *European American Journals*, 12(5), 67-82. Retrieved from Universal Digital Repository: <https://eajournals.org/ijeld/vol12-issue-5-2024/examination-of-the-impact-of-learning-management-system-on-university-undergraduate-students-academic-performance/>
5. Investigating the effects of quality factors and organizational factors on university students' satisfaction of e-learning system quality *Cogent Education* 17
6. IEEE Xplore
7. Expanding The Technology Acceptance Model (TAM) to Examine Faculty Use of Learning Management Systems (LMSs) In Higher Education Institutions *MERLOT Journal of Online Learning and Teaching* Vol. 11 No. 2210-227
8. Level of utilization of eLearning among students at selected KMTC campuses *International Journal of Community Medicine and Public Health* 11120-27
9. Using the Technology Acceptance Model in Understanding Academics' Behavioural Intention to Use Learning Management Systems *International Journal of Advanced Computer Science and Applications* 51143-155
10. Exploring Students' Acceptance of E-Learning Through the Development of a Comprehensive Technology Acceptance Model *Open Access Journal*
11. Examining The Effect Of Learning Management System Quality And Perceived Usefulness On Student's Satisfaction 2018 *Journal of Theoretical and Applied Information Technology* 8034-8044
12. Challenges and Opportunities for the Adoption of e-Learning at the University of Gondar 2023 *Mastercard Foundation e-Learning Initiative Working Paper Series* 4-21
13. The Unified Theory of Acceptance and Use of Technology (UTAUT) examines the acceptance of technology, determined by the effects of performance expectancy, effort expectancy, social influence and facilitating conditions. 2023 *TheoryHub Book* 1-16
14. *Tuning Journal for Higher Education*
15. *Journal of Education and Learning*
16. *Journal of Information Technology Education*
17. *Frontier in Psychology*
18. *International Journal of Educational Technology in Higher Education*
19. Your research project (2nd ed.) 2005 London SAGE Publications Ltd.
20. Qualitative research & evaluation methods. (3rd ed.). 2002 Sage Thousand Oaks
21. 2003 *MIS Quarterly*, 27(3) 425-478
22. An empirical investigation of the Unified Theory of Acceptance and Use of Technology (UTAUT) in higher education 2017
23. *Journal of Educational Technology Development and Exchange* 2013
24. *Journal of Educational Computing Research* 2015
25. An empirical study of the determinants of web-based learning management system acceptance 2010

26. An investigation of the factors influencing students' acceptance of learning management systems2017Journal of Educational Computing Research564419-437
27. The technology acceptance model and learning management system: A systematic review2020Journal of Educational Computing Research624419-437
28. Adapting the technology acceptance model to investigate student responses to e-learning2022South African Journal of African Languages4211-8
29. Acceptance of e-learning technology by government school teachers: application of extended technology acceptance modelInteractive Learning Environments3262970-2988
30. Extending the TAM model to explore the factors that affect Intention to Use an Online Learning Community
31. Exploring factors influencing students' continuance intention to use the learning management system (LMS): a multi-perspective framework2022INTERACTIVE LEARNING ENVIRONMENTS3081475–1497 scispace

APPENDIX

QUESTIONNAIRE

The purpose of this instrument is to collect data on students' satisfaction with the LMS's utilization at the University of Cape Coast. Your responses will provide the E-learning and Knowledge Management Section with information about your experience, helping further customise and improve the e-learning platform. All responses will be treated with utmost confidence.

Thank you for your help.

Please, tick (✓) where appropriate.

1. What is your current level of study?

2. Your sex?

3. Mode of Study?

4. Age

5. What is the URL of the e-learning platform?

Male •	Undergraduate •	Post-graduate •
Female •	Graduate •	
Regular Affiliation •	Distance •	Sandwich •
16-22 •	23-29 •	30-36 • 37-43 • 44-50 •

CONTENT AVAILABILITY

6. Are you enrolled in your registered courses on the e-learning platform?

Yes ☐ No ☐

7. Do most registered courses have learning resources available on the LMS?

- ☐ Yes
☐ No
☐ Partially

8. How would you rank the learning resources available on the LMS platform?

- ☐ Excellent
☐ Good
☐ Average
☐ Poor
☐ No Materials

LEARNER ENGAGEMENT

9. Do your course lecturers interact with you on the e-learning platform?

Yes ☐ No ☐

10. How satisfied are you with the level of support and assistance provided by the course lecturers?

- ☐ Very satisfied
☐ Satisfied
☐ Neutral
☐ Dissatisfied
☐ No Support

11. How satisfied are you with the lecturers' level of engagement on the e-learning platform?

- ☐ Very satisfied
☐ Satisfied
☐ Neutral
☐ Dissatisfied
☐ Very dissatisfied

12. What aspects of e-learning do you find most satisfactory? (Select all that apply)

- ☐ Convenience of learning from anywhere
- ☐ Flexibility of course schedules
- ☐ Access to a variety of learning resources and materials
- ☐ Ability to learn at your own pace
- ☐ Interaction with other students through online forums/discussion boards
- ☐ Communication with instructors via email or video conferences
- ☐ Assessment methods and feedback provided
- ☐ Other (please specify)

13. What aspects of e-learning do you find least satisfactory? (Select all that apply)

- ☐ Limited face-to-face interaction with instructors
- ☐ Limited interaction with peers
- ☐ Technical difficulties with the online platform
- ☐ Insufficient support or guidance from instructors
- ☐ Lack of hands-on practical learning opportunities
- ☐ Difficulty in staying motivated and disciplined
- ☐ Other (please specify)

SYSTEMS/INFRASTRUCTURE

14. How often do you encounter technical difficulties when accessing the e-learning platform?

- ☐ Very Often
- ☐ Often
- ☐ Sometimes
- ☐ Rarely
- ☐ Never

15. How satisfied are you with the level of support offered by the eLearning office?

- ☐ Very satisfied
- ☐ Satisfied
- ☐ Neutral
- ☐ Dissatisfied
- ☐ No Support

16. What areas of improvement would you suggest for the e-learning platform?

Please specify

.....
.....

17. How satisfied are you with the accessibility and usability of the e-learning platform?

- ☐ Very satisfied
- ☐ Satisfied
- ☐ Neutral
- ☐ Dissatisfied
- ☐ Very dissatisfied

18. How satisfied are you with the overall e-learning experience?

- ☐ Very satisfied
- ☐ Satisfied
- ☐ Neutral
- ☐ Dissatisfied
- ☐ Very dissatisfied

Thank you for taking the time to complete the survey. Your feedback is important to us.