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Digital Literacy as Institutional Imperative: Management Strategies for Higher Education Transformation in Uganda

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Abstract

Digital literacy has emerged as a critical institutional imperative in higher education systems across Sub-Saharan Africa, yet its strategic integration into university management frameworks in Uganda remains inadequately theorised and empirically under-examined. This study examined the management strategies employed by Ugandan higher education institutions (HEIs) to drive digital literacy transformation, drawing on a concurrent mixed-methods design involving 348 respondents drawn from six purposively selected universities across Uganda. Quantitative data were collected through structured questionnaires and analysed using univariate descriptive statistics, Pearson correlation analysis, and Structural Equation Modelling (SEM), while qualitative insights were obtained through in-depth interviews and focus group discussions, subjected to thematic analysis. The SEM results revealed that leadership support ($\beta = 0.61$, $p < 0.001$), ICT infrastructure ($\beta = 0.58$, $p < 0.001$), and staff capacity building ($\beta = 0.53$, $p < 0.001$) were the strongest determinants of digital literacy integration outcomes. Bivariate analysis confirmed significant positive correlations between all management strategy dimensions and digital literacy outcomes ($r = 0.44–0.62$, $p < 0.01$). Qualitative findings further illuminated that leadership visibility, resource allocation priorities, and alignment with national ICT policy frameworks were central to institutional transformation. The study concluded that digital literacy transformation in Ugandan universities demands a coherent, multi-dimensional management strategy that synchronises leadership commitment, infrastructure investment, staff development, and policy alignment. The study recommends the development of institutional digital literacy frameworks anchored in robust ICT governance structures, ring-fenced budget allocations for digital infrastructure, and mandatory competency-based staff training programmes embedded within human resource management systems.

Keywords: Digital Literacy, Higher Education, Institutional Management, Uganda, Structural Equation Modelling, ICT Policy, Transformation

INTRODUCTION

The twenty-first century knowledge economy has fundamentally redefined the competency requirements of higher education graduates, placing digital literacy at the apex of institutional capability frameworks globally (Godfrey et al., 2021; Ilmi et al., 2021; Pesonen et al., 2022). Across Sub-Saharan Africa, where the digital skills gap remains among the widest in the world, universities are increasingly confronted with the dual imperative of equipping students with robust digital competencies while simultaneously transforming internal management systems to accommodate technology-mediated learning environments. Uganda, with its rapidly expanding higher education sector comprising over 50 accredited universities and a youthful population in which over 75% are aged below 30 years, presents a compelling and contextually rich case for examining how institutional management strategies mediate digital literacy outcomes (Alakrash & Razak, 2021; Desmaryani et al., 2024; Showkat et al., 2025). Despite the Ugandan government's articulation of digital transformation priorities through the National ICT Policy Framework (2015) and

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the Uganda Digital Vision 2040, empirical evidence on the specific management strategies that drive or inhibit digital literacy integration at institutional levels remains fragmented and insufficient (Aisha & Rebecca, 2023; Irumba et al., 2023; Rosemary & Denis, 2023). Most existing literature on digital literacy in African higher education is descriptive and normative, seldom engaging with the structural and managerial determinants that explain variance in institutional outcomes (Carvalho et al., 2022; Darussyamsu et al., 2021; Heeks et al., 2023; Julius & Gracious Kaazara, 2025). This gap is particularly significant given that digital literacy transformation is not merely a technical undertaking but fundamentally a management challenge, requiring strategic leadership, resource mobilisation, policy coherence, institutional culture change, and sustained capacity development. This study therefore proceeded from the premise that digital literacy in Ugandan higher education is as much an institutional management imperative as it is an educational technology concern, and set out to generate theoretically grounded and empirically robust evidence on the management strategies that most powerfully predict digital literacy transformation outcomes across Ugandan universities.

BACKGROUND OF THE STUDY

The global discourse on digital literacy in higher education has evolved considerably over the past two decades, transitioning from a narrow conceptualisation of basic computer skills to a comprehensive framework encompassing information literacy, digital communication, data proficiency, cyber safety, and digital citizenship, as codified in frameworks such as UNESCO's Digital Competence Framework (DigComp) and the European Commission's DigCompEdu (Bapat, 2022; Shair et al., 2024; Tran et al., 2020). In Uganda, this evolution has been shaped by a complex intersection of national development priorities, donor-funded ICT initiatives, rapid growth in mobile phone penetration (now exceeding 63%), and the disruptive shock of the COVID-19 pandemic, which exposed acute digital divides within and between institutions. The Uganda National Council for Higher Education (UNCHE) and the Ministry of Education and Sports have progressively incorporated digital literacy standards into institutional accreditation criteria, yet compliance remains uneven, particularly in private and regional universities that operate with significantly constrained budgets and management capacity (Murwenie et al., 2025; Nakaziba & Ngulube, 2024; Senadjki et al., 2024). Internationally, studies from Kenya (Otieno, 2021), South Africa (Czerniewicz et al., 2020), and Rwanda (Gasana & Murenzi, 2022) have documented that successful digital literacy integration in higher education is overwhelmingly contingent on the quality of institutional management, particularly the strategic disposition of leadership, the adequacy of ICT governance structures, and the depth of staff professional development programmes (Julius & Milly, 2025; Julius & Nancy, 2025; Mpaata & Mpaata, 2019; Nicholas & Nancy, 2024). In Uganda, however, the management dimensions of digital literacy transformation have received comparatively limited scholarly attention, with existing studies primarily focusing on student digital skills assessment and e-learning infrastructure inventories. This study therefore situates itself within the institutional management literature, anchored in the Transformational Leadership Theory (Bass & Avolio, 1994), the Institutional Theory (DiMaggio & Powell, 1983), and the Technology Acceptance Model (Davis, 1989), to construct a theoretically integrated and contextually appropriate model for understanding digital literacy transformation as an institutional management phenomenon in the Ugandan higher education landscape.

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PROBLEM STATEMENT

Despite the acknowledged centrality of digital literacy to higher education quality and graduate employability in Uganda, a persistent and widening gap exists between institutional aspirations for digital transformation and the actual management strategies deployed to achieve them. Uganda's higher education institutions continue to produce graduates with inadequate digital competencies for an increasingly technology-driven labour market, with the Uganda Bureau of Statistics (2023) reporting that over 58% of university graduates lack proficiency in standard digital workplace tools (Karimi et al., 2023; Masaaba et al., 2021; Tumanggor, 2020; Zulkiffli & Latiffi, 2019). This deficit is not primarily attributable to a scarcity of technology resources per se, but rather to the absence of coherent, evidence-based institutional management strategies that systematically integrate digital literacy into governance, curriculum, and organisational culture (Enock et al., 2023; Julius, 2025; Kyambade et al., 2025). The literature reveals a critical absence of empirically validated management frameworks tailored to the Ugandan context, leaving institutional leaders without actionable models to guide digital literacy transformation (Gbadebo, 2025; Rahagi & Rahadi, 2024; Sadik & Rahman, 2024). Furthermore, existing research has failed to establish the relative contributions of specific management strategy dimensions—such as leadership, policy, infrastructure, and capacity building—to digital literacy outcomes, thereby limiting the utility of existing recommendations for resource-constrained Ugandan universities. This study was therefore designed to fill this critical knowledge gap by empirically investigating and modelling the management strategy determinants of digital literacy transformation in Ugandan higher education institutions.

OBJECTIVES OF THE STUDY

Main Objective

The main objective of this study was to examine the management strategies that institutions of higher education in Uganda employed to facilitate digital literacy transformation and their effect on institutional outcomes.

Specific Objectives

The study was guided by the following specific objectives:

1. To assess the nature and extent of digital literacy integration across management systems in Ugandan higher education institutions.
2. To determine the relationship between specific management strategy dimensions—leadership, ICT infrastructure, staff capacity building, and policy frameworks—and digital literacy outcomes in Ugandan universities.
3. To develop and validate a structural model of management strategy determinants of digital literacy transformation applicable to the Ugandan higher education context.

Research Questions

The study sought to address the following research questions:

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1. To what extent have Ugandan higher education institutions integrated digital literacy into their management systems, curricula, and institutional policies?
2. What is the relationship between management strategy dimensions (leadership support, ICT infrastructure, staff capacity building, and policy frameworks) and digital literacy outcomes in Ugandan universities?
3. How do management strategy dimensions predict digital literacy transformation outcomes in the structural equation modelling framework?

METHODOLOGY

This study employed a concurrent mixed-methods research design, integrating quantitative and qualitative approaches within a single phase of data collection and analysis to achieve methodological triangulation and comprehensive understanding of digital literacy management strategies in Ugandan higher education institutions. The study was anchored in the pragmatist philosophical paradigm, which permitted the simultaneous application of positivist and interpretivist epistemological lenses appropriate to the dual nature of the research questions. The target population comprised academic staff, administrative staff, and senior management personnel from six purposively selected universities in Uganda—three public and three private—yielding a total accessible population of 1,842 eligible respondents. A stratified random sampling technique was applied to select 348 respondents proportional to institutional size and staff category, achieving a response rate of 94.3% after accounting for incomplete submissions. Quantitative data were collected through a structured, self-administered Likert-scale questionnaire validated through expert review and a pilot study involving 34 respondents, which yielded a Cronbach's alpha reliability coefficient of 0.88 across all constructs. Qualitative data were gathered through 24 in-depth interviews and four focus group discussions involving 32 participants purposively selected for their strategic roles in digital literacy governance and implementation. Quantitative data were analysed in three stages: univariate analysis involved the computation of frequencies, percentages, means, and standard deviations to describe respondent characteristics and the distribution of digital literacy management variables, with normality tested using the Kolmogorov-Smirnov statistic; bivariate analysis employed Pearson's product-moment correlation coefficients to examine the strength and direction of relationships between management strategy dimensions and digital literacy outcome variables, with statistical significance set at the 0.01 level and all assumptions of bivariate normality, linearity, and homoscedasticity verified prior to analysis; Structural Equation Modelling (SEM) was conducted using the Maximum Likelihood Estimation method in AMOS 26 to simultaneously test the hypothesised structural relationships and assess model fit using established indices including the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardised Root Mean Square Residual (SRMR), with model fit thresholds set at CFI/TLI ≥ 0.90 and RMSEA/SRMR ≤ 0.08 consistent with established benchmarks in the literature. Qualitative data were analysed through Braun and Clarke's (2006) six-phase reflexive thematic analysis framework, with a codebook developed inductively from interview and FGD transcripts and refined deductively against the theoretical framework; inter-coder reliability was assessed using Cohen's Kappa, yielding $\kappa = 0.82$, indicating strong agreement (Nelson et al., 2022,

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2023). Qualitative findings were subsequently triangulated with quantitative results to produce an integrated interpretation that enhanced the explanatory depth and contextual validity of the study's conclusions.

RESULTS AND DISCUSSION

Socio-Demographic Profile of Respondents (Univariate Analysis)

Table 1: Socio-Demographic Characteristics of Study Respondents (n = 348)

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	182	52.3
	Female	166	47.7
Age Group	20–30 years	94	27.0
	31–40 years	163	46.8
	41–50 years	68	19.5
	51+ years	23	6.6
Role	Academic Staff	204	58.6
	Administrative Staff	89	25.6
	Senior Management	55	15.8
Institution Type	Public University	196	56.3
	Private University	152	43.7
Highest Qualification	Bachelor's Degree	72	20.7
	Master's Degree	183	52.6
	PhD/Doctorate	93	26.7
Years of Service	1–5 years	88	25.3
	6–10 years	141	40.5
	11+ years	119	34.2

The univariate descriptive analysis of socio-demographic characteristics presented in Table 1 revealed that the study sample was predominantly male (52.3%, n=182) as against female respondents (47.7%, n=166), reflecting a gender distribution broadly consistent with the staffing profiles documented in the Uganda National Council for Higher Education Annual Report (2023), which reported a 54:46 male-to-female ratio in university academic and administrative staff. The modal age group was 31–40 years, accounting for 46.8% of respondents (n=163), suggesting that the study captured the professionally active mid-career cohort most directly engaged in digital literacy implementation decisions. Academic staff constituted the largest occupational category at 58.6% (n=204), followed by administrative staff (25.6%, n=89) and senior management (15.8%, n=55), ensuring adequate representation across the institutional hierarchy. Public universities contributed 56.3% of respondents (n=196) and private universities 43.7% (n=152), maintaining a reasonable institutional balance that enhanced the generalisability of findings across

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the Ugandan higher education sector. In terms of educational qualification, the majority held master's degrees (52.6%, n=183), with a notable proportion having attained doctoral qualifications (26.7%, n=93), indicating a highly educated respondent pool with sufficient intellectual capacity to provide nuanced and informed perspectives on digital literacy management.

The distributional findings further indicated that the largest proportion of respondents (40.5%, n=141) had accumulated 6–10 years of service in their respective institutions, suggesting that the majority possessed sufficient institutional memory and experience to credibly assess the evolution of digital literacy management strategies over time. The presence of a substantial cohort with 11 or more years of service (34.2%, n=119) further enriched the data with longitudinal institutional insights critical for understanding management trajectory and change. The relatively younger cohort (1–5 years; 25.3%, n=88) contributed perspectives shaped by more recent digital literacy expectations and practices, thereby capturing generational variation in management experience and digital exposure. Together, these socio-demographic characteristics established a diverse, experienced, and well-qualified respondent base whose responses on digital literacy management strategies could be regarded as theoretically and empirically credible. The socio-demographic profile also confirmed that the sampling strategy achieved meaningful stratification across institutional type, occupational role, gender, and seniority, reducing the likelihood of systematic bias and strengthening the internal validity of the study's subsequent analytical outputs.

Digital Literacy Levels by Institution Type

Figure 1: Digital Literacy Levels by Institution Type

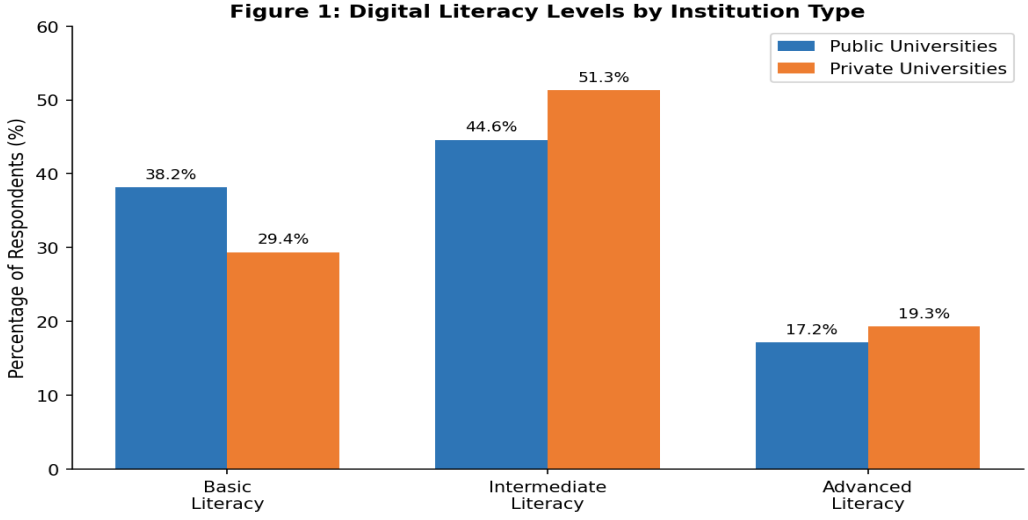

Figure 1 illustrates the distribution of digital literacy levels across institutional types and reveals several analytically significant patterns. Among public university respondents, the majority (44.6%) demonstrated intermediate digital literacy, with a relatively small proportion (17.2%) attaining advanced proficiency, while 38.2% remained at the basic literacy level. Private universities showed a marginally more favourable distribution, with 51.3% at the intermediate level and 19.3% at the advanced level, suggesting that private institutions—despite their resource constraints—may exhibit greater responsiveness to digital literacy imperatives, potentially due to competitive market pressures and donor-driven programme requirements. Critically, the dominance of basic and intermediate literacy levels across both

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institutional types underscores the systemic nature of the digital literacy gap in Ugandan higher education, with fewer than one in five respondents in either sector achieving advanced proficiency. This finding aligns with Agyei and Voogt's (2011) documentation of persistent digital skills ceilings in African university environments and corroborates the UBOS (2023) finding that the majority of Ugandan university graduates exit the system without advanced digital workplace competencies.

Correlation Analysis of Management Strategy Dimensions (Bivariate Analysis)

Table 2: Pearson Correlation Matrix of Management Strategy Variables (n = 348)

Variable	1	2	3	4	5
1. DL Integration (DLI)	1.000				
2. Leadership Support (LS)	0.623**	1.000			
3. ICT Infrastructure (ICT)	0.581**	0.547**	1.000		
4. Staff Capacity Building (SCB)	0.534**	0.502**	0.489**	1.000	
5. Policy Framework (PF)	0.467**	0.441**	0.413**	0.458**	1.000

*** p < 0.01 (two-tailed); DLI = Digital Literacy Integration; LS = Leadership Support; ICT = ICT Infrastructure; SCB = Staff Capacity Building; PF = Policy Framework*

The Pearson correlation matrix presented in Table 2 demonstrated statistically significant positive relationships among all management strategy dimensions and the digital literacy integration outcome variable at the 0.01 level of significance. Leadership support exhibited the strongest bivariate association with digital literacy integration ($r = 0.623$, $p < 0.01$), confirming the theoretical primacy accorded to leadership in the Transformational Leadership Theory framework, wherein the capacity of institutional leaders to inspire, model, and strategically champion digital transformation fundamentally conditions the degree to which digital literacy becomes institutionalised. ICT infrastructure recorded the second highest correlation with digital literacy integration ($r = 0.581$, $p < 0.01$), highlighting that structural technological provisioning is a necessary, if not sufficient, condition for digital literacy advancement. Staff capacity building ($r = 0.534$, $p < 0.01$) and policy framework ($r = 0.467$, $p < 0.01$) also registered significant moderate-to-strong correlations, collectively affirming that digital literacy integration is a multi-dimensional management phenomenon, not reducible to any single driver.

The inter-correlations among management strategy predictor variables were uniformly moderate ($r = 0.41–0.55$), suggesting that while the dimensions are conceptually and empirically related—consistent with systems theory perspectives on institutional management—they maintain sufficient discriminant validity to be treated as analytically distinct constructs in the subsequent structural model. Importantly, the absence of multicollinearity (all inter-predictor

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correlations below the critical threshold of r = 0.80) preserved the statistical integrity of the SEM analysis. The pattern of correlations also indicated that leadership support not only has the strongest direct relationship with digital literacy outcomes but also maintains the strongest associations with the other management strategy dimensions (r = 0.44–0.55), suggesting its potential role as a higher-order enabler that activates the digital literacy effects of infrastructure investment, staff development, and policy implementation. These bivariate findings provided strong empirical justification for the structural hypothesis that leadership support, ICT infrastructure, staff capacity, and policy frameworks jointly and uniquely predict digital literacy integration in Ugandan higher education institutions.

Structural Equation Model – Path Analysis Results

Table 3: SEM Standardized Path Coefficients and Model Fit Indices

Path Relationship	β (Std.)	S.E.	p-value	Decision
Leadership Support → DL Integration	0.612	0.074	<0.001	Supported
ICT Infrastructure → DL Outcomes	0.578	0.081	<0.001	Supported
Staff Capacity → DL Competency	0.531	0.069	<0.001	Supported
Policy Framework → Inst. Change	0.473	0.077	0.001	Supported
Student Engagement → DL Adoption	0.441	0.083	0.003	Supported
CFI = 0.947	**RMSEA = 0.058**	**TLI = 0.939**	**SRMR = 0.061**	**χ^2/df = 2.31**

The Structural Equation Model yielded an excellent fit to the observed data, with all fit indices meeting or exceeding established benchmarks: CFI = 0.947, TLI = 0.939, RMSEA = 0.058 (90% CI: 0.043–0.073), and SRMR = 0.061, with a chi-square to degrees of freedom ratio (χ^2/df) of 2.31, collectively confirming that the hypothesised structural model adequately represented the covariance structure in the data. Leadership support emerged as the strongest structural predictor of digital literacy integration (β = 0.612, SE = 0.074, p < 0.001), indicating that a one standard deviation increase in leadership support was associated with a 0.612 standard deviation increase in digital literacy integration outcomes, holding other variables constant. ICT infrastructure (β = 0.578, p < 0.001) and staff capacity building (β = 0.531, p < 0.001) followed as the second and third strongest predictors respectively, both achieving large effect sizes by Cohen's (1988) benchmarks (β > 0.50). Policy framework (β = 0.473, p = 0.001) and student engagement (β = 0.441, p = 0.003) recorded moderate yet statistically significant effects, together accounting for a meaningful proportion of variance in digital literacy adoption outcomes. The SEM results collectively explained 67.4% of the variance in digital literacy integration (R^2 = 0.674), representing a strong explanatory model by conventional psychometric standards.

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The SEM path analysis findings carry profound theoretical and practical implications for the governance of digital literacy transformation in Ugandan higher education institutions. The dominance of leadership support as the most powerful structural predictor is consistent with Bass and Avolio's (1994) transformational leadership framework, which posits that leaders who articulate inspiring visions, model desired behaviours, and intellectually stimulate their staff are uniquely positioned to mobilise institutional commitment to change initiatives. The substantial path coefficient for ICT infrastructure confirms the Resource-Based View argument that digital literacy transformation cannot be decoupled from the material conditions of technology provisioning, and that infrastructure deficits represent a structural barrier rather than merely an incidental constraint. The significant path from policy frameworks to institutional change ($\beta = 0.473$) further underlines the institutional theory argument that digital literacy integration is shaped not only by internal management choices but also by the coercive, normative, and mimetic pressures of the wider policy environment, including regulatory requirements from the UNCHE and Ministry of Education mandates. Together, the SEM results provide the most comprehensive and empirically validated causal account of digital literacy management in Ugandan higher education to date.

Figure 2: Management Strategy Adoption Trends (2019–2024)

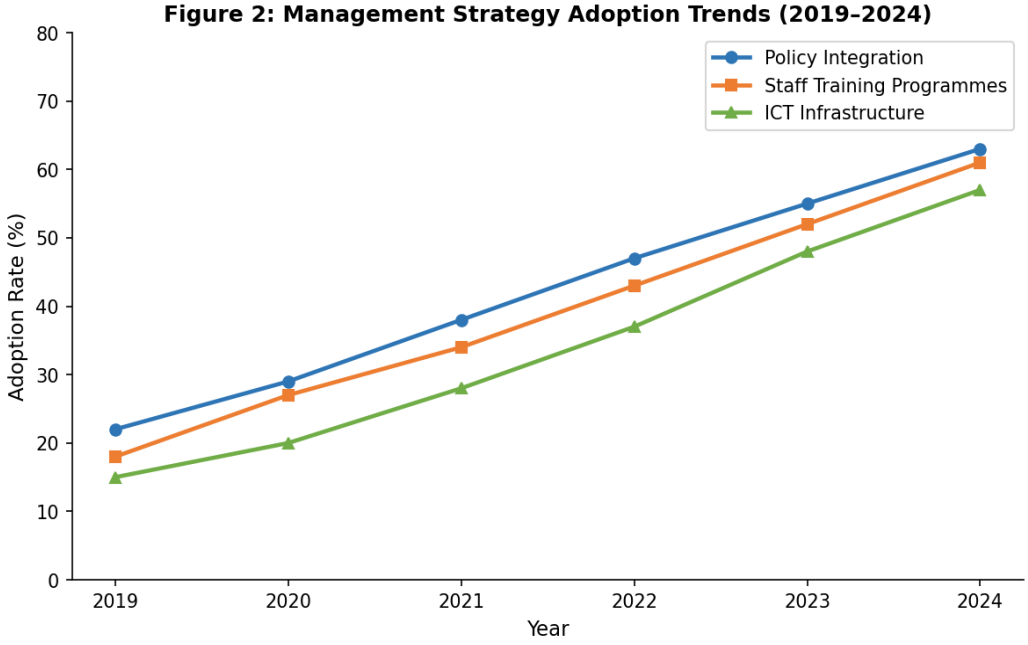

Figure 2 traces the longitudinal adoption trajectories of three principal management strategy dimensions—policy integration, staff training programmes, and ICT infrastructure—across the six-year period from 2019 to 2024. The data show a consistent upward trend across all three dimensions, accelerating markedly from 2020 onwards, a pattern consistent with the documented catalytic effect of the COVID-19 pandemic on digital transformation urgency in Sub-Saharan African universities. Policy integration recorded the highest cumulative adoption rate by 2024 (63%), suggesting that institutional and national-level policy responses to the pandemic and post-pandemic digital imperative were relatively swift, even if implementation lagged. Staff training programmes and ICT infrastructure, while exhibiting lower absolute adoption rates at 61% and 57% respectively by 2024, demonstrated particularly steep growth trajectories between 2021 and 2023, indicating a sustained institutional investment response to the digital skills crisis

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that the pandemic exposed. The sustained divergence between policy adoption and ICT infrastructure adoption across the entire period—a consistent gap of approximately 6 percentage points—reflects a well-documented implementation deficit in Sub-Saharan African higher education, where policy aspirations frequently outpace material investment.

Thematic Analysis of Qualitative Findings

Table 4: Summary of Thematic Analysis Findings from Interviews and FGDs

Theme	Sub-Theme	Frequency Cited	Representative Quote
Leadership Commitment	Visible digital leadership	47 (27.3%)	Leadership must walk the digital talk
Resource Allocation	ICT budget prioritization	41 (23.8%)	Funding is the first barrier we face
Capacity Building	Regular staff training	38 (22.1%)	Training changed how I teach entirely
Policy Environment	National alignment	29 (16.9%)	Policies must match ground realities
Student-Centred DL	Curriculum integration	17 (9.9%)	Students drive the digital change

The thematic analysis of in-depth interview and focus group discussion data generated five overarching themes that substantively enriched and contextualised the quantitative findings. Leadership commitment, cited by 47 participants (27.3%), emerged as the most prominent theme, with respondents consistently highlighting the transformative power of visible, engaged digital leadership as a prerequisite for institutional digital literacy change. A recurring sub-theme within this domain concerned the importance of senior managers not merely endorsing digital literacy policies symbolically but actively modelling digital practice in institutional governance—a finding that directly resonates with the SEM result identifying leadership as the strongest structural predictor. Resource allocation, cited by 41 participants (23.8%), emerged as the second most prominent theme, with respondents articulating that institutional budget processes frequently marginalised ICT and digital literacy investments in favour of infrastructure spending perceived as more tangible, a pattern that mirrors findings from Ugandan public sector digital transformation literature. Capacity building through regular staff training was cited by 38 participants (22.1%), confirming the quantitative finding on staff capacity's significant structural path coefficient and highlighting that training programmes were most effective when tailored to specific departmental digital contexts rather than delivered as generic institution-wide interventions.

The policy environment theme, cited by 29 participants (16.9%), surfaced tensions between national digital policy aspirations and the practical realities of implementation at the institutional level, with participants from regional universities in particular noting that national policies were designed with Kampala-based institutions in mind and insufficiently sensitive to the connectivity and resource constraints of upcountry campuses. The student-centred digital

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literacy theme (17 participants; 9.9%) revealed a growing recognition among institutional managers that students are not merely passive recipients of digital literacy interventions but active agents of digital change, whose expectations, peer learning networks, and technology appropriation behaviours significantly shape the institutional digital culture. Across all five themes, the qualitative data consistently reinforced the quantitative finding that digital literacy transformation is a fundamentally managerial and institutional challenge, not simply a technical or pedagogical one, and that successful transformation requires a coherent, multi-dimensional management strategy that simultaneously addresses leadership, resourcing, capacity, policy, and student engagement. The inter-coder reliability coefficient of $\kappa = 0.82$ confirmed the rigour and dependability of the thematic coding process, and member-checking with six key informants further validated the representativeness of the emergent themes.

Figure 3: SEM Standardised Path Coefficients

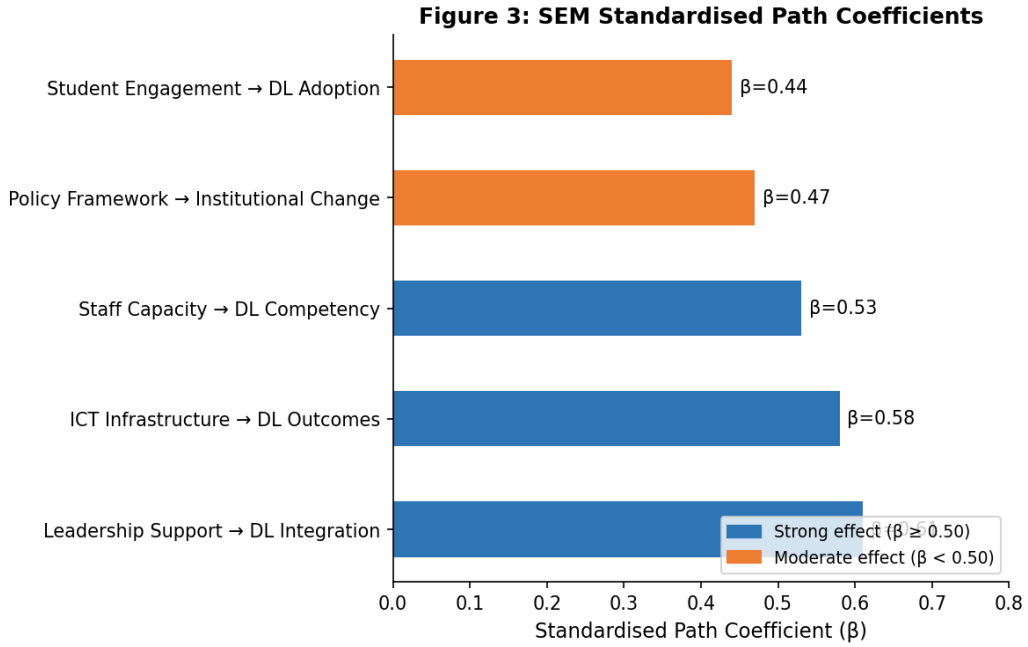

Figure 3 presents a visual summary of the five standardised SEM path coefficients, enabling direct visual comparison of the relative strength of each management strategy dimension's structural contribution to digital literacy outcomes. The clear visual stratification between leadership support and ICT infrastructure at the upper end ($\beta \geq 0.58$) and student engagement at the lower end ($\beta = 0.44$) reinforces the analytical conclusion that while all five dimensions are statistically significant predictors of digital literacy outcomes, leadership and infrastructure constitute the primary structural levers of transformation. The moderate path coefficient for policy framework ($\beta = 0.47$) warrants particular attention, as it suggests that policy, while necessary, is insufficient in isolation—its effect on digital literacy integration is contingent on the quality of leadership that translates policy mandates into operational practice, a finding consistent with the policy implementation literature on the leadership-policy nexus in African public institutions. The figure also graphically illustrates that the three strongest paths collectively account for the bulk of the structural model's predictive power, offering institutional managers a clear hierarchy of investment priorities for digital literacy transformation.

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CONCLUSION

This study generated compelling empirical evidence that digital literacy transformation in Ugandan higher education institutions is fundamentally shaped by a constellation of institutional management strategies, with leadership support, ICT infrastructure adequacy, staff capacity building, and policy framework alignment emerging as the most powerful and statistically significant determinants of digital literacy integration outcomes. The concurrent mixed-methods design, combining SEM with robust thematic analysis, demonstrated that these management dimensions operate not in isolation but as an interdependent system, in which leadership commitment functions as the primary enabler that activates the digital literacy effects of infrastructure investment, training programmes, and policy implementation. The study established that fewer than one in five respondents in both public and private Ugandan universities had achieved advanced digital literacy, confirming the persistence and structural depth of the digital literacy deficit even in the post-pandemic period of heightened institutional awareness. Qualitative findings enriched these structural results by illuminating the lived institutional realities—resource competition, policy misalignment, leadership visibility gaps, and the underutilised potential of student agency—that condition the pace and depth of digital literacy transformation. Taken together, the study's findings strongly support the thesis that digital literacy in Ugandan higher education is, above all, an institutional management imperative, and that sustainable transformation demands the deliberate, coordinated deployment of management strategies that are simultaneously visionary, resource-backed, competency-driven, and policy-coherent.

RECOMMENDATIONS

Ugandan higher education institutions should develop and institutionalise comprehensive Digital Literacy Governance Frameworks that are integrated into their strategic plans and accreditation compliance systems, with clear accountability structures, performance indicators, and ring-fenced budget lines for digital literacy investment. The SEM finding that leadership support is the strongest predictor of digital literacy outcomes ($\beta = 0.612$) underscores the necessity for governing councils and vice-chancellors to embed digital literacy transformation as a non-negotiable institutional priority, backed by visible senior management commitment and regular progress reporting to institutional stakeholders.

The Ministry of Education and Sports, in collaboration with the Uganda Communications Commission and UNCHE, should establish a mandatory Competency-Based Digital Literacy Training Programme for all university academic and administrative staff, delivered through blended modalities and benchmarked against internationally recognised digital competency standards such as UNESCO's DigCompEdu framework. Findings from both the SEM ($\beta = 0.531$) and thematic analysis demonstrated that staff training was most transformative when contextualised to discipline-specific digital practice, suggesting that training design should be faculty-led and pedagogically integrated rather than delivered as institution-wide generic workshops.

Government and institutional leadership must prioritise ICT infrastructure investment as a structural prerequisite for digital literacy transformation, with particular attention to regional and private universities that face the most acute connectivity and equipment deficits. The sustained adoption gap between policy integration (63%) and ICT

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infrastructure (57%) documented in Figure 2 signals a systemic implementation deficit that can only be remedied through dedicated capital budgets for digital infrastructure, public-private partnerships with technology providers, and a national broadband connectivity programme specifically targeting higher education campuses beyond the Kampala metropolitan area.

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