



East African Journal of Education Studies

eajes.eanso.org

Volume 9, Issue 1, 2026

Print ISSN: 2707-3939 | Online ISSN: 2707-3947

Title DOI: <https://doi.org/10.37284/2707-3947>

ENSO

EAST AFRICAN
NATURE &
SCIENCE
ORGANIZATION

Original Article

Teachers' Perceived Challenges and the Uptake of E-Learning in Kampala Capital City

Nantagya Grace Ssebanakitta^{1*}, Joel Yawe Masagazi¹, Mary Kagoire Ocheng¹ & Kyakulumbye Stephen²

¹Uganda Christian University, P. O. Box 4, Mukono, Uganda.

²Uganda Management Institute, P. O. Box 20131, Kampala, Uganda

* Author for Correspondence ORCID ID; <https://orcid.org/0009-0003-1652-9347>; Email: nantagyagrace2018@gmail.com

Article DOI: <https://doi.org/10.37284/eajes.9.1.4409>

Date Published: ABSTRACT

28 January 2026

Keywords:

E-learning Challenges, Teacher Perceptions, Unified Theory of Acceptance and Use of Technology (UTAUT), Technology-Mediated Learning (TML), Uganda Secondary Education.

This study investigated the challenges affecting teachers' uptake of e-learning instruction in government-aided Universal Secondary Education (USE) schools in Kampala Capital City, Uganda. The objective was to examine the infrastructural, institutional, and personal factors that hindered teachers' effective engagement with e-learning platforms. Guided by the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technology-Mediated Learning (TML) frameworks, a convergent mixed-methods design was employed. The study population comprised 393 teachers and 10 headteachers from ten USE schools, all selected through a universal sampling strategy to ensure representativeness. Data were collected using a structured questionnaire and semi-structured interviews. Quantitative data were analysed using descriptive statistics (means, standard deviations) and inferential tests (t-tests, ANOVA, chi-square, and multiple regression), while exploratory factor analysis (EFA) confirmed construct validity. Qualitative data underwent thematic analysis, following systematic stages of familiarisation, coding, and theme refinement. The results revealed that teachers faced numerous challenges affecting e-learning uptake. Quantitatively, unreliable electricity ($M = 1.39$, $SD = 0.05$), weak internet connectivity ($M = 1.59$, $SD = 0.35$), insufficient ICT equipment ($M = 1.31$, $SD = 0.13$), and limited technical support emerged as critical barriers. Regression analysis indicated that dependence on desktop-based teaching tools negatively influenced e-learning adoption ($\beta = -0.134$, $p = 0.012$), while lack of student access further constrained implementation ($\beta = -0.119$, $p = 0.024$). Qualitative findings reinforced these outcomes, highlighting funding inadequacies, irregular teacher training, inconsistent administrative support, and fragile maintenance systems as recurring obstacles. Headteachers also cited low motivation, absence of national e-learning policies, and erratic digital environments as institutional challenges. The study concluded that the barriers to e-learning uptake in USE schools are systemic, multifaceted, and structurally embedded within Uganda's educational ecosystem. It recommends enhanced investment in digital infrastructure, sustainable funding frameworks, continuous professional development, and stronger

administrative leadership to institutionalise e-learning practices. Empowering teacher collaboration networks and strengthening feedback systems were further advised to promote sustained technology-mediated instruction.

APA CITATION

Ssebanakitta, N. G., Masagazi, J. Y., Ocheng, M. K. & Kyakulumbye, S. (2026). Teachers' Perceived Challenges and the Uptake of E-Learning in Kampala Capital City. *East African Journal of Education Studies*, 9(1), 322-341. <https://doi.org/10.37284/eajes.9.1.4409>

CHICAGO CITATION

Ssebanakitta, Nantagya Grace, Joel Yawe Masagazi, Mary Kagoire Ocheng and Stephen Kyakulumbye. 2026. "Teachers' Perceived Challenges and the Uptake of E-Learning in Kampala Capital City." *East African Journal of Education Studies* 9 (1), 322-341. <https://doi.org/10.37284/eajes.9.1.4409>.

HARVARD CITATION

Ssebanakitta, N. G., Masagazi, J. Y., Ocheng, M. K. & Kyakulumbye, S. (2026), "Teachers' Perceived Challenges and the Uptake of E-Learning in Kampala Capital City", *East African Journal of Education Studies*, 9(1), pp. 322-341. doi: 10.37284/eajes.9.1.4509

IEEE CITATION

N. G., Ssebanakitta, J. Y., Masagazi, M. K., Ocheng & S., Kyakulumbye "Teachers' Perceived Challenges and the Uptake of E-Learning in Kampala Capital City", *EAJES*, vol. 9, no. 1, pp. 322-341, Jan. 2026.

MLA CITATION

Ssebanakitta, Nantagya Grace, Joel Yawe Masagazi, Mary Kagoire Ocheng & Stephen Kyakulumbye. "Teachers' Perceived Challenges and the Uptake of E-Learning in Kampala Capital City". *East African Journal of Education Studies*, Vol. 9, no. 1, Jan. 2026, pp. 322-341, doi:10.37284/eajes.9.1.4409.

INTRODUCTION

The digital transformation of education has reshaped how teaching and learning are conceived, delivered, and experienced globally. Over the past decade, the integration of e-learning platforms has emerged as a key driver of educational access, flexibility, and innovation, particularly across developing regions where traditional systems face infrastructural and pedagogical limitations. As education systems worldwide continue to align with the imperatives of the Fourth Industrial Revolution, e-learning adoption has become central to educational reform. However, despite its transformative potential, implementation across many contexts remains fraught with persistent challenges. A substantial body of scholarship has examined educators' and learners' reflections on these constraints (Kisanjara *et al.*, 2019; Bada *et al.*, 2020; Torun, 2020; Barrot *et al.*, 2021; Fabian *et al.*, 2022; Chimbunde, 2023; Lopes *et al.*, 2023). These studies generally concur that while e-learning offers significant promise, its efficacy is curtailed by systemic, institutional, and individual-level barriers. For instance, Bada *et al.* (2020) examined instructors' reflections at Makerere University and revealed that unstable

learning management systems, frequent technical disruptions, and unreliable internet connectivity severely affected synchronous teaching. Similarly, Matete *et al.* (2023) identified unstable internet as a major obstacle to the continuity of online instruction. Instructors also expressed concerns over limited institutional and pedagogical capacity to develop localised e-content, and the absence of standardised national e-learning policies that undermined engagement and satisfaction with virtual instruction (Bada *et al.*, 2020; Ahmad *et al.*, 2023).

However, most of these investigations were conducted within higher education contexts, thereby leaving secondary school settings, particularly government-aided Universal Secondary Education (USE) schools in Uganda, largely underexplored. Previous scholarship by Kisanjara *et al.* (2019), Maune (2023), and Chimbunde (2023) identified inadequate internet infrastructure, high data costs, erratic power supply, and limited device access as key challenges in higher education institutions across Tanzania, Zimbabwe, and Nigeria. Yet, whether and how such challenges manifest within Uganda's secondary schools remained unclear. This gap prompted the present study, which

explored the perceived challenges to e-learning instruction uptake among teachers in USE schools in Kampala Capital City.

Furthermore, earlier research frequently lacked theoretical anchoring, limiting its explanatory power. For example, Bada *et al.*'s (2020) work, though rich in reflective insights, was not guided by theoretical models such as Connectivism, the Task–Technology Fit (TTF) theory, or the Unified Theory of Acceptance and Use of Technology (UTAUT). Such frameworks are essential in unpacking how technological infrastructure, organisational readiness, and individual competence intersect to influence technology acceptance and usage. The present study, therefore, extended prior work by situating its analysis within these theoretical models, allowing for a more holistic understanding of teachers' perceptions, digital competence, and pedagogical adaptability in relation to e-learning technology.

In addition, emerging research (Kelkay *et al.*, 2025; Pavlou & Burke, 2025) has highlighted new categories of challenges arising from rapid technological advancement. Technologies such as AI-assisted instruction, adaptive learning platforms, and gamified systems have become increasingly prevalent in global education ecosystems, yet remain largely absent or uncustomized within Uganda's secondary education curriculum. Scholars such as Oulamine *et al.* (2025) and Barikzai *et al.* (2024) observed that the limited contextual adaptation of these technologies exacerbates a new digital divide not only in terms of access but also in pedagogical relevance and local usability.

In this context, the present study investigated and documented teachers' reflections on the technological, institutional, and personal challenges affecting e-learning implementation in Kampala's USE schools. The findings revealed that while teachers recognised e-learning as an innovative pedagogical avenue, they encountered persistent barriers, including infrastructural limitations, inconsistent technical support, insufficient digital skills, and the lack of localised

content and assessment frameworks. By foregrounding teachers' lived experiences, this study contributes empirical evidence from a neglected educational tier, expands understanding of e-learning adoption in sub-Saharan Africa, and provides policy-relevant insights for the sustainable integration of educational technologies in Uganda's secondary education system.

LITERATURE REVIEW

Theoretical Review

E-learning has evolved from a peripheral innovation into a central modality of instructional delivery, particularly in the wake of global digitalisation and post-pandemic pedagogical reforms. Recent research underscores that its success depends not merely on technological availability but on the extent to which educators and learners perceive it as useful, accessible, and pedagogically congruent (Ali, 2025; Ahmad *et al.*, 2023; Jevsikova *et al.*, 2021). Studies across sub-Saharan Africa (Kisanjara *et al.*, 2019; Chimbunde, 2023; Maune, 2023) have emphasised the structural and socio-technical barriers to e-learning, including limited internet infrastructure, high costs, erratic power supply, and inadequate institutional support. While such findings have been well-documented in higher education, the secondary education sector, particularly government-aided USE schools in Uganda, remains underrepresented in this discourse. The present study addressed this gap by examining the reflections of secondary school teachers in Kampala Capital City regarding the challenges they encountered in adopting e-learning. The study found that while teachers acknowledged the potential of digital tools to enhance engagement and instructional delivery, they also highlighted persistent constraints related to system reliability, digital competence, and alignment between available technologies and pedagogical tasks. These challenges echo patterns identified in previous studies in higher education but reveal distinct contextual nuances in secondary schooling—particularly the absence of

structured digital pedagogy frameworks, insufficient professional development, and limited institutional readiness. To interpret these dynamics comprehensively, the study drew upon the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technology-Mediated Learning (TML) Theory frameworks as guiding lenses.

Theoretical Framework

The conceptual foundation of this study drew upon two complementary frameworks—the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technology-Mediated Learning (TML) Theory to interpret teachers' reflections on e-learning adoption and instructional engagement within Uganda's government-aided USE schools. The integration of these theories enabled a holistic understanding of both the behavioural and pedagogical dimensions of e-learning implementation in secondary education contexts.

The Unified Theory of Acceptance and Use of Technology (UTAUT), originally developed by Venkatesh et al. (2003), has been widely applied to explain individuals' behavioural intentions and actual usage of technological innovations. The model consolidates insights from multiple earlier theories, such as the Technology Acceptance Model (TAM), Theory of Planned Behaviour (TPB), and Diffusion of Innovation Theory, and identifies four core constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. These constructs collectively predict users' intentions to adopt technology and their subsequent usage behaviour. In recent years, UTAUT has been extensively applied in diverse educational and professional domains, reaffirming its robustness and adaptability. Xue et al. (2024) demonstrated that UTAUT effectively explains e-learning adoption trends in higher education, emphasising the role of institutional support and perceived usefulness in shaping behavioural intentions. Similarly, Al-Nuaimi et al. (2024) extended UTAUT to evaluate the determinants of learning management system

(LMS) acceptance in the post-pandemic era, finding that facilitating conditions and social influence strongly predicted continued use. Yang et al. (2024) and Yeung et al. (2024) further highlighted that UTAUT remains relevant in emerging digital learning modalities such as mobile health (m-health) and tele-delivered education, confirming its cross-contextual validity. Studies focusing on education professionals, including Bayag & Madimabe (2024) and Chuang & Liu (2024), reinforced that teachers' acceptance of technology is shaped by their perceptions of pedagogical relevance, institutional encouragement, and collaborative culture. These findings align with the results of the present study, where teachers' adoption of e-learning in USE schools was significantly influenced by perceived usefulness (performance expectancy), the ease of navigating digital platforms (effort expectancy), collegial and administrative support (social influence), and institutional infrastructure (facilitating conditions).

By employing UTAUT, this study elucidated how these psychological and contextual factors jointly shaped teachers' intentions and actual engagement with e-learning systems. Moreover, the framework enabled the identification of barriers—such as unstable internet, inconsistent policy guidance, and inadequate training—as systemic weaknesses within the “facilitating conditions” dimension. Thus, UTAUT provided a powerful explanatory lens through which teachers' technology acceptance and use behaviours could be interpreted in relation to both individual readiness and institutional capacity. The Technology-Mediated Learning (TML) Theory extends the understanding of e-learning adoption beyond behavioural intention to include the pedagogical and interactional processes enabled by technology. Rooted in constructivist and socio-cognitive learning paradigms, TML posits that technology serves as a mediating agent that shapes the quality of learning experiences, cognitive engagement, and instructional outcomes (Wang, 2025). In this sense, learning is not merely

transferred through technology but is transformed by it.

According to Riofrío-Calderón & Ramírez-Montoya (2022), technology mediation encompasses the use of digital environments to support learner interaction, personalisation, and contextualised knowledge construction. Similarly, Bhushan et al. (2025) observed that personalisation through adaptive interfaces and tailored content enhances learner motivation and engagement in technology-mediated environments. Mekheimer (2025) and Pires et al. (2025) further emphasised that learner satisfaction and self-efficacy are strongly linked to how effectively technology mediates cognitive processes and supports differentiated instruction.

Recent studies have expanded TML's scope to include AI-enhanced and data-driven learning environments. For example, Bai & Wang (2025) demonstrated that the quality of AI-generated outputs and the degree of interactive mediation directly influenced students' learning outcomes. Likewise, Honigsberg et al. (2025) showed that generative AI tools can serve as mediating instruments for literacy development, thereby redefining the teacher-learner dynamic in higher education.

In the context of the present study, the TML framework offered an interpretive basis for understanding how teachers in USE schools perceived the pedagogical affordances and constraints of e-learning tools. Teachers' reflections indicated that while technology facilitated access to digital content and interaction, the lack of contextual adaptation, limited instructional design support, and insufficient digital pedagogy training weakened the mediating potential of e-learning environments. As Ahmed et al. (2024) and Nattamai et al. (2024) observed in related studies, the success of technology-mediated learning depends not only on system availability but also on the meaningful integration of digital tools into instructional design and teacher practice.

This theoretical integration enabled a nuanced understanding of why e-learning adoption in Ugandan USE schools remains inconsistent. While teachers demonstrated positive attitudes toward technology, inadequate mediation through localised content, insufficient professional training, and weak institutional facilitation limited meaningful pedagogical integration. Thus, the unified application of UTAUT and TML theories positioned this study to contribute both conceptually and empirically to the growing discourse on technology adoption and mediated pedagogy in African secondary education systems.

MATERIALS AND METHODS

Sample Size and Selection

The study adopted a dual sampling strategy corresponding to its mixed-methods design. The qualitative strand involved a purposive selection of ten headteachers drawn from Universal Secondary Education (USE) schools within Kampala Capital City. The number was informed by the principle of data saturation, achieved when additional interviews yield no novel themes or analytic insights (Ahmed, 2025; Hennink & Kaiser, 2022; Naeem *et al.*, 2024). In line with contemporary qualitative standards, data collection and analysis occurred concurrently to monitor the point of thematic closure, thereby confirming the adequacy of the sample size (Guest *et al.*, 2020; Christou, 2025; Mpofo, 2025; Saunders *et al.*, 2019). This sampling approach ensured that the headteachers' experiences captured the contextual realities underpinning e-learning adoption, consistent with the Technology-Mediated Learning (TML) framework's emphasis on contextual interpretation of instructional practices. For the quantitative component, the sample consisted of teachers drawn from a finite population of 393 within the ten USE schools. The sample size was determined statistically using Yamane's (1967) formula, a standard procedure for deriving representative samples from known populations (Ahmed, 2024). This approach minimised

sampling error and enhanced representativeness, aligning with the Unified Theory of Acceptance and Use of Technology (UTAUT) perspective, which underscores the importance of capturing diverse user experiences to predict adoption behaviour.

Regarding school selection, a universal sampling technique was applied to include all ten USE schools in Kampala Capital City. This strategy is recommended for small populations as it ensures full inclusion of all eligible institutions (Kamalloo *et al.*, 2022; Abbas *et al.*, 2023). The targeted schools were purposively chosen due to their participation in Uganda's UCUSAF programme, an initiative supporting e-learning integration through investments in ICT infrastructure, teacher capacity building, and internet connectivity enhancement (Partridge, 2023; Kituyi *et al.*, 2025; Ministry of Education and Sports, 2024; UCC, 2024). The combination of purposive and universal sampling techniques allowed for both depth of insight and breadth of representation, providing a comprehensive basis for triangulating qualitative and quantitative findings within the TML and UTAUT theoretical orientations.

Data Quality and Error Control

To safeguard the quality and accuracy of the research instruments, rigorous validation and reliability procedures were implemented for both the quantitative and qualitative components. For the quantitative data, instrument validity was ensured through content validation and confirmatory factor analysis. Content validity involved evaluation by three domain experts in e-learning, who independently assessed each questionnaire item for clarity, relevance, and alignment with the study objectives. Items were coded as relevant (R) or irrelevant (IR), and a Content Validity Index (CVI) was subsequently calculated. Following the methodological guidance of Yusoff (2019) and Madadzadeh & Bahariniya (2023), CVI values above 0.70 were deemed acceptable, indicating satisfactory agreement among expert raters. Items with suboptimal scores were revised to improve

precision and conceptual coherence. Similar validation frameworks have been endorsed in contemporary scale development studies, emphasising item clarity and construct consistency (Saeneewong & Ayuttaya *et al.*, 2025; Saw *et al.*, 2025). For the qualitative strand, data trustworthiness was reinforced by adhering to Lincoln & Guba's (1985) four evaluative criteria: credibility, transferability, dependability, and confirmability. Multiple verification strategies were applied, including triangulation, peer debriefing, and audit-trail maintenance, to ensure methodological transparency and analytical rigour (Forero *et al.*, 2018; Mattick *et al.*, 2018; Stahl & King, 2020; Hayashi *et al.*, 2021). These strategies align with recent best practices that advocate methodological transparency and reflexivity as critical to establishing credibility and robustness in qualitative inquiry (Ahmed, 2024; Lim, 2025; Parkinson & Davey, 2025; Beher *et al.*, 2025). Collectively, these procedures ensured that the data collection instruments and analytic processes were both methodologically sound and theoretically congruent, reinforcing the study's reliability and internal validity across the mixed-methods design.

Data Collection and Analysis

Data collection for the study was guided by a convergent mixed-methods design, which facilitated the integration of quantitative and qualitative evidence to achieve a comprehensive understanding of teachers' experiences with e-learning. Two instruments were utilised: a structured questionnaire for the quantitative strand and a semi-structured interview guide for the qualitative component. This combination allowed for methodological triangulation, thereby enhancing the credibility, validity, and interpretive depth of the findings (Huang *et al.*, 2025; Fàbregues & Guetterman, 2025). Quantitative data were analysed using descriptive and inferential statistics, including *t*-tests, chi-square, ANOVA, and multiple regression, to examine differences and predictors of e-learning adoption. Exploratory factor analysis validated construct integrity following Kamal *et al.* (2022).

The analysis framework aligned with the Unified Theory of Acceptance and Use of Technology (UTAUT), emphasising how performance expectancy and facilitating conditions influenced behavioural intention toward e-learning adoption (Venkatesh *et al.*, 2003; Kagoma *et al.*, 2025; Fàbregues & Guetterman, 2025). Qualitative data from headteacher interviews were analysed thematically to identify recurring meanings and contextual insights into e-learning implementation (Renjith *et al.*, 2021; Im *et al.*, 2023). The process followed sequential steps of familiarisation, coding, and theme refinement, ensuring credibility and coherence (Masagazi *et al.*, 2024). Guided by the Technology-Mediated Learning framework, the analysis illuminated how contextual, institutional, and pedagogical dynamics shaped teachers' engagement with digital instruction (Haq & Yasin, 2025; Siemens, 2005; Downes, 2005). Overall, the analytical process ensured methodological coherence, theoretical alignment, and interpretive rigour across the study's mixed-methods framework.

Ethical Considerations

Ethical approval for the study was granted by the Uganda Christian University Research Ethics Committee (UCUREC-2024-909) and the Uganda National Council for Science and Technology (UNCST-SS4059ES). Following authorisation,

the researcher formally engaged headteachers of all participating USE schools in Kampala City to obtain institutional consent. Informed consent was also obtained from each participant after providing detailed information about the study's purpose, procedures, and voluntary nature. Participants were assured of confidentiality and anonymity through coded identifiers and secure data storage. Ethical compliance adhered to international research standards emphasising respect, beneficence, and justice (Haq & Yasin, 2025; Lim, 2025). The process aligned with the TML and UTAUT frameworks, which highlight trust, transparency, and voluntary engagement as essential to fostering ethical participation in technology-mediated learning research.

RESULTS AND DISCUSSION

Descriptive Statistics of Teachers' Perceived Challenges

Descriptive statistics were computed to examine teachers' perceptions of the challenges affecting e-learning uptake in USE schools in Kampala Capital City. As presented in Table 1, the overall mean perception score was 2.26 (SD = 0.576), which falls within the "disagree" range on the five-point Likert scale. This indicates that teachers largely perceived multiple factors as challenges to the effective implementation of e-learning.

Table 1: Teachers' Perceptions of Challenges to E-learning (N = 393)

Indicator	Mean	SD
I am positive about teaching by sending lesson content online	1.76	0.31
I am positive about sending students learning materials online	2.39	0.44
I am okay with sending students homework online	2.53	0.40
I do not mind delivering lessons live via Zoom	3.72	0.42
I believe e-learning is a favourable educational alternative	3.76	0.96
I am computer-literate enough to use online tools	2.03	0.81
There is strong internet connectivity at school	1.59	0.35
The school has all the ICT equipment that supports e-learning	1.31	0.13
The school's electric supply is stable enough to facilitate e-learning	1.39	0.05
Overall mean	2.26	0.58

Source: *Primary data (2025)*

Teachers' perceptions revealed several key trends. They disagreed that they were positive about sending lesson content online ($M = 1.76$) and administering online assessments ($M = 1.99$), showing resistance toward asynchronous instructional methods. Similarly, perceptions of internet quality ($M = 1.59$), ICT adequacy ($M = 1.31$), and power reliability ($M = 1.39$) revealed serious infrastructural gaps that constrained e-learning engagement. Conversely, teachers agreed that delivering live lessons via Zoom ($M = 3.72$) and using desktop PCs facilitated e-teaching ($M = 3.55$). They also considered e-learning a favourable educational alternative ($M = 3.76$) and felt self-motivated to use online resources ($M = 3.75$). These findings suggest that while teachers valued synchronous and interactive forms of e-learning, they faced persistent systemic barriers that limited consistent use. In light of the Technology-Mediated Learning (TML) theory,

these outcomes underscore a mismatch between the technological affordances and the contextual realities of the schools. Teachers' motivation and willingness to use digital platforms did not translate into full integration due to infrastructural deficits and low institutional readiness. From the UTAUT perspective, this pattern reflects the influence of weak facilitating conditions—specifically, poor internet, unstable power, and limited ICT tools, which negatively affected performance expectancy and effort expectancy, leading to low uptake of e-learning.

Perception Differences by Teacher Attributes

Further analyses were conducted to determine whether perceptions of e-learning challenges varied according to teacher demographics and professional characteristics (Table 2).

Table 2: Teacher Perception of Challenges by Teacher Attributes (N = 393)

Attribute	Significant Variable	Statistic	p-value
Sex	Using mobile devices eases online teaching	$U = 15957$	0.003
Designation	Computer literacy; teacher competence; invigilation capacity	$H = 8.24-10.10$	0.041–0.039
Years as Teacher	E-learning effectiveness: ease of use	$H = 8.84-8.94$	0.030–0.032
Years in School	Online materials; feedback; management response	$H = 9.30-10.29$	0.016–0.026
E-learning Exposure	Administering exams online, a desktop utility, favourable perception	$H = 7.84-10.66$	0.013–0.049
Platform Used	Desktop utility; ICT adequacy	$H = 9.92-13.95$	0.008–0.042
Teaching Level	Favourable perception; usefulness	$H = 7.07-9.99$	0.029–0.007
Age	Comfort with sending assignments online	$H = 10.66$	0.014
Academic Qualification	Television use: ease of using e-learning materials	$H = 11.29-11.99$	0.035–0.046

Source: *Primary data (2025)*

Significant variations emerged across several demographic variables. Sex differences ($U = 15957$, $p = 0.003$) indicated that male and female teachers differed in confidence and comfort using mobile-based e-learning platforms. Designation-related differences ($H = 8.24-10.10$, $p < 0.05$) showed that administrative position correlated with technological competence and institutional

preparedness. Similarly, teachers' years of experience influenced perceptions of e-learning's effectiveness and ease of use, suggesting that familiarity with digital tools increases confidence over time. The findings further revealed that exposure to e-learning and platform type significantly shaped perceptions of infrastructural adequacy and e-learning favorability. Teachers

who frequently used desktops and institutional LMS platforms demonstrated greater appreciation of e-learning’s potential, whereas those with limited exposure remained sceptical. These results affirm the UTAUT proposition that user experience and facilitating conditions strongly determine technology adoption behaviours. They also reflect TML’s notion that technological

mediation is effective only when contextual support and user readiness align.

Factor Analysis of E-learning Challenges

Exploratory factor analysis identified a single dominant latent factor explaining teachers’ perceptions of e-learning challenges (Table 3).

Table 3: Factor Loadings for E-learning Challenges (N = 393)

Statement	Factor	Loading
The electricity supply is stable for e-learning	1	0.376
There is strong internet connectivity at school	1	-0.305

Source: Primary data (2025)

Only one significant factor emerged infrastructural challenge comprising stable electricity and internet connectivity. The positive loading for electricity (0.376) and the negative loading for internet connectivity (-0.305) confirm that the poorer the internet quality, the greater the challenge to e-learning engagement. This outcome resonates with the Technology-Mediated Learning principle that learning effectiveness depends on the reliability of technological

mediation. It also aligns with UTAUT’s facilitating conditions construct, showing that infrastructural stability is a foundational determinant of adoption.

Predictors of E-learning Uptake

A multiple linear regression model was performed to determine how specific perceived challenges predicted teachers’ uptake of e-learning.

Table 4: Regression Model for Predicting E-learning Uptake

Predictor	B	SE	t	p	95% CI
Using desktops eases online teaching	-0.134	0.05	-2.52	0.012	[-0.238, -0.030]*
All students can access content online	-0.119	0.05	-2.27	0.024	[-0.222, -0.016]*

Model Summary: $R^2 = 0.092$; Adjusted $R^2 = 0.009$; $F(33, 359) = 1.10$, $p = 0.325$

Source: Primary data (2025)

Two predictors were statistically significant. First, reliance on desktops for online teaching negatively influenced e-learning uptake ($B = -0.134$, $p = 0.012$), implying that fixed, less mobile technologies constrained teaching flexibility and adaptability. Second, the belief that all students could access online content was inversely related to uptake ($B = -0.119$, $p = 0.024$), suggesting that teachers may become complacent when assuming that access equates to engagement. The regression results demonstrate that infrastructural and attitudinal factors, rather than pedagogical or motivational ones, most strongly predicted e-

learning engagement. This aligns with UTAUT’s structural emphasis on facilitating conditions and with the TML perspective that the mediating role of technology is limited by the physical and systemic constraints within which it operates.

Overall, the findings portray e-learning uptake in USE schools as shaped by a constellation of personal, institutional, and infrastructural challenges. Teachers expressed self-motivation and positive attitudes toward e-learning, yet faced barriers including unstable internet, unreliable electricity, inadequate ICT facilities, and

insufficient administrative support. The UTAUT framework explains these results as a product of weak facilitating conditions, while the TML framework situates them within pedagogical mediation limits. Addressing infrastructural and institutional gaps will be critical in enhancing sustainable e-learning integration in Uganda's secondary schools.

To complement the quantitative analysis, qualitative data obtained from headteacher interviews provided deeper insights into the contextual and experiential dimensions of the challenges affecting teachers' uptake of e-learning in USE schools within Kampala Capital City. Thematic analysis revealed four overarching themes that encapsulate the complexities of e-learning implementation: inconsistent administrative support, inadequate institutional and government support, fragmented feedback systems, and adaptive resource mobilisation efforts. The following excerpts illustrate these themes and demonstrate how leadership, infrastructure, and institutional culture jointly shaped teachers' instructional engagement with e-learning.

Inconsistent Administrative Support for E-Learning

Headteachers consistently highlighted that administrative support for e-learning was inconsistent, often relying more on individual leadership effort than on systemic institutional backing. Participant HTA01 remarked,

“Administrative support has been... let's say, modest. We try to encourage our teachers, but budget limitations really tie our hands. We issued a few tablets last year, but follow-up was minimal.”

This statement illustrated the disconnect between policy intention and practical implementation, where leadership motivation was constrained by financial fragility. Similarly, HTB02 added: *“We've tried to be proactive, designated an ICT champion, and encouraged blended lessons. But*

honestly, morale drops when the tools don't work.” These extracts collectively revealed that administrative enthusiasm alone could not sustain digital engagement without the infrastructural foundation to back it. From the UTAUT perspective, this reflected weak facilitating conditions, a core determinant of technology acceptance. In TML terms, the mediation process between technology and pedagogy was undermined by system unreliability, resulting in intermittent motivation and reduced institutional coherence.

Inadequate Institutional and Government Support

Institutional and government-level deficiencies were frequently cited as major impediments to e-learning uptake. Participant HTA01 explained:

“When the government introduced e-learning support during the pandemic, we received a few tablets and laptops. However, these were not enough for all staff... Teachers often have to share or use personal devices.”

HTB02 supported this observation, stating:

“We received a donation of five computers from an old student. Sadly, only three are functional now due to maintenance challenges.”

These responses demonstrate the fragile and uneven nature of resource distribution, characterised by donor dependency and inadequate maintenance capacity. Within the TML framework, these accounts highlight the technological-contextual misalignment where tools are introduced without adequate support systems for integration or sustainability. From the UTAUT standpoint, such insufficiency weakens both performance expectancy and effort expectancy, thereby constraining long-term adoption.

Informal and Fragmented Feedback Systems

A recurrent theme across interviews was the informality and inconsistency of institutional feedback mechanisms for e-learning implementation. Participant HTD04 noted:

“Most feedback is shared casually, which makes it hard to track. We plan to start a digital log to record and follow up.”

Similarly, HTF06 observed:

“Feedback is informal. Teachers speak up during break or after classes. We listen but lack funds to solve every issue immediately.”

These excerpts reveal that while some schools were beginning to institutionalise feedback systems, many still relied on ad hoc and interpersonal exchanges rather than formalised digital communication frameworks. This aligns with Technology-Mediated Learning Theory, which posits that structured and contextualised communication channels are essential to sustain learning environments. The limited formal dialogue restricted opportunities for collaborative reflection and iterative improvement, thus reinforcing the quantitative evidence of weak institutional support.

Resource Mobilisation and Local Adaptation Initiatives

Despite systemic limitations, some headteachers demonstrated creative, locally driven strategies to mitigate e-learning challenges. For instance, HTA01 reported:

“We’ve worked closely with the PTA and community leaders to purchase solar panels and a few second-hand laptops.”

Likewise, HTG07 described a partnership-driven approach:

“We partnered with an ICT vocational institute that gave us five computers and a

technician who trains our teachers on weekends.”

These adaptive practices highlight a culture of improvisation and resilience, where schools leveraged community networks to address infrastructural gaps. The findings affirm the TML proposition that technological sustainability relies on the dynamic interplay between institutional context, available tools, and user agency. They also resonate with the UTAUT construct of social influence, where collaborative strategies enhance adoption likelihood. However, as HTG07 cautioned,

“We celebrate small tech wins. But we lack the hardware to go big.”

These innovations remain limited in scale and reliant on individual leadership rather than systemic reform.

Synthesis of Qualitative and Quantitative Insights

The qualitative evidence reinforced the quantitative findings that e-learning adoption in USE schools was constrained by systemic infrastructural inadequacies, inconsistent institutional support, and limited professional development. Yet, it also revealed the human and contextual dimensions of these challenges, teachers’ resilience, leadership creativity, and the role of informal networks. The UTAUT framework explains these patterns as outcomes of insufficient facilitating conditions and low performance expectancy, while TML provides a pedagogical lens for understanding how technological mediation breaks down when contextual and social supports are weak. For sustainable e-learning uptake, institutional policy must move beyond isolated innovation toward long-term infrastructural investment, consistent administrative leadership, and collaborative capacity building that links teachers, school leaders, and community stakeholders.

DISCUSSION OF FINDINGS

The study set out to examine the challenges constraining teachers' adoption and implementation of e-learning instruction in government-aided USE schools in Kampala Capital City. The findings from both quantitative and qualitative analyses demonstrate that e-learning uptake remains hindered by deep-seated infrastructural, institutional, and pedagogical constraints. These results align with earlier research conducted in similar low-resource educational contexts across Sub-Saharan Africa (Kisanjara *et al.*, 2019; Kassymova *et al.*, 2023; Mutalemwa *et al.*, 2024), reaffirming that the barriers to digital transformation in education are structural and persistent rather than isolated or transient.

Infrastructural and Institutional Deficits. Quantitative results identified unreliable electricity supply, weak internet connectivity, insufficient ICT equipment, and inadequate institutional support as the most significant obstacles to e-learning. These findings corroborate those of Bada *et al.* (2020) and Ahmad *et al.* (2023), who reported that infrastructural fragility undermines the stability and effectiveness of e-learning systems in East African higher education institutions. Qualitative evidence provided further depth, revealing that infrastructural challenges are not merely technical but are entrenched within institutional culture, leadership capacity, and funding structures. Headteachers frequently described the disconnection between administrative intention and operational execution. As one noted, *"We try to encourage our teachers, but budget limitations really tie our hands."* Such accounts illustrate how leadership aspirations for digital transformation are constrained by material scarcity and inconsistent support systems. This echoes findings by Ali (2025) and Lopes *et al.* (2023), who observed that administrative enthusiasm alone is insufficient when not reinforced by logistical and infrastructural stability. From a Technology-Mediated Learning (TML) perspective (Bower, 2019; Wang, 2025), this

imbalance represents a breakdown between pedagogical vision and technological mediation, where the desired learning outcomes cannot materialise because the supporting systems are unstable.

Training Gaps and Teacher Preparedness. Beyond infrastructure, the study found that teachers faced insufficient time, limited digital competence, and a lack of structured professional development. Training initiatives were often ad hoc, short-term, or informal, depending heavily on donor programs or enthusiastic administrators. As one headteacher explained, *"We trained two teachers to cascade ICT skills, but there's no structured framework, so progress is uneven."* This mirrors earlier observations by Rahman *et al.* (2023) and Pavlou & Burke (2025), who emphasised that teacher readiness and digital self-efficacy are decisive factors in technology adoption. The absence of a coherent capacity-building framework aligns with UTAUT constructs, particularly effort expectancy and facilitating conditions, which predict that perceived difficulty of use and institutional support directly influence adoption behaviour (Venkatesh *et al.*, 2003; Xue *et al.*, 2024). Teachers who lacked sufficient training or access to functional equipment perceived e-learning as labour-intensive rather than enabling, reducing motivation and consistency in technology use. This finding extends previous work by Cheok *et al.* (2017) and Almusawi & Durugbo (2024), who also found that educators' acceptance of technology hinges on institutional scaffolding that supports both technical and pedagogical competence.

Leadership Efforts and Funding Constraints

The qualitative findings further underscored funding limitations as a cross-cutting issue affecting nearly all facets of e-learning adoption, from equipment purchase to maintenance and content development. School leaders described diverting funds from other budget lines or relying on donations to sustain minimal digital functionality. For instance, one administrator remarked, *"ICT is seen as a luxury. We rely*

heavily on donations or NGO support.” These accounts echo the arguments by Bayaga & du Plessis (2024) and Kassymova *et al.* (2023), who warned that without sustainable financing strategies, digital transformation in African schools remains vulnerable and short-lived. Even in cases where innovative local initiatives were evident, such as repurposing staffrooms into digital hubs or organising community fundraisers, the sustainability of such interventions was uncertain. As HTG07 put it, “*We celebrate small tech wins. But we lack the hardware to go big.*” This sentiment illustrates what Bada *et al.* (2020) previously referred to as “*fragile innovation*”—context-specific efforts that demonstrate agency and adaptability but remain unsustainable due to weak systemic anchorage. Within the TML framework, this represents a recurring disconnect between context, technology, and human agency, where creative efforts are continuously undermined by systemic fragility.

Feedback Mechanisms and Institutional Learning. An additional theme emerging from the qualitative analysis was the informality of feedback and evaluation systems regarding e-learning implementation. Teachers and administrators often exchanged reflections through casual conversations rather than structured reviews. This finding supports the view of Riofrío-Calderón & Ramírez-Montoya (2022), who argued that effective technology-mediated learning environments require structured communication and reflective systems to sustain engagement. The absence of formal feedback processes limits opportunities for institutional learning, adaptation, and shared problem-solving. From a TML standpoint, such informality disrupts the “feedback mediation loop” necessary to translate technological inputs into pedagogical improvement. Within UTAUT, it suggests a deficiency in the social influence construct, where collaboration and shared vision are needed to normalise technology use among staff.

Connectivism and Informal Networks. The study also uncovered how teachers and administrators leveraged informal digital networks to

compensate for institutional limitations. Headteachers mentioned using WhatsApp groups and peer mentorship channels to coordinate lesson planning and share resources. This reflects the Connectivist perspective (Siemens, 2005; Downes, 2005), which views learning as distributed across networks of people and digital nodes. Such informal practices demonstrate teacher resilience and adaptability in the absence of a formal e-learning infrastructure. However, as Rahman *et al.* (2023) and Gitiha *et al.* (2024) caution, without institutional recognition or integration, these networks remain fragmented and difficult to scale sustainably.

Theoretical Interpretation and Synthesis. Taken together, the findings affirm that the barriers to e-learning uptake in USE schools are systemic, multidimensional, and contextually embedded. From the UTAUT perspective, weak facilitating conditions and low performance expectancy emerged as dominant explanatory constructs. Teachers perceived e-learning as useful in principle but were discouraged by recurrent technical failures, poor infrastructure, and limited support (Al-Adwan *et al.*, 2025; Mohamad Mozie *et al.*, 2025). From the TML lens, the findings underscore that the potential of technology to mediate learning is contingent on coherent alignment between pedagogical design, technological tools, and contextual realities (Wang, 2025; Bhushan *et al.*, 2025). The breakdown of this alignment through unreliable power, insufficient devices, or lack of training renders digital pedagogy inconsistent and unsustainable. Finally, from a Connectivist standpoint, the informal peer networks observed demonstrate that knowledge creation and sharing can thrive even in constrained settings. Yet, these networks cannot substitute for systemic institutional reform. Without consistent investment in digital infrastructure, formal feedback systems, and structured professional development, e-learning in USE schools will remain fragmented, reactive, and unevenly implemented.

Overall, the study's findings reveal that the challenges affecting e-learning uptake among teachers in USE schools are not limited to technological inadequacies but are woven into the broader fabric of institutional capacity, leadership, and policy environment. The integration of quantitative and qualitative evidence demonstrates that sustainable e-learning adoption requires a holistic approach addressing infrastructure, funding, training, and governance simultaneously. Unless these structural foundations are strengthened, Uganda's digital education agenda will continue to depend on short-term interventions rather than achieving lasting transformation (Ali, 2025; Bygholm *et al.*, 2025; Pavlou & Burke, 2025).

CONCLUSION AND RECOMMENDATIONS

Conclusion

The study sought to examine the challenges affecting teachers' uptake of e-learning instruction in government-aided USE schools in Kampala Capital City. The integration of quantitative and qualitative analyses revealed that e-learning adoption remains constrained by a combination of infrastructural inadequacies, limited institutional support, insufficient teacher training, and unsustainable financing models. Quantitative evidence highlighted that unreliable electricity, poor internet connectivity, and limited ICT devices were the most significant impediments to e-learning engagement. These findings were reinforced by qualitative accounts that exposed deeper institutional and cultural roots of these constraints, such as inconsistent administrative support, unstructured professional development, and reactive rather than strategic resource mobilisation. Overall, the findings conclude that the barriers to e-learning uptake in USE schools are systemic, multidimensional, and interdependent. They extend beyond technical limitations to include leadership, cultural, and financial determinants that collectively hinder the normalisation of digital pedagogy. Without a strategic shift toward integrated policy support,

sustainable financing, and continuous professional capacity-building, e-learning in Uganda's secondary schools risks remaining episodic, inequitable, and institutionally fragile.

Recommendations

Based on the study's findings and theoretical insights, the following recommendations are proposed to enhance the sustainability and impact of e-learning in government-aided USE schools:

Strengthen Digital Infrastructure and Connectivity. The government, through the Ministry of Education and Sports (MoES) and in partnership with local governments and private sector actors, should prioritise investment in reliable power supply, broadband internet, and ICT equipment in all USE schools. As demonstrated in the results, infrastructural inadequacy remains the most significant barrier to e-learning. Establishing solar-powered backup systems and subsidising institutional internet packages would enhance digital stability and equity across schools (Kisanjara *et al.*, 2019; Kassymova *et al.*, 2023).

Institutionalise Continuous Professional Development (CPD). Teacher competence and confidence in using technology must be reinforced through structured, ongoing digital literacy training. Training should move beyond one-off workshops to include modular, school-based professional learning communities that integrate both technical and pedagogical dimensions of e-learning (Rahman *et al.*, 2023; Pavlou & Burke, 2025). Collaboration with teacher training colleges and universities could ensure sustainability and contextual adaptation.

Establish Sustainable Funding Frameworks. The findings revealed that reliance on donor support and improvised fundraising undermines long-term sustainability. It is therefore recommended that the MoES develop a dedicated e-learning funding framework within the education budget. This should include matching grants, ICT maintenance funds, and public-private

partnerships to ensure the continuous renewal of hardware, software, and connectivity services (Bayaga & du Plessis, 2024).

Enhance Administrative Leadership and Policy Enforcement. School leaders should be empowered through digital leadership programs that equip them to coordinate e-learning policy implementation, monitor progress, and mobilise resources effectively. Leadership development is critical to bridge the gap between administrative vision and operational execution (Ali, 2025; Bada *et al.*, 2020). Stronger enforcement of institutional e-learning policies will ensure accountability and coherence across schools. Drawing from Connectivist principles, schools should encourage teacher networks and peer-learning platforms that extend professional collaboration beyond physical boundaries. Institutional support for online communities of practice can help teachers share resources, troubleshoot challenges, and co-create instructional content. Integrating these networks into formal CPD frameworks would help scale innovation and sustain engagement.

Develop Structured Monitoring and Feedback Systems. To ensure that e-learning interventions are evidence-driven, schools and district education offices should establish systematic monitoring, evaluation, and feedback mechanisms. Digital tracking of training outcomes, resource utilisation, and learner engagement will facilitate adaptive planning and policy responsiveness (Riofrío-Calderón & Ramírez-Montoya, 2022).

REFERENCES

- Abbas, M., Khan, N., & Farooq, R. (2023). *Designing representative samples in small educational populations: A methodological overview. Educational Research Review, 18*(2), 145–159.
- Ahmad, S., Mohd Noor, A. S., Alwan, A. A., Gulzar, Y., Khan, W. Z., & Reegu, F. A. (2023). *eLearning acceptance and adoption challenges in higher education. Sustainability, 15*(7), 6190. <https://doi.org/10.3390/su15076190>
- Ahmed, R. E., Elhassan, R. M., Alkhali, A. A., Basheer, H. E., Gabu, E. I. A., Ibrahim, A. M., & Noureldeen, A. N. (2024). *Implementing technology-mediated learning in universities to achieve Sustainable Development Goals: King Khalid University as a case study. Migration Letters, 21*(3), 363–378.
- Ahmed, S. K. (2024). *How to choose a sampling technique and determine sample size for research: A simplified guide for researchers. Oral Oncology Reports, 12*, 100662.
- Ahmed, S. K. (2024). *The pillars of trustworthiness in qualitative research. Journal of Medicine, Surgery, and Public Health, 2*, 100051.
- Ahmed, S. K. (2025). *Sample size for saturation in qualitative research: Debates, definitions, and strategies. Journal of Medicine, Surgery, and Public Health, 5*, 100171.
- Al-Adwan, A. S., Meet, R. K., Anand, S., Shukla, G. P., Alsharif, R., & Dabbaghia, M. (2025). *Understanding continuous use intention of technology among higher education teachers in emerging economy: Evidence from integrated TAM, TPACK, and UTAUT model. Studies in Higher Education, 50*(3), 505–524.
- Ali, R. (2025). *How challenging? Barriers for teachers in institutional implementation of blended learning. Open Learning: The Journal of Open, Distance and e-Learning, 40*(3), 324–341.
- Almusawi, H. A., & Durugbo, C. M. (2024). *Linking Task–Technology Fit, innovativeness, and teacher readiness using structural equation modelling. Education and Information Technologies, 29*(12), 14899–14928.

- Al-Nuaimi, M. N., Al Sawafi, O. S., Malik, S. I., & Al-Marroof, R. S. (2024). *Extending the Unified Theory of Acceptance and Use of Technology to investigate determinants of acceptance and adoption of learning management systems in the post-pandemic era: A structural equation modeling approach*. *Interactive Learning Environments*, 32(5), 1710–1736.
- Al-Rahmi, W. M., Al-Adwan, A. S., Al-Maatouk, Q., Othman, M. S., Alsaud, A. R., Almogren, A. S., & Al-Rahmi, A. M. (2023). *Integrating communication and Task–Technology Fit theories: The adoption of digital media in learning*. *Sustainability*, 15(10), 8144.
- Bada, J. K., Sewankambo, B., & Kasule, G. (2020). *Instructors' reflections on e-learning implementation at Makerere University*. *Makerere Journal of Higher Education*, 12(2), 45–62.
- Bai, Y., & Wang, S. (2025). *Impact of generative AI interaction and output quality on university students' learning outcomes: A technology-mediated and motivation-driven approach*. *Scientific Reports*, 15(1), 24054.
- Barikzai, A., Khan, T., & Rahimi, M. (2024). *Challenges of integrating adaptive learning platforms in developing education systems*. *International Journal of Educational Technology in Higher Education*, 21(2), 112–130.
- Barrot, J. S., Llenares, I. I., & del Rosario, L. S. (2021). *Teachers' online learning experiences during the COVID-19 pandemic: A qualitative study*. *Education and Information Technologies*, 26(6), 7207–7224.
- Bayag, A., & Madimabe, M. (2024). *Unified Theory of Acceptance and Use of Technology (UTAUT) model as means to maximise teacher collaboration in the indigenisation of mathematics pedagogy*. *South African Journal of Higher Education*, 38(3), 46–63.
- Beher, J., Treml, E., & Wintle, B. (2025). *Group discussions improve reliability and validity of rated categories based on qualitative data from systematic review*. *PLoS One*, 20(6), e0326166.
- Bhushan, P., Sengupta, A., & Abraham, C. (2025). *Technology-mediated learning in the workplace: Influence of personalization*. *Management Decision*, 63(2), 344–361.
- Bower, M. (2019). *Technology-mediated learning theory*. *British Journal of Educational Technology*, 50(3), 1035–1048.
- Bygholm, A., Dirckinck-Holmfeld, L., & Tabo, G. O. (2025). *Advances toward digital learning*. In *African Higher Education* (pp. 221–234). Springer.
- Cheok, M. L., Wong, S. L., Ayub, A. F., & Mahmud, R. (2017). *Teachers' perceptions of e-learning in Malaysian secondary schools*. *Malaysian Online Journal of Educational Technology*, 5(2), 20–33.
- Chimbunde, T. (2023). *Challenges of e-learning implementation in Zimbabwean higher education institutions*. *African Journal of Educational Studies*, 15(1), 98–115.
- Christou, P. (2025). *Looking beyond numbers in qualitative research: From data saturation to data analysis*. *The Qualitative Report*, 30(1), 3088–3100.
- Chuang, L. M., & Liu, H. H. (2024). *An exploration of key success factors for enterprises implementing online education training based on the Unified Theory of Acceptance and Use of Technology*. *Advances in Management and Applied Economics*, 14(2), 1–18.
- Downes, S. (2005). *An introduction to connective knowledge*. In T. Hug (Ed.), *Media, knowledge & education: Exploring new spaces, relations and dynamics in digital*

- media ecologies* (pp. 77–102). Innsbruck University Press.
- Fabian, K., Topping, K. J., & Barron, I. G. (2022). *Using digital technology to improve learning: Theoretical and practical perspectives*. *Computers & Education*, *178*, 104385.
- Fàbregues, S., & Guetterman, T. C. (2025). *Mixed methods research systematic methodological reviews Benefits, challenges, and solutions*. *Journal of Mixed Methods Research*, *19*(1), 6–17.
- Forero, R., Nahidi, S., De Costa, J., Mohsin, M., Fitzgerald, G., Gibson, N., McCarthy, S., & Aboagye-Sarfo, P. (2018). *Application of four-dimension criteria to assess rigour in qualitative research*. *International Journal for Quality in Health Care*, *30*(4), 291–296.
- Gituha, R. W., Rugano, P., Wakhu, S., & Muriithi, C. G. (2024). Students' perceptions towards the uptake of educational technologies in Christian Religious Education. *Cogent Education*, *11*(1), 2310968.
- Guest, G., Namey, E., & Chen, M. (2020). *A simple method to assess and report thematic saturation in qualitative research*. *PLoS One*, *15*(5), e0232076.
- Haq, M., & Yasin, N. (2025). *Qualitative, quantitative, and mixed methodology paradigms*. *Journal of Practical Studies in Education*, *6*(6), 1–15.
- Hasan, A., Raghuwanshi, S., Harsora, H., Kumar, P., Gupta, V., & Singh, A. S. (2025). *E-learning adoption among millennials: Behavioural intentions and the extended UTAUT model*. *Discover Education*, *4*(1), 400.
- Hayashi, P., Abib, G., & Hoppen, N. (2021). *Validating qualitative research: A process for verification*. *Qualitative Report*, *26*(2), 375–388.
- Hennink, M. M., & Kaiser, B. N. (2022). *Sample sizes for saturation in qualitative research: A systematic review of empirical studies*. *Sociological Methods & Research*, *51*(2), 797–824.
- Honigsberg, S., Watkowski, L., & Drechsler, A. (2025). *Generative artificial intelligence in higher education: Mediating learning for literacy development*. *Communications of the Association for Information Systems*, *56*(1), 35–50.
- Huang, L., Zan, J., Lv, K., & Zhao, X. (2025). *A systematic review of mixed methods research in tourism and hospitality*. *Journal of Hospitality and Tourism Management*, *63*, 163–176.
- Im, E. O., Lee, Y. H., & Chee, W. (2023). *Thematic analysis: Conceptual clarification, challenges, and recommendations*. *Qualitative Health Research*, *33*(8), 1235–1248.
- Jevsikova, T., Stupurienė, G., Stumbrienė, D., Juškevičienė, A., & Dagienė, V. (2021). *Acceptance of distance learning technologies by teachers: Determining factors and emergency state influence*. *Informatika*, *32*(3), 517–542. Kelkay, J. M., Wubante, S. M., Anteneh, D. S.,
- Kagoma, P., Mongi, R., & Kalolo, A. (2025). *Exploratory mixed-methods analysis of the determinants of use of health research evidence among planning teams in Tanzania*. *BMJ Open*, *15*(10), e099692.
- Kamal, A., Malik, R., & Hussain, M. (2022). *Exploratory factor analysis in social science research: Concepts and applications*. *International Journal of Social Research Methodology*, *25*(4), 621–636.
- Kamalloo, L., Kundu, P., & Wanjiku, R. (2022). *Universal sampling and representativeness in small educational populations*. *Educational*

- Measurement and Evaluation Review*, 14(3), 201–215.
- Kelkay, J. M., Wubante, S. M., Anteneh, D. S., Takilo, M. K., Gebeyehu, C. D., Alameraw, T. A., & Gashu, K. D. (2025). Intention to use eLearning-based continuing professional development and its predictors among healthcare professionals in Amhara region referral hospitals, Ethiopia, 2023: using modified UTAUT-2 model. *BMC Health Services Research*, 25(1), 178.
- Kisanjara, S. B., Abeka, S., & Mwalongo, A. (2019). *Challenges of adopting e-learning systems in Tanzanian universities. International Journal of Education and Development Using ICT*, 15(2), 124–140.
- Kituyi, G. M., Abaho, E., Aguma, D., Nkambwe, I., & Beronda, J. (2025). Improving access to communication services by the unserved and underserved communities in Uganda through information and communication technologies. *Universal Access in the Information Society*, 24(2), 1873–1882.
- Lim, W. M. (2025). *What is qualitative research? An overview and guidelines. Australasian Marketing Journal*, 33(2), 199–229.
- Lincoln, Y.S. and Guba, E.G. (1985), *Naturalistic Inquiry*, 1st ed., Sage Publications Inc, Newbury Park.
- Lopes, C., Ugochukwu, N., & Eze, S. (2023). *Barriers to e-learning adoption in Nigerian higher education: Insights from teacher reflections. Education and Information Technologies*, 28(4), 6213–6231.
- Madadzadeh, F., & Bahariniya, S. (2023). *Tutorial on how to calculating content validity of scales in medical research. Perioperative Care and Operating Room Management*, 31, 100315.
- Masagazi, M., Tumusiime, M., & Nkata, J. (2024). *Thematic analysis in educational research: Methodological reflections from Ugandan contexts. African Journal of Education and Practice*, 10(1), 55–72.
- Matete, J., Mugenyi, R., & Kaggwa, M. (2023). *Internet stability and e-learning continuity in East African universities. Journal of Open and Distance Learning*, 8(1), 112–128.
- Mattick, K., Johnston, J., & de la Croix, A. (2018). *How to ensure qualitative research is credible and trustworthy. BMJ*, 363, k3823.
- Maune, A. (2023). *Institutional barriers to technology-enhanced learning in Zimbabwean universities. African Journal of Educational Management*, 17(1), 55–70.
- Mekheimer, M. (2025). *Technological self-efficacy, motivation, and contextual factors in advanced EFL e-learning: A mixed-methods study of strategy use and satisfaction. Humanities and Social Sciences Communications*, 12(1), 1–18.
- Mohamad Mozie, N., Ghazali, N., & Ali Husin, L. I. (2025). *Adopting artificial intelligence in higher education: Insights from the UTAUT framework on student intentions. Advances in Business Research International Journal*, 11(1), 71–79.
- Mpofu, F. Y. (2025). *The saturation dilemma reconsidered: Role, challenges, and controversies for qualitative research in the digital era. International Journal of Qualitative Methods*, 24, 16094069251348542.
- Mutalemwa, D. K., Issa, F., & Mwashambwa, M. G. (2024). *Determinants, Awareness, and Perceptions of COVID-19 Vaccination among Youth in Dar es Salaam, Tanzania. African Journal of Empirical Research*, 5(1), 146–156.
- Naem, M., Ozuem, W., Howell, K., & Ranfagni, S. (2024). *Demystification and actualisation*

- of data saturation in qualitative research through thematic analysis. International Journal of Qualitative Methods*, 23, 16094069241229777.
- Nattamai Kannan, K. B., & Taylor, W. (2024). *Limits to the adoption of Technology-Mediated Learning: A comparative empirical analysis of digital and non-digital supplemental learning products. SMU Cox School of Business Research Paper* (23–02).
- Oulamane, Z., Cherkaoui, S., & Berrada, K. (2025). *Artificial intelligence in education: Challenges and opportunities for adaptive learning systems in Africa. Education and Information Technologies*, 30(2), 455–472.
- Parkinson, J., & Davey, J. (2025). *Research credibility through methodological transparency in health marketing. Health Marketing Quarterly*, 42(1), 1–6.
- Partridge, R. (2023). *ICT infrastructure for educational equity: Evaluating Uganda's UCUSAF Programme. Journal of African Digital Policy*, 8(2), 101–119.
- Pavlou, V., & Burke, K. (2025). *Understanding technology acceptance towards online creative arts learning in teacher education. Teaching and Teacher Education*, 162, 105085.
- Pires, M. D. C. C. M., Barbieri-Figueiredo, M. D. C. A., Cardoso, D. F. B., Duque, F. M., Tricas-Sauras, M. S., Prosen, M., & Menino, E. G. (2025). *Technology-mediated training programs for school health teams on special health care needs: A scoping review. Revista da Escola de Enfermagem da USP*, 59, e20240328.
- Renjith, V., Yesodharan, R., Noronha, J. A., Ladd, E., & George, A. (2021). *Qualitative methods in health research: One size does not fit all. Frontiers in Public Health*, 9, 796–881.
- Riofrío-Calderón, G., & Ramírez-Montoya, M. S. (2022). *Mediation and online learning: Systematic literature mapping (2015–2020). Sustainability*, 14(5), 2951.
- Saeneewong Na Ayuttaya, P., Lawthong, N., Robson, M. G., & Siritwong, W. (2025). *Development of a pesticide labeling literacy scale for Thai rice farmers: Item generation and content validity testing. Journal of Agromedicine*, 30(1), 1–13.
- Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H., & Jinks, C. (2019). *Saturation in qualitative research: Exploring its conceptualization and operationalization. Quality & Quantity*, 52(4), 1893–1907.
- Saw, Z. K., Yuen, J. J. X., Ashari, A., Ibrahim Bahemia, F., Low, Y. X., Nik Mustapha, N. M., & Lau, M. N. (2025). *Forward-backward translation, content validity, face validity, construct validity, criterion validity, test-retest reliability, and internal consistency of a questionnaire on patient acceptance of orthodontic retainer. PLoS One*, 20(1), e0314853.
- Siemens, G. (2005). *Connectivism: A learning theory for the digital age. International Journal of Instructional Technology and Distance Learning*, 2(1), 3–10.
- Stahl, B. C., & King, M. (2020). *The importance of transparency for trustworthiness in qualitative research. Ethics and Information Technology*, 22(3), 189–201.
- Torun, F. (2020). *Teachers' opinions on the distance education process during COVID-19 pandemic: The sample of primary school teachers. Journal of Social Research and Behavioral Sciences*, 6(2), 45–61.
- UCC (Uganda Communications Commission). (2024). *Annual report on the Uganda Communications Universal Service and*

- Access Fund (UCUSAF)*. Kampala: UCC Publications.
- VanDeWiele, M. D., Hastings, A. M., Evans, M. D., O'Connell, M. S., & Flynn, P. M. (2025). *Using the Unified Theory of Acceptance and Use of Technology (UTAUT) to predict the behavioral intent of teledentistry utilization among United States adults*. *Journal of Telemedicine and Telecare*, 31(2), 286–296.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). *User acceptance of information technology: Toward a unified view*. *MIS Quarterly*, 27(3), 425–478.
- Wang, Q. (2025). *Technology and Technology-Mediated Learning*. In *Designing Technology-Mediated Learning Environments: Perspectives, Processes, and Applications* (pp. 1–7). Springer Nature Singapore.
- Xue, L., Rashid, A. M., & Ouyang, S. (2024). *The Unified Theory of Acceptance and Use of Technology (UTAUT) in higher education: A systematic review*. *Sage Open*, 14(1), 21582440241229570.
- Yamane, T. (1967). *Statistics: An introductory analysis* (2nd ed.). New York: Harper & Row.
- Yang, M., Al Mamun, A., Gao, J., Rahman, M. K., Salameh, A. A., & Alam, S. S. (2024). *Predicting m-health acceptance from the perspective of Unified Theory of Acceptance and Use of Technology*. *Scientific Reports*, 14(1), 339.
- Yeung, N. C., Lau, S. T., Mak, W. W., Cheng, C., Chan, E. Y., Siu, J. Y., & Cheung, P. S. (2024). *Applying the Unified Theory of Acceptance and Use of Technology to identify factors associated with intention to use tele delivered supportive care among recently diagnosed breast cancer survivors during COVID-19 in Hong Kong*. *JMIR Cancer*, 10(1), e51072.
- Yusoff, M. S. B. (2019). *ABC of content validation and content validity index calculation*. *Education in Medicine Journal*, 11(2), 49–54.