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INFLUENCE OF INFRASTRUCTURAL FACTORS ON ONLINE LEARNING AMONG UPGRADING NURSING STUDENTS IN A RESOURCE-CONSTRAINED UNIVERSITY SETTING IN KENYA

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Abstract:
Although digital learning offers flexibility and improved access to higher education, particularly for upgrading nursing students, its effectiveness largely depends on the availability of adequate infrastructural resources. This study examined the influence of infrastructural factors on online learning among upgrading nursing students at Kenya Methodist University, Kenya. The study adopted a descriptive cross-sectional research design using a mixed-methods approach. Quantitative data were collected from 200 upgrading nursing students selected through probability random sampling using semi-structured questionnaires, while qualitative data were obtained through purposive interviews with four lecturers involved in digital education and one university administrator. Quantitative data were analyzed using descriptive and inferential statistics, whereas qualitative data were analyzed thematically to complement and explain the quantitative findings. The findings demonstrated that infrastructural factors significantly influenced the quality of online learning among upgrading nursing students. The findings demonstrated significant associations between perceived online learning quality and the availability of computer laboratories (p = 0.008), adequate computers (p < 0.001), stable internet connectivity (p = 0.002), standby generators (p < 0.001), powered lecture rooms (p < 0.001), TV/DVD facilities (p < 0.001), and Smart Boards (p = 0.011). However, ICT accessibility (p = 0.306), ICT policy (p = 0.094), and stable electricity supply (p = 0.162) were not significantly associated with perceived online learning quality. Qualitatively, unreliable internet connectivity, intermittent power

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supply, limited access to digital devices, and system instability disrupted participation, reduced engagement, and constrained students' online learning experiences. The study recommends strengthening ICT infrastructure for enhanced quality of online learning.

Keywords: customer focus, meeting customer requirements, student satisfaction, examinations management, SERVQUAL

1. Introduction

The rapid advancement of information and communication technologies (ICTs) has transformed higher education globally, leading to increased adoption of online learning as a flexible and accessible mode of instructional delivery. In nursing education, online learning has become particularly important because it enables practicing nurses to upgrade their professional qualifications while maintaining employment and meeting family responsibilities. Unlike conventional face-to-face instruction, online learning provides flexibility in time and location, thereby supporting lifelong learning and continuous professional development among healthcare workers (Sebuliba, 2021).

The demand for online learning accelerated considerably following the COVID-19 pandemic, which compelled higher education institutions worldwide to transition from traditional classroom teaching to virtual learning environments. Medical and nursing schools increasingly adopted digital platforms such as Learning Management Systems (LMS), Zoom, and Microsoft Teams to ensure continuity of teaching and learning while complying with public health restrictions (Abraham, 2021b; Gordon & Cleland, 2021). Although this transition enabled uninterrupted delivery of academic programmes, it also exposed significant infrastructural challenges that affected students' participation and learning experiences, particularly in developing countries.

For nursing education, online learning presents unique opportunities and challenges. While virtual learning environments improve access to educational resources, facilitate continuous assessment, and provide immediate feedback, they also require substantial investments in ICT infrastructure, reliable internet connectivity, digital devices, electricity supply, and institutional technical support (JISC, 2019; Sundler et al., 2014; Ullah et al., 2014). The effectiveness of online learning therefore depends not only on students' willingness to embrace digital technologies but also on the availability of an enabling technological environment capable of supporting teaching, learning, and assessment.

Globally, inadequate ICT infrastructure remains one of the most frequently reported barriers to effective online learning. Universities in many low- and middle-income countries continue to experience insufficient computer laboratories, inadequate numbers of computers, limited bandwidth, unreliable internet connectivity, and intermittent network interruptions that constrain students' access to digital learning resources (Czerniewicz et al., 2020; UNESCO, 2023; World Bank, 2022). These infrastructural limitations disproportionately affect students enrolled in professional

programmes such as nursing, where continuous interaction with instructors, access to multimedia learning resources, and participation in synchronous online sessions are essential for developing clinical competencies.

Internet connectivity has consistently emerged as one of the most critical infrastructural determinants of successful online learning. Although many higher education institutions have invested in campus wireless internet services, studies conducted in Kenya indicate that internet access remains unreliable both within university campuses and students' home environments. Kibuku et al. (2020) reported that despite widespread awareness of campus Wi-Fi availability among Kenya Medical Training College (KMTC) students, unreliable internet connections, slow connection speeds, poor network coverage, and frequent disruptions significantly limited effective participation in online learning activities. These challenges were particularly severe among students residing in rural areas where network infrastructure and electricity supply remain inadequate.

Access to appropriate digital devices constitutes another important infrastructural requirement for online learning. Although ownership of smartphones has increased considerably among university students, many learners continue to experience difficulties accessing online learning because their devices are incompatible with institutional learning platforms or lack adequate functionality for academic activities. Boro (2021) reported that approximately 9.6% of nursing students in selected Kenyan universities did not own suitable e-learning devices, while nearly 70% possessed gadgets that were incompatible with required learning platforms. The study further demonstrated a significant association between device ownership and participation in virtual classes, emphasizing the importance of adequate technological resources for effective online learning.

Kenya Methodist University has progressively integrated online learning into its nursing programmes through the use of Learning Management Systems and other digital platforms. Nevertheless, like many universities operating in resource-constrained environments, the institution continues to face challenges associated with ICT infrastructure, internet connectivity, availability of learning resources, and technical support. While previous studies have documented various barriers to online learning in higher education, limited empirical evidence exists regarding the specific influence of infrastructural factors on online learning among upgrading nursing students enrolled in private universities in Kenya. This study therefore examined the influence of infrastructural factors on online learning among upgrading nursing students at Kenya Methodist University. The study sought to generate evidence that can inform institutional investment decisions, strengthen digital learning environments, and improve the quality of online nursing education in resource-constrained university settings.

2. Literature Review

2.1 Theoretical Framework

This study was primarily anchored on the Technology Acceptance Model (TAM) developed by Davis (1989). This framework provides complementary perspectives for explaining how institutional infrastructure influences the effectiveness of online learning among upgrading nursing students.

2.1.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) (Davis, 1989) explains the factors influencing individuals' acceptance and use of information technologies. The model posits that technology adoption is primarily determined by two constructs: perceived usefulness, defined as the degree to which an individual believes that using a technology will enhance performance, and perceived ease of use, which refers to the extent to which an individual believes that using the technology will require minimal effort (Hussain et al., 2025; Marikyan & Papagiannidis, 2026). These perceptions shape users' attitudes towards technology, subsequently influencing behavioural intention and actual technology use. Students are more likely to engage actively in online learning when they perceive digital platforms as useful, accessible, and easy to navigate (Hu & Xiao, 2025; Hussain et al., 2025). Conversely, inadequate ICT infrastructure reduces both perceived usefulness and perceived ease of use, thereby negatively affecting students' participation and satisfaction with online learning (Brugliera, 2024).

The present study applies TAM to explain how infrastructural conditions shape students' online learning experiences. Availability of reliable internet connectivity, adequate digital devices, stable electricity supply, and institutional ICT resources creates an enabling environment that enhances students' perceptions of the usefulness and usability of online learning platforms. In contrast, deficiencies in these infrastructural resources increase technological barriers, reduce learner engagement, and ultimately compromise the quality of online learning. TAM therefore provides an appropriate theoretical lens for understanding the relationship between infrastructural factors and online learning among upgrading nursing students at Kenya Methodist University.

2.2 ICT Infrastructure and Online Learning in Nursing Education

The integration of Information and Communication Technologies (ICT) into higher education has fundamentally transformed the delivery of nursing education worldwide. Online learning has increasingly become an important strategy for supporting continuous professional development among practicing nurses by providing flexible access to education while allowing learners to maintain their clinical responsibilities (Sebuliba, 2021). The widespread adoption of digital learning accelerated following the COVID-19 pandemic, compelling universities to replace conventional face-to-face instruction with virtual learning environments. Although this transition ensured continuity of education, it simultaneously exposed substantial infrastructural limitations

that continue to hinder effective online learning, particularly in low- and middle-income countries (Abraham, 2021b; Gordon & Cleland, 2021).

The effectiveness of online learning depends on the availability of adequate ICT infrastructure, including reliable internet connectivity, appropriate digital devices, functional Learning Management Systems (LMS), electricity supply, and institutional technical support. These resources facilitate communication between students and instructors, enable access to learning materials, support online assessments, and promote collaborative learning experiences. Conversely, inadequate ICT infrastructure limits learner engagement, reduces participation in synchronous learning activities, and compromises educational outcomes (Czerniewicz et al., 2020; UNESCO, 2023; World Bank, 2022).

Reliable internet connectivity is consistently identified as one of the most critical determinants of successful online learning. Global evidence demonstrates that higher education institutions continue to experience significant disparities in internet infrastructure. Many universities possess inadequate network capacity, resulting in limited access to digital learning resources and frequent interruptions during online learning activities (Czerniewicz et al., 2020). These infrastructural deficiencies disproportionately affect students enrolled in professional programmes requiring regular interaction with instructors and continuous access to digital learning platforms. Evidence from Kenya reflects similar challenges. Kibuku et al. (2020) reported that although most Kenya Medical Training College (KMTC) students were aware of the availability of institutional wireless internet, many perceived the connection to be unreliable and unstable. Students frequently experienced slow internet speeds, interrupted connectivity, and difficulties accessing online learning materials, particularly when studying from rural locations where network coverage and electricity supply were inadequate. These findings suggest that internet connectivity remains a major determinant of learner participation and engagement within virtual learning environments.

Access to suitable digital devices is another important infrastructural requirement for effective online learning. Boro (2021) reported that approximately 9.6% of nursing students in selected Kenyan universities lacked personal e-learning devices and therefore relied on borrowing equipment from family members or friends. More importantly, nearly 70% of students possessed devices that were incompatible with institutional online learning platforms, limiting their ability to participate effectively in virtual learning. The study further established a significant association between ownership of appropriate devices and participation in online classes ($\chi^2 = 4.393$, $p = 0.036$), indicating that technological accessibility directly influences learner engagement.

Reliable electricity supply provides the foundation upon which digital learning infrastructure operates. Katumbi and Magutu (2018) observed that inadequate electricity supply significantly constrained ICT implementation within educational institutions. Frequent power outages, high electricity costs, and limited access to alternative energy sources reduced opportunities for integrating technology into teaching and learning.

Similar infrastructural challenges continue to affect online education by interrupting virtual classes, limiting students' ability to charge electronic devices, and reducing access to institutional digital learning platforms.

The implementation of online learning within Kenyan universities has expanded considerably over the past decade. Nevertheless, infrastructural inadequacies continue to constrain effective delivery of online education. Previous studies have identified limited ICT investment, inadequate computer facilities, insufficient internet bandwidth, unstable electricity supply, and inadequate learner support as persistent barriers affecting students' participation in online learning (Kashorda & Waema, 2014; Mutisya & Makokha, 2016).

In nursing education, infrastructural adequacy is particularly important because students must develop theoretical knowledge alongside clinical reasoning and decision-making skills. Online learning environments therefore require technological systems capable of supporting multimedia instruction, virtual demonstrations, simulations, collaborative discussions, and continuous assessment. Without adequate infrastructure, the quality of nursing education and students' learning experiences may be substantially compromised. This study therefore sought to address this knowledge gap by examining the influence of infrastructural factors on online learning among upgrading nursing students at Kenya Methodist University.

3. Method

This study adopted a descriptive cross-sectional research design employing a mixed-methods approach to examine the influence of infrastructural factors on online learning among upgrading nursing students at Kenya Methodist University. The study was conducted at Kenya Methodist University (KeMU), a chartered private Christian university located in Meru County, Kenya, offering undergraduate and postgraduate programmes in various disciplines, including nursing and health sciences (Commission for University Education [CUE], 2023; Kenya Methodist University, 2024). The university has integrated online learning through a Learning Management System (LMS) to support flexible learning, particularly for students enrolled in upgrading nursing programmes.

The target population comprised 400 upgrading nursing students enrolled at Kenya Methodist University who had prior experience with online learning. The study also included lecturers involved in online teaching and a university administrator responsible for coordinating online learning. A probability random sampling technique using the Taro Yamane formula (Yamane, 1967) was used to determine 200 student participants from different cohorts within the upgrading nursing programme to ensure that each eligible student had an equal opportunity of selection. For the qualitative component, purposive sampling was employed to recruit four lecturers involved in digital education and one university administrator based on their experience and responsibilities in online learning implementation.

Quantitative data were collected using a semi-structured questionnaire administered to the selected upgrading nursing students, while qualitative data were collected through semi-structured interviews with lecturers and the university administrator. Quantitative data were analyzed using descriptive and inferential statistical techniques. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize respondents' characteristics and perceptions regarding infrastructural factors influencing online learning. Inferential statistical analyses were conducted to determine the relationship between infrastructural factors and online learning. Qualitative interview data were analyzed thematically. Responses from lecturers and the university administrator were organized into recurrent themes that explained institutional experiences, infrastructural challenges, and recommendations for improving online learning. These qualitative findings were integrated with the quantitative results to provide a comprehensive understanding of how infrastructural factors influence online learning among upgrading nursing students.

4. Results

4.1 Availability of ICT Infrastructure and Online Learning Quality

The study examined the availability of institutional ICT infrastructure and its influence on perceived online learning quality among upgrading nursing students at Kenya Methodist University. Findings demonstrated that infrastructural factors significantly influenced students' perceptions of online learning quality. The most available ICT resources were television and DVD facilities within the nursing department (72.8%), Smart Boards (54.3%), and adequate computers (52.0%). Moderate availability was reported for stable internet connectivity (46.8%), ICT accessibility (31.2%), and powered lecture rooms (27.7%). However, standby generators (15.6%) and stable electricity supply (11.6%) were reported as the least available infrastructural resources. The findings are presented in Table 1.

Table 1: Availability of ICT Infrastructure among Upgrading Nursing Students

Infrastructure component	Availability (%)
TV/DVD facilities	72.8
Smart Boards	54.3
Adequate computers	52.0
Stable internet	46.8
ICT accessibility	31.2
Powered lecture rooms	27.7
Standby generators	15.6
Stable electricity	11.6

The study further sought to establish the association between the availability of ICT infrastructure and the perceived quality of online learning. The results are as presented in Table 2.

Table 2: Association Between ICT Infrastructure and Perceived Online Learning Quality

Infrastructure factor	**p-value**
Computer laboratory availability	0.008
Adequate computers	<0.001
Stable internet	0.002
Standby generator	<0.001
Powered lecture rooms	<0.001
TV/DVD facilities	<0.001
Smart Boards	0.011
ICT accessibility	0.306
ICT policy	0.094
Electricity stability	0.162

4.2 Influence of Internet Connectivity on Online Learning

Internet stability emerged as one of the most important infrastructural determinants of online learning quality. Students who reported stable internet connectivity were significantly more likely to perceive online learning quality positively compared with those experiencing unstable connectivity ($p = 0.002$). Specifically, 59.8% of students with low perceived online learning quality reported stable internet connectivity compared with 35.1% among those reporting high perceived quality, while unstable internet was reported by 64.9% of students with high perceived quality compared with 40.2% among those with low perceived quality.

Although the direction of association requires careful interpretation, the statistical relationship demonstrates that internet reliability remains a central component of online learning implementation. Qualitative findings provided further explanation, with participants indicating that network congestion during peak usage periods resulted in slow connections, temporary disconnections, and disruption of online assessments. One lecturer explained:

> "*When many students log in… the platform can slow down or briefly disconnect*." (L1)

Another participant highlighted inequalities in access:

> "*Some depend entirely on the university labs, while others practice at home with stronger internet."* (L2)

4.3 Availability of Computers and Computer Laboratories

Access to computers and computer laboratories was significantly associated with perceived online learning quality. Students reporting availability of computer laboratories were more likely to report higher quality online learning experiences ($p = 0.008$). Similarly, availability of adequate computers showed a significant association with perceived online learning quality ($p < 0.001$).

These findings demonstrate that institutional computer facilities remain important despite increased ownership of personal digital devices. For upgrading nursing students,

who often combine professional responsibilities with academic demands, access to reliable institutional facilities provides an alternative for students who lack personal computers or adequate home-based learning environments.

Qualitative findings reinforced this observation. Participants indicated that limited computer laboratory availability reduced opportunities for students to practice using online platforms before examinations. An administrator noted:

> "*Not all students can access the labs as often as they would like, which reduces their practice opportunities*." (ADM1)

4.4 Electricity Supply and Backup Power Infrastructure

Although electricity stability did not demonstrate a statistically significant association with perceived online learning quality ($p = 0.162$), qualitative findings revealed that power interruptions remained a practical challenge affecting online learning activities.

Students and staff reported that power interruptions and fluctuations occasionally disrupted online examinations and created uncertainty. One lecturer stated:

> "*We have had episodes where power interruptions affected the exam flow, even with a generator available*." (L2)

Interestingly, availability of standby generators showed a statistically significant association with perceived online learning quality ($p < 0.001$). This suggests that while students may not directly perceive routine electricity stability as a determinant, backup power systems provide important resilience during high-stakes online learning activities such as examinations.

4.5 Other ICT Facilities Supporting Online Learning

Other institutional ICT resources also demonstrated significant associations with perceived online learning quality. The availability of powered lecture rooms was significantly associated with online learning quality ($p < 0.001$), while TV/DVD facilities in the nursing department ($p < 0.001$) and Smart Boards ($p = 0.011$) also showed significant associations.

These findings suggest that online nursing education requires a combination of technological resources rather than reliance on a single infrastructure component. Nursing education involves theoretical instruction, demonstrations, visualization of clinical procedures, and access to multimedia resources. Therefore, ICT infrastructure that supports different modes of content delivery may enhance learning engagement and comprehension.

However, ICT accessibility ($p = 0.306$) and availability of an ICT policy ($p = 0.094$) were not statistically associated with perceived online learning quality. This finding suggests that the mere existence of policies or access mechanisms may not automatically

translate into improved online learning experiences unless accompanied by functional resources, reliable connectivity, and effective implementation strategies.

5. Discussion

The limited availability of essential digital infrastructure highlights the continuing challenges experienced by higher education institutions operating within resource-constrained environments. Although Kenya Methodist University has adopted online learning platforms to enhance flexibility and accessibility, gaps remain in ensuring consistent access to the technological resources required for effective digital education. These findings are consistent with evidence from low- and middle-income countries, where inadequate ICT infrastructure, limited digital resources, and unreliable connectivity continue to constrain the expansion and effectiveness of online learning (Czerniewicz et al., 2020; UNESCO, 2023; World Bank, 2022).

The findings further support the Technology Acceptance Model (TAM), which suggests that users' acceptance of technology is influenced by perceived usefulness and perceived ease of use (Davis, 1989). In this context, adequate infrastructure enhances students' perception that online learning platforms are reliable, accessible, and beneficial for academic activities. Conversely, poor infrastructure increases technological difficulties and reduces students' confidence in engaging with digital learning environments. This interpretation aligns with the thesis framework, which identifies infrastructure reliability as an important determinant of online learning experiences.

With regard to the results on internet connectivity and online learning, the findings correspond with previous evidence from Kenya. Kibuku et al. (2020) reported that unreliable internet connectivity significantly affected participation in online learning among medical training students, particularly where students relied on unstable networks and limited institutional resources. Similar challenges have been documented globally, where poor bandwidth and inconsistent connectivity restrict students' participation in synchronous classes, access to online resources, and completion of digital assessments (UNESCO, 2023; World Bank, 2022).

From a Community of Inquiry perspective, unreliable internet infrastructure affects all three dimensions of online learning: teaching presence, social presence, and cognitive presence. When students cannot consistently access learning platforms, interaction with instructors decreases, peer engagement is limited, and opportunities for meaningful knowledge construction are reduced (Garrison et al., 2000; Chang et al., 2023). On availability of computers and computer laboratories, the findings are supported by previous studies indicating that institutional ICT facilities remain essential resources for students who experience digital inequalities. Czerniewicz et al. (2020) noted that disparities in ICT infrastructure continue to influence students' ability to participate effectively in online learning, particularly in developing contexts. Similarly, Kashorda and Waema (2014) reported persistent challenges related to inadequate computer

facilities and low student-to-computer ratios within African higher education institutions.

The results on electricity supply and power backup are consistent with Katumbi and Magutu (2018), who identified unreliable electricity supply as a significant barrier to ICT integration within educational institutions. In resource-constrained environments, digital learning infrastructure depends not only on internet availability but also on dependable energy systems capable of supporting continuous technology use.

5.1 Implications for Research, Policy and Practice

The findings also emphasize the importance of strengthening students' access to institutional ICT facilities. Computer laboratories, powered lecture rooms, Smart Boards, and multimedia resources should be maintained and strategically integrated into nursing education delivery to enhance students' engagement with digital learning environments. The study provides evidence that institutional investment in ICT infrastructure remains essential for sustainable online learning implementation. University management should prioritize infrastructure planning that addresses identified gaps, particularly in internet reliability, computer availability, and power resilience.

The significant influence of standby generators indicates the importance of institutional preparedness for technological disruptions. Universities implementing online examinations and digital learning activities should strengthen backup systems to minimize interruptions that may compromise assessment integrity and learner participation.

The findings have implications for organizations responsible for regulating nursing education and higher education in Kenya. As digital learning becomes increasingly integrated into health professional education, regulatory frameworks should consider minimum ICT infrastructure standards required for institutions offering online and blended learning programmes.

6. Conclusion

This study demonstrates that infrastructural factors significantly influence online learning experiences among upgrading nursing students in a resource-constrained university setting. The availability of adequate computers, computer laboratories, stable internet connectivity, standby generators, powered lecture rooms, TV/DVD facilities, and Smart Boards were important determinants associated with perceived online learning quality.

The findings highlight that successful implementation of online nursing education requires more than the availability of digital platforms. Sustainable online learning depends on a supportive technological ecosystem that enables students to access learning materials, participate in virtual interactions, and engage effectively with digital learning activities.

Although some infrastructure-related factors, including ICT accessibility, ICT policy availability, and electricity stability, were not statistically significant in this study, qualitative findings demonstrated that infrastructure challenges continue to influence the learning environment. Therefore, continuous improvement of ICT infrastructure remains necessary to enhance the effectiveness, reliability, and equity of online learning among nursing students.

Strengthening institutional digital infrastructure will not only improve students' online learning experiences but also contribute to the development of competent nursing professionals equipped to function within increasingly digital healthcare systems.

6.1 Recommendations

Based on the findings of this study, the following recommendations are proposed:

1) Universities should prioritize investment in reliable and high-capacity internet infrastructure to support uninterrupted access to online learning platforms.
2) Institutions offering upgrading nursing programmes should increase the availability of computers and improve access to computer laboratories. Adequate computer facilities should be strategically scheduled to allow students who lack personal devices sufficient opportunities to participate in online learning activities.
3) Universities should strengthen electricity resilience by investing in reliable backup power systems to maintain continuity during online assessments, virtual classes, and access to digital resources.
4) Institutional online learning strategies should incorporate ICT infrastructure development as a core component rather than treating technology platforms as standalone interventions. Infrastructure investments should be guided by student needs assessments and regular evaluation of digital learning challenges.
5) Universities should continue investing in multimedia facilities such as Smart Boards, powered lecture rooms, and digital teaching resources to support interactive and engaging nursing education. These resources are particularly important for nursing programmes requiring demonstration, visualization, and integration of theoretical and practical knowledge.

Conflict of Interest Statement

The authors declare that they have **no conflicts of interest** related to the research, authorship, or publication of this manuscript.

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References

Abraham, R. (2021b). Turning constraints into opportunities: online delivery of communication skills simulation sessions to undergraduate medical students during the COVID-19 pandemic. *Perspectives in Education*, *39*(4), 57–71. https://doi.org/10.18820/2519593X/PIE.V39.I4.8

Boro, S. (2021). Influence of mobile phones on enhancing learner support services for distance education programmes. *Journal of Online and Distance Learning, CARI Journals Limited,* *1*(1), 45-59. Retrieved from https://ideas.repec.org/a/bhx/ojjodl/v1y2021i1p45-59id637.html

Brugliera, P. (2024). The effectiveness of digital learning platforms in enhancing student engagement and academic performance. *Journal of Education Humanities and Social Research 1*(1), 26-36. https://doi.org/10.70088/xq3gy756

Chang, J.J., Hain, A., Dosiou, C., & Gesundheit, N. (2023). Use of the community of inquiry framework to measure student and facilitator perceptions of online flipped classroom compared with online lecture learning in undergraduate medical education. *Adv Med Educ Pract.* 14, 963-972. https://doi.org/10.2147/AMEP.S413201

CUE, (2023). *Accredited Universities in Kenya.* Commission for University Education

Czerniewicz, L., Agherdien, N., Badenhorst, J., Belluigi, D., Chambers, T., Chili, M., de Villiers, M., Felix, A., Gachago, D., Gokhale, C., Ivala, E., Kramm, A., Marshall, D., Prinsloo, P., Solomon, K., & Wissing, G. (2020). *A wake-up call: Equity, inequality and Covid-19 emergency remote teaching and learning*. *Postdigital Science and Education, 2*(3), 946–967. https://doi.org/10.1007/s42438-020-00187-4

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2-3), 87-105. Retrieved from https://www.sciencedirect.com/science/article/abs/pii/S1096751600000166

Gordon, L., & Cleland, J. A. (2021). Change is never easy: How management theories can help operationalise change in medical education. *Medical Education*, *55*(1), 55–64. https://doi.org/10.1111/medu.14297

Hu J, Xiao W. (2025). What are the influencing factors of online learning engagement? A systematic literature review. *Front Psychol.* 17. https://doi.org/10.3389/fpsyg.2025.1542652.

Hussain, A., Zhiqiang M., Li, M., Jameel, A., Kanwel, S., Ahmad, S., & Ge, B. (2025). The mediating effects of perceived usefulness and perceived ease of use on nurses' intentions to adopt advanced technology. *BMC Nurs. 24*(1), 33. https://doi.org/10.1186/s12912-024-02648-8

JISC. (2019). *JISC Digital Experience Insights Survey 2019 – Media and Learning*. Retrieved from https://media-and-learning.eu/type/book-reviews/jisc-digital-experience-insights-survey-2019/

Kashorda, M., & Waema, T. (2014). *E-readiness survey of Kenyan universities (2013 report).* Kenya Education Network (KENET). Retrieved from https://www.kenet.or.ke/sites/default/files/E-readiness%202013%20Survey%20of%20Kenyan%20Universities_FINAL.pdf

Katumbi, M.N., & Magutu, O.C. (2018). Challenges of accessing electricity for ICT Use in Kenyan secondary schools: a case of Nandi County. *IOSR Journal of Engineering (IOSRJEN). 8*(8), 11-16. Retrieved from https://www.iosrjen.org/Papers/vol8_issue8/Version-6/C0808061116.pdf

Kenya Methodist University. (2024). *University profile*. Meru, Kenya: Kenya Methodist University.

Kibuku, R.N., Ochieng, D.O., Wausi, A. (2020). e-Learning Challenges Faced by Universities in Kenya: A Literature Review. *The Electronic Journal of e-Learning, 18*(2). https://doi.org/10.34190/EJEL.20.18.2.004

Marikyan, D. & Papagiannidis, S. (2026). *Technology Acceptance Model: A review*. In S. Papagiannidis (Ed.), Theory Hub Book. Retrieved from https://eprints.ncl.ac.uk/302879

Mutisya, D. N. & Makokha, G.L. (2016). Status of E-Learning in Public Universities in Kenya. *International Review of Research in Open and Distributed Learning, 17*(3), 341-359. Retrieved from https://doi.org/10.19173/irrodl.v17i3.2235

Sebuliba, F. (2021). Degree completion nursing students' readiness to learn in the online environment in Uganda. *Texila International Journal of Nursing*. https://doi.org/10.21522/TIJNR.2015.07.02.ART007

Sundler, A. J., Björk, M., Bisholt, B., Ohlsson, U., Engström, A. K., & Gustafsson, M. (2014). Student nurses' experiences of the clinical learning environment in relation to the organization of supervision: A questionnaire survey. *Nurse Education Today*, *34*(4), 661–666. https://doi.org/10.1016/j.nedt.2013.06.023

Ullah, H., Ali, J., & Naz, A. (2014). Gender representation in children's books: A critical review of empirical studies. *World Applied Sciences Journal, 29*(1), 134-141. https://doi.org/10.5829/idosi.wasj.2014.29.01.13831

UNESCO. (2023). *Global education monitoring report 2023: Technology in education—A tool on whose terms?* UNESCO. Retrieved from https://www.unesco.org/gem-report/en/publication/technology

World Bank. (2022). *The state of global learning poverty: 2022 update*. World Bank. Retrieved from https://www.worldbank.org/en/topic/education/publication/state-of-global-learning-poverty