

Original Research Article

## Assessing the Influence of Internet Availability on Learning Enhancement among Selected Universities in Kampala

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**Abstract:** This study examines the influence of internet availability on learning enhancement among university students in Kampala. Using a cross-sectional survey of 293 students from three universities, data were collected via structured questionnaires and analyzed using descriptive statistics, Pearson correlation and regression. Results revealed a strong positive relationship between internet availability and learning enhancement ( $r = 0.6346$ ,  $p < 0.001$ ), with internet access explaining 40.27% of variance in outcomes ( $R^2 = 0.4027$ ). Despite 78.95% of students using ICT for learning, challenges such as high data costs (consuming 30% of budgets), inconsistent connectivity, and uneven faculty training hindered equitable access. While 73.6% owned devices, infrastructural gaps persisted, particularly in rural areas. The study concludes that internet availability significantly enhances learning but requires complementary investments in affordable connectivity, faculty capacity building, and hybrid learning models. The study recommends adopting policies aligned with the African Union's Digital Education Strategy (2023–2028) and leveraging subsidized data initiatives to bridge access disparities.

**Keywords:** Internet Availability, Learning Enhancement, Higher Education.

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## BACKGROUND

Internet availability is a pivotal driver of learning enhancement in higher education, enabling access to digital resources, collaborative platforms, and innovative pedagogies (Scherer *et al.*, 2021). Globally, studies link reliable connectivity to improved academic performance, particularly in STEM fields, through open educational resources and virtual laboratories (Agarwal *et al.*, 2020; OECD, 2021). However, Sub-Saharan Africa lags, with only 28% of its population accessing the internet, compared to 66% globally (GSMA, 2023). Uganda's higher education system exemplifies this disparity: while Kampala hosts the nation's most advanced ICT infrastructure, rural-urban divides, high data costs, and inconsistent power supply hinder equitable access (NITA-Uganda, 2020; Muwanga *et al.*, 2021). A 2022 survey conducted among universities in Central Uganda revealed that 62% of students depend on costly mobile data, diverting 30% of their budgets to connectivity, a barrier exacerbating dropout rates among low income groups (Kizito, 2022; Tusiime *et al.*, 2021). Regional comparisons highlight divergent progress. Kenya's Digital Literacy Programme boosted graduate employability by 15% through enhanced digital skills (Were *et al.*, 2021), while Rwanda's Smart Education

Initiative enabled 78% of university students to engage in online collaborations via nationwide fiber-optic networks (Ndayambaje *et al.*, 2022). In contrast, only 40% of Uganda's university students report consistent academic internet access, underscoring systemic gaps in policy implementation and infrastructure (Ssewanyana & Busler, 2020). Financial constraints are compounded by pedagogical challenges: 55% of lecturers at Kyambogo University lack training in digital tools, limiting the use of platforms like Moodle (Nampijja *et al.*, 2023). Similar issues persist in Kenya, where 60% of universities fail to provide regular ICT training for staff (Mwangi & Mutisya, 2021). Strategic interventions elsewhere offer actionable insights. South Africa's "Zero-Rating" initiative, providing free access to educational sites, raised online course completion by 25% among disadvantaged students (Czerniewicz *et al.*, 2023), while Ghana's subsidized student data bundles reduced connectivity costs by 40% (Agyei *et al.*, 2022). Such models align with Uganda's National ICT Policy goals of "digital inclusion for all learners" (NITA-Uganda, 2020, p. 14), yet only 30% of its 2025 targets have been met (Uganda Communications Commission, 2023). The pedagogical implications of internet access are profound. Nigerian and Ethiopian students with reliable connectivity exhibit 35% higher digital literacy

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than peers without (Adewumi *et al.*, 2021; Teshome *et al.*, 2022). However, Uganda's infrastructural and training gaps stifle similar gains. For instance, 48% of students report frequent online lecture disruptions due to power outages (Nabaggala, 2023), mirroring Tanzania's challenges, where only 22% access high-speed internet for less than 5 hours daily (Mtebe & Raisamo, 2020). This study therefore, examines how internet availability influences learning outcomes in Kampala's universities, employing mixed methods to assess academic performance and stakeholder perceptions.

## METHODOLOGY

### Study Area

The study was conducted in three selected universities namely: Metropolitan International University (Latitude: 0.3408; Longitude:32.5410), Kampala International University (Latitude:0.2944; Longitude:32.6040) and Kyambogo University (Latitude:0.350000; Longitude:32.630000) in Kampala metropolitan area. Metropolitan International University is located approximately 300 meters along Nakibinge Road off Kampala-Hoima Road (Google, 26 December 2020), whereas, Kyambogo university is located on on Kyambogo Hill, approximately 8 kilometers east of Kampala's central business district. Kampala International University's (KIU) is located in Kansanga, a neighborhood in the Makindye Division of Kampala, Uganda. It's approximately 7 kilometers southeast of Kampala's central business district, along the road to Ggaba.

### Research Design

The study adopted a cross-sectional survey research design due to its high magnitude of precision and accuracy (Ambetsa *et al.*, 2020). The design allowed

for collection of data at a single point thus saving on resources and time (Wambua *et al.*, 2019). Ambetsa *et al.*, (2020) explains that cross sectional survey helps researchers describe populations within the study area in regard to the findings and define the extent to which the results relate to the sampled population. The design employs both quantitative and qualitative data in collecting and analyzing data with an intent of having one phase of the mixed method building into another. It allows for data collected from both quantitative and qualitative to be converged or integrated at the discussion stage of the study (Creswell & Plano-Clark, 2018).

### Study Population and Sampling Design

The study population consisted of students from three selected universities (Metropolitan International University, Kampala International University and Kyambogo University (ARs offices, 2020). A two-stage sampling technique was employed. The first stage was purposive selection three universities due to their location in the central part of the country where internet is more accessible and reliable compared to any other universities beyond. This was followed by simple random sampling technique that was used to select the study sample due to its representative of the population and being free from bias and prejudice (Neumann, 2012). Each student name was assigned a random number from which a sample of 293 students were randomly selected (Table 1), following procedures of Yamane (1970) as shown below;

$$\text{Sample size } (n) = \frac{N}{1 + N^2}$$

Where:

$n$  = desired sample size

$N$  = population size (i.e. the entire group that the study population is drawn from)

$e$  = acceptable sampling error (0.05)

**Table 1: Total number of selected student participants**

Category of respondents	Population of BA students	Sample size
Kyambogo University	500	134
Kampala International University	400	107
Metropolitan International University	195	52
<b>Total</b>	<b>1095</b>	<b>293</b>

Source: Primary data (2025)

### Data Types and Data Collection

This study utilized cross-sectional primary data, which was gathered through a pre-tested, researcher-administered structured questionnaire. The questionnaire included items addressing students' demographic characteristics (sex, age, and university affiliation), use of ICT and duration for learning and search engines used. Additionally, a 5 pointer Likert scale ranging from "Strongly Disagree" to "Strongly agree" was employed to assess both internet availability and learning enhancement among students.

### Validity and Reliability

This study used different types of validity procedures to explain how well the collected data covered the actual area of investigation. They included: face validity, content validity, Kaiser-Meyer-Olkin (KMO) and Bartlett's Test. For reliability, this study used the Cronbach Alpha Coefficient (CAC or  $r$ ) to examine whether or not the questionnaire as an instrument was generally reliable for field study of the current study.

### Data Analysis

Descriptive analysis was performed in SPSS, before the data was exported to STATA v. 14 for

econometric analysis. Descriptive statistics and simple inferential statistics involved computations of means, frequency distribution and standard deviations for students' continuous and categorical characteristics, internet availability and its influence on learning enhancement. Students' perception on internet availability and its influence on learning enhancement were measured using of a 5-point Likert scale following procedures of Likert (1932). Likert- scale type of interview results in a single score that represents the degree to which a person is favorable or unfavorable with respect to the question asked (Bernard, 1994). Some questions were reverse coded to avoid bias. Each respondent was asked to indicate their extent of agreement or disagreement against each statement along a 5-point scale: very low, low, moderate, high and very high. Weights assigned to these responses were 5, 4, 3, 2, and 1 respectively. Cronbach's Alpha analysis was done to determine the reliability and internal consistency of questions regarding Students' perception on internet availability and its influence on learning enhancement (Olaniyi, 2019). Arithmetic means were calculated from the Likert scale to get the overall students' perception. Pearson correlation and regression were used to examine the relationship between internet availability and learning enhancement as the dependent variable, among university students.

## RESULTS AND DISCUSSION OF RESULTS

### Respondent Demographics and ICT Usage Patterns

Results showed that the demographic distribution of respondents, skewed towards individuals aged 21–24 years (74.14%, n=215), and this aligns with global patterns in undergraduate enrollment, where younger adults dominate due to standardized tertiary education pathways (UNESCO, 2022). The underrepresentation of older age groups (e.g., 0.69% above 40 years, n=2) reflects persistent barriers to adult education, such as work-life balance challenges and institutional inflexibility, as noted in OECD (2023) reports. The slight female majority (52.78%, n=152) mirrors global trends in higher education, where women now constitute 55% of university enrollments, a shift attributed to socio-cultural and policy changes (HESA, 2023; World Bank, 2022). The predominance of Bachelor's degree holders (85.0%, n=227) is consistent with enrollment statistics in developing and developed nations, where undergraduate programs remain the primary entry point to higher education (Altbach *et al.*, 2022). The limited representation of postgraduate students (e.g., 1.0% PhD candidates, n=2) highlights the niche status of advanced degrees, a phenomenon linked to funding constraints and career prioritization (Nerad, 2020).

**Table 2: Respondent demographics and ICT usage patterns**

Variable	Category	Frequency	Percentage
Age	Below 20	29	10.00
	21 - 24	215	74.14
	25 - 30	30	10.34
	31 - 40	14	4.83
	Above 40	2	0.69
Gender	Male	136	47.22
	Female	152	52.78
Education level	Diploma	27	10.0
	Degree	227	85.0
	Masters	10	4.0
	PhD	2	1.0
Experience with computers	Less than a year	66	23
	1 to 3	114	39.72
	4 to 6	49	17.07
	More than 6	59	20.21
Use of ICT for Learning	Yes	225	78.95
	No	60	21.05
Duration of ICT for learning	Never	25	9
	6months	43	15
	6-12months	47	16
	More than a year	174	60
Search engines used	Internet Explorer	99	34.98
	Google Chrome	159	56.18
	Mozilla Firefox	9	3.18
	Microsoft Edge	16	5.65

**Source:** Field research, (2025)

Respondents' computer experience, with 39.72% (n=114) reporting 1–3 years of use, reflects the increasing integration of digital tools in secondary education curricula (European Commission, 2021). However, the notable proportion with over six years of experience (20.21%, n=59) suggests a subgroup with advanced digital literacy, likely influenced by early exposure to technology in both academic and personal contexts (van Laar *et al.*, 2020). The high adoption of ICT for learning (78.95%, n=225) aligns with post-pandemic shifts toward blended and online education, as documented in global surveys by the International Association of Universities (Marinoni *et al.*, 2022). The majority (60%, n=174) using ICT for over a year supports findings that sustained engagement with digital tools enhances self-efficacy and academic performance (Scherer *et al.*, 2021). However, the persistence of non-users (21.05%, n=60) highlights lingering digital divides, often rooted in socioeconomic disparities or inadequate institutional support (Czerniewicz *et al.*,

2023). Google Chrome's dominance as the preferred search engine (56.18%, n=159) correlates with its global market share (87% as of 2023) and user-friendly design for academic research (StatCounter, 2023). The residual use of internet explorer (34.98%, n=99) may reflect institutional reliance on legacy systems, despite its phased discontinuation in 2022 (Microsoft, 2022).

### Students Perception on Internet Availability

Results in table 3 showed mixed perceptions of students regarding free internet access as a motivator for online learning, where 58.8% (n=168) agreed or strongly agreed with its positive influence, while 34.9% (n=100) disagreed. This aligns with findings of Muwanga *et al.*, (2021), where it was revealed that internet affordability and reliability significantly shaped engagement. The moderate mean score (3.33) and high standard deviation (1.589) reflect the uneven distribution of digital resources in East Africa, as noted in a World Bank (2022) report on Sub-Saharan Africa's digital divide.

**Table 3: Students perception on internet availability**

Statements on internet availability	Respondents' ranking (%)						Std. Dev	Interpretation	Ranking
	SD	D	N	A	SA	Mean			
With fast internet, I can actively learn.	5.3	6.4	9.6	41.8	37	3.99	1.10	High	1
The lecturer provides the guidance I need to be successful in class.	5.7	8.9	8.9	50.4	26	3.83	1.09	High	2
I am comfortable communicating electronically.	9.5	9.5	7.7	45.1	28	3.75	1.24	High	3
I have access to a device for e-learning	10.4	10.4	5.7	42.5	31	3.74	1.29	High	4
In future, I intend to pursue my studies online.	12.2	11.1	14	28.9	34	3.62	1.37	High	5
The internet at the University is stable.	11.9	10.8	16	38.8	22	3.48	1.28	High	6
I can control my effort and attention in solving tasks online.	9.9	13.5	14	46.8	16	3.45	1.20	High	7
I am motivated by provision of free internet at the university.	23.4	11.5	6.3	25.9	33	3.33	1.59	Moderate	8
My lecturers are helpful while am learning on line	15.8	16.5	13	38.8	16	3.22	1.33	Moderate	9
I am satisfied with the availability of internet while learning	21.6	19.9	7.8	30.1	21	3.08	1.48	Moderate	10

**Key:** SD-Strongly Disagree, D-Disagree, N-Neutral, A-Agree, SA-Strongly Agree

**Legend:** 4.20- 5.00 (*very high/Strongly agree*), 3.40 - 4.19 (*high/Agree*), 2.60-3.39 (*moderate/Neutral*) 1.80 -2.59 (*low/Disagree*), 1.00-1.79 (*very low/Strongly disagree*)

**Source:** Field research, (2025)

A majority of students (73.6%, n=206) reported having devices for e-learning, though disparities in access persisted (SD=1.285). This mirrors trends observed by Tusiime *et al.*, (2021), who found that while urban Ugandan universities have higher device ownership, rural students often rely on institutional resources. The moderate agreement on lecturer support (mean=3.22, SD=1.333) echoes Nampijja *et al.*, (2023), who emphasized the irreplaceable role of instructor guidance in blended learning models in Ugandan higher education institutions (HEIs). Satisfaction with internet availability was polarized, with 50.7% (n=143) satisfied and 41.5% (n=117) dissatisfied, likely reflecting

infrastructure inconsistencies common in East Africa (GSMA, 2023). The moderate mean (3.08, SD=1.480) parallels findings by Kizito (2022), who noted that Ugandan students often face connectivity interruptions despite institutional investments. The strong consensus on fast internet facilitating active learning (78.7%, n=222; mean=3.83) resonates with global studies (Scherer *et al.*, 2021) and local research by Ssewanyana and Busler (2020), who linked stable connectivity to improved academic outcomes in Ugandan universities. However, variability in perceived stability (mean=3.48, SD=1.275) underscores persistent infrastructural gaps, as highlighted in the International



Telecommunication Union's (ITU, 2023) report on East Africa's digital landscape. Students' comfort with electronic communication (73.3%,  $n=208$ ;  $mean=3.75$ ) aligns with Byamugisha *et al.*, (2020), who found that Ugandan learners increasingly adopt platforms like WhatsApp for collaborative learning. The expressed interest in future online studies (63%,  $n=181$ ) reflects broader post-pandemic shifts in East Africa, where HEIs are prioritizing digital integration (Marinoni *et al.*, 2022).

### Students' Perception on Learning Enhancement with Internet Availability

Results in table 4 revealed that the high engagement in online collaboration reported by students (74.9%,  $Mn = 3.66$ ) aligns with findings by Muwanga *et*

*al.*, (2021), who noted that Ugandan universities saw increased peer interaction via digital platforms during the COVID-19 pandemic. However, the notable disagreement (21.0%) reflects infrastructural and skill-based barriers, as observed in rural East African contexts (Tusiime *et al.*, 2021). Regarding lecturer feedback, the majority agreement (71.8%,  $Mean = 3.60$ ) correlates with Nampijja *et al.*, (2023), who emphasized the critical role of instructor responsiveness in blended learning at Makerere University. The divergence in perceptions (20.8% disagreement) may stem from uneven institutional support, a challenge highlighted in the World Bank's (2022) analysis of Sub-Saharan African higher education.

**Table 4: Students' perception on learning enhancement with internet availability**

Statements on learning enhancement	Respondents' ranking (%)				Std Dev			Interpretation	Ranking
	SD	D	N	A	SA	Mean			
I am certain I can master the skills being taught.	6.00	3.50	7.80	50.00	32.60	4.00	1.05	Very high	1
I know how to receive and send emails with attachments	5.70	5.70	12.40	36.20	40.10	3.99	1.13	High	2
The lecturer provides the guidance that I need to be successful.	7.70	6.60	6.60	54.50	24.50	3.81	1.11	High	3
I can have open consultations with my lecturers.	7.20	9.40	6.10	58.10	19.10	3.73	1.10	High	4
I work with other students online.	12.60	8.40	4.20	49.70	25.20	3.66	1.29	High	5
I receive feedback from lecturers.	8.10	12.70	7.40	54.80	17.00	3.6	1.15	High	6
The lecturer spends half the time giving presentations.	12.40	15.50	11.30	46.30	14.50	3.35	1.26	Moderate	7

**Key:** SD-Strongly Disagree, D-Disagree, N-Neutral, A-Agree, SA-Strongly Agree

**Legend:** 4.20- 5.00 (very high/Strongly agree), 3.40 - 4.19 (high/Agree), 2.60-3.39 (moderate/Neutral) 1.80 -2.59 (low/Disagree), 1.00-1.79 (very low/Strongly disagree)

**Source:** Field research, (2025)

The mixed responses on lecture time dedicated to presentations (60% agreement,  $Mn = 3.35$ ) resonate with Kizito (2022), who found that Ugandan educators often prioritize traditional methods over interactive pedagogies due to resource constraints. This contrasts with global trends advocating for student-centered approaches (OECD, 2023). Strong agreement on open lecturer consultations (77.2%,  $Mean = 3.73$ ) mirrors findings by Ssewanyana and Busler (2020), who linked accessible faculty communication to improved academic outcomes in Ugandan institutions. Similarly, the high perceived self-efficacy (82.6%,  $Mean = 4.00$ ) reflects growing digital confidence among East African students, as noted in GSMA's (2023) report on mobile-internet adoption. Students' email proficiency ( $Mean = 3.99$ ) and comfort with electronic communication ( $Mean = 4.08$ ) align with Byamugisha *et al.*, (2020), who documented rapid adoption of digital tools in Ugandan universities

post-2020. These results emphasize the region's progress in foundational digital literacy, though disparities persist in advanced technical skills (ITU, 2023).

### Relationship between Internet Availability and Learning Enhancement

The significant positive correlation between internet availability and learning enhancement ( $r = 0.6346$ ,  $p < 0.001$ ) as shown in table 5 aligns with findings by Oyo and Kalema (2022), who demonstrated that students in Ugandan universities with reliable internet access exhibited 30% higher academic performance in online courses compared to peers with intermittent connectivity. This relationship is further supported by Businge and Openjuru (2023), whose study in East African technical institutes linked consistent internet access to improved problem-solving skills and collaborative learning outcomes.

**Table 5 Correlation analysis between internet availability and learning enhancement**

Variables	Internet availability	Learning enhancement
Internet availability	1.0000	
Learning enhancement	0.6346***	1.0000

\*\* Correlation is significant at the 0.01 level (2-tailed), \* Correlation is significant at the 0.05 level (2-tailed).

Source: Field survey (2025)

The regression coefficient ( $\beta = 0.5922$ ,  $p < 0.001$ ) shown in table 6 highlights internet availability as a critical predictor of learning enhancement, corroborating Nakazibwe and Tumusiime's (2023) work in Ugandan rural colleges, where a 10% increase in internet reliability was associated with a 5.9% rise in student engagement. However, the moderate  $R^2$  (0.4027)

suggests that 60% of variance in learning outcomes is explained by factors beyond connectivity, such as pedagogical strategies or socioeconomic barriers. This aligns with Sseguya *et al.*, (2021), who found that Ugandan students' academic success in e-learning depended equally on instructor competence and digital infrastructure.

**Table 6: Regression analysis of the relationship between internet availability and learning enhancement**

Learning enhancement	Coefficient	Std. error	t	p-value
Internet availability	0.5922245	0.042876	13.81	0.000
Constant	1.716522	0.1530829	11.21	0.000

Number of obs=285,  $F(1,23)=190.78$ ,  $Prob>F=0.0000$ ,  $R\text{-squared}=0.4027$ ,  $Adj\ R\text{-squared}=0.4006$ ,  $Root\ MSE=0.60052$

Source: Field survey (2025)

The significant constant term (1.7165,  $*p < 0.001$ ) reflects baseline learning enhancement even with minimal internet access, a phenomenon observed by Nabaggala (2022) in Ugandan rural schools using hybrid models (e.g., offline LMS platforms). This mirrors Adewumi *et al.*, (2023) findings in Nigeria, where students leveraged community Wi-Fi hubs and peer networks to mitigate connectivity gaps. The model's statistical significance ( $F = 190.78$ ,  $*p < 0.001$ ) reinforces African Union's (2023) call for prioritizing internet infrastructure in education policies across the continent. However, Olalere *et al.*, (2022) caution that without addressing affordability and digital literacy, such investments risk exacerbating inequalities, as seen in Kenya's urban-rural education divide.

## CONCLUSION

In conclusion, the study confirms internet availability significantly enhances learning in universities, yet high costs and infrastructural gaps hinder equity. To bridge the digital divide, investments in affordable connectivity, faculty training, and hybrid models are essential. Aligning with the African Union's Digital Education Strategy and subsidized data initiatives can foster inclusive educational advancement.

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