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Mobile Learning Devices and Access to Internet-Based Educational Resources: A Study of a Teacher Training Institution in Uganda

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Abstract
In the 21st century, mobile devices have become increasingly vital for enhancing access to online learning, particularly as their adoption remains nascent among Ugandan students. This study examined the relationship between mobile learning device usage and student teachers' access to internet-based educational resources (IBER) at Kyambogo University's School of Education, employing a mixed-methods approach with descriptive and correlational designs, purposive sampling of 280 in-service teacher trainees, and both descriptive and inferential statistical analyses. Quantitative findings revealed a weak but statistically significant positive correlation between device use and IBER access while qualitative insights indicated that devices enhanced students' capability, confidence and speed in accessing resources—making academic programs more pleasant by supplementing lectures, yet fall short of strong perceived academic excellence due to limited proficiency, low satisfaction and institutional barriers like inconvenient labs and restricted use. The study concludes that greater device utilization supports modest IBER gains, recommending that university management bolster pedagogical and technical support through training, clearer guidelines, improved Wi-Fi and lab designs and ICT policy integration of mobile-friendly LMS, cost-free scholarly sites and structured social media use to translate these benefits into deeper proficiency and equity.

Keywords: Access; mobile learning devices; internet-based educational resources.

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Introduction
The use of mobile learning devices and internet-based educational resources can be traced back to the 20th century, when mobile phones and laptops began to impact digital teaching and learning (Traxler, 2020). In the 2000s, improvements in wireless connectivity, the spread of mobile phones and the growth of the World Wide Web set a basis for mobile learning (Berge & Muilenburg, 2013). In the 2010s, international organizations, such as UNESCO's Mobile Learning Week and the World

Bank's ICT in Education programs extensively acknowledged mobile devices as essential tools for increasing learning opportunities, especially for underprivileged people. Later, the COVID-19 pandemic enabled universities to adopt online learning, increasing dependence on mobile devices for remote instruction (Anthony & Noel, 2021).

In Sub-Saharan Africa, the history of mobile learning is closely tied to the penetration of mobile phones, beginning in the early 2000s (Agar, 2013). Despite limited fixed broadband infrastructure, the region experienced one of the world's fastest expansions in mobile connectivity. Early interventions by organizations, such as UNESCO, UNICEF and the African Development Bank, encouraged governments and institutions to integrate ICT into education. Pilot programs in countries like Kenya, South Africa, Nigeria, and Uganda explored the use of basic mobile phones for delivering SMS-based learning, teacher training, and agricultural education (Jordan, 2023). The spread of affordable smartphones in the 2010s expanded access to internet-based educational resources. However, challenges such as high data costs, rural-urban connectivity gaps, limited digital literacy and inconsistent electricity supply have constrained widespread implementation (Namuleme, 2025).

In Uganda, the first official National Teacher Policy (NTP) was introduced by the Ministry of Education and Sports in 2019. NTP aligned teacher training with the Sustainable Development Goals (SDGs) to ensure quality education and provide lifelong learning opportunities for all (Ministry of Education and Sports, 2019). Apart from observing ICT among the key measures in support of teacher education and professional development, the policy also emphasizes the effective use of ICT in content delivery.

The current teacher education curricula emphasize the integration of ICT to prepare teachers for 21st-century classrooms. In response, teacher training institutions in Uganda have made substantial progress in integrating ICT resources in their curricula (Eight Tech Consults Ltd, 2025). For instance, teacher training institutes provide internet services within their premises for both staff and student teachers in a sustainable manner (Wolters, 2021). Additionally, specific networks have been established to support student off-campus learning. The outbreak of the COVID-19 pandemic, which restricted face-to-face teaching, exacerbated the need to adopt Internet-Based Educational Resources (IBER) in teacher education. As a result, technology has become a standard medium through which students can access learning in teacher education programs across universities (Seaton et al., 2025). Mobile learning devices, identified as emerging technologies are becoming integral to the training systems (Garzón et al., 2024).

As the learning environment becomes more complex and dynamic, mobile devices have diminished traditional physical boundaries by creating new opportunities through global communication and access to the Internet (Almaiah et al., 2021). Mobile learning enables students to engage with educational materials via personal electronic devices, such as iPads, smartphones and laptops (Pratama & Scarlatos, 2020). For example, at Kyambogo University, in order to enhance digital learning, the university provides various ICT resources through a Learning Management System (LMS) referred to as the Kyambogo University Electronic Learning System (Kyambogo University, 2025). Consequently, part of the university curriculum has already been uploaded onto the LMS (Olema et al., 2020).

Additionally, the university launched an Open, Distance and e-Learning (ODeL) center to support blended academic programs. Through it, the academic staff encourages students to use mobile learning technologies to access educational materials through distance learning. At the University, the use of mobile learning devices is a significant innovation within the teacher education curriculum. While at the university, students are encouraged to use mobile learning devices as a means of accessing IBER (Olema et al., 2020). While contemporary university students are stimulated to use mobile learning devices to access IBER, much of the existing literature focuses on general e-learning readiness and not on actual usage patterns for IBER resources in specific faculties such as the School of Education. Consequently, the extent and factors influencing students' use of mobile devices for accessing IBER in teacher education remain empirically limited, creating a clear knowledge and practice gap.

Universities in Sub-Saharan Africa have made minimal efforts to enhance students' use of mobile devices for accessing IBER (Mtega & Benard, 2022). If this challenge remains unaddressed, students in the School of Education will continue to experience

low access to these essential resources. This study, therefore, determined the extent to which student teachers at the School of Education use mobile learning devices to access IBER and to examine the patterns and factors associated with their use. Particularly, the study sought to generate evidence that could inform strategies for enhancing effective integration of mobile learning in accessing IBER among the undergraduate teacher trainees at Kyambogo University.

Theoretical Underpinnings

This study was guided by the Connectivism theory advanced by Siemens in 2005. The theory posits that learning is a process of creating connections and developing networks through which knowledge can be accessed and shared. Contrasting old learning philosophies that highlight individual cognition, Connectivism stresses the role of technology and digital networks in facilitating learning. In the setting of mobile learning, university students use mobile devices to access internet-based educational resources, permitting them to connect with a wide range of information sources, peers and educators beyond the confines of the classroom.

According to Connectivism theory, learning takes place as students navigate, filter and create knowledge from multiple online resources, including educational websites, e-books, discussion forums and virtual classrooms. This theory is pertinent to this study because it explains how mobile learning devices serve as channels for knowledge acquisition and sharing in digital environments. It also highlights that in today's knowledge-driven world, the ability to access, evaluate and apply information from diverse online sources is fundamental to learning, making mobile devices and internet connectivity vital for teacher education.

Empirical Literature

The introduction of mobile learning devices has changed educational practices, contributing to innovative opportunities for students to engage with learning resources beyond the traditional classroom. Mobile learning devices (MLDs), such as smartphones, tablets and laptops, combined with access to internet-based educational resources, have shaped an ecosystem where students can learn anytime and anywhere (Garzón et al., 2024). Some key mobile learning devices required in universities include smartphones, tablets, e-readers, laptops, Chromebooks, smart watches, digital pens and notebooks. An earlier study conducted by Camilleri and Camilleri (2020) among 317 students reported that the use of mobile learning devices in universities can improve students' interests and access to online educational resources.

Additionally, the study by Pratama and Scarlatos (2020) on mobile device ownership and usage among adolescents in Indonesia revealed that the use of mobile devices significantly influenced students' interest, achievement and access to online educational resources. However, contextual gaps arise from the studies above, which none categorically focused on student teachers, which constitutes the focus of this study.

According to Mirembe et al. (2019), e-device experience among students indicates that an overwhelming 91.1% of college learners use social media. There is more convenience and privacy in the learning environment if students use mobile computers than converging at a university's typical computer lab. At higher learning institutions, where students value their privacy, they prefer using personal mobile devices to the readily exposed gadgets at the university school labs (Ahmad, 2018; Dempsey et al., 2018; Jewer & Evermann, 2017). Students who have mobile devices stand the chance of acquiring high levels of ICT confidence (Pechenkina, 2017; Bali et al., 2024). Having a mobile computer improves the students' operational skills and consequently, their positive attitude. It is easier for students with mobile devices to access IBER than those without (Kakumba, 2022). Evidence from the same study further shows that students with mobile phones efficiently use their devices not only to access relevant IBER but also for social networking; and more frequently learners use mobile tools to access the Internet, the more positively they are inclined to these technologies.

According to Dreesen et al. (2021), mobile devices helped bridge gaps in educational access for students in rural or underserved communities, particularly by providing them with access to otherwise unavailable educational materials. Similarly, Traxler (2018) studied mobile learning in higher education and its role in reshaping teaching and learning practices, observing that mobile learning devices foster greater learner independence and engagement by enabling students to self-direct their academic progress at their own pace.

Furthermore, Sharma (2022) notes that mobile devices are crucial in closing educational

opportunities differences for students in rural communities by enabling access to academic materials that would otherwise be unreachable. However, the studies reviewed largely involved student cohorts outside teacher education curricula and in non-Ugandan settings, such as general undergraduate populations, which may differ from teacher trainees in the School of Education at Kyambogo University in terms of preparation focus, institutional context and expectations for professional use of EducTech. At the contextual level, existing empirical work on Mobile Learning Devices and access to IBER has predominantly been conducted in other Ugandan universities and programs, with limited studies targeting student teachers' use of mobile learning devices to access IBER in the School of Education at Kyambogo University (Nabagesera & Kawalya, 2024), thereby making this study necessary.

The widespread adoption of internet-based educational resources has significantly reshaped the modes through which learners access, process and consume knowledge. The resources consist of online courses, open educational resources (OERs), educational apps, digital textbooks and collaborative platforms, such as discussion forums and virtual classrooms. With internet access, students can supplement traditional learning with a wealth of diverse materials, from multimedia content to interactive simulations (Zharylgapova et al., 2025). In this context, mobile learning devices play a crucial role in enabling students to connect to the internet, access resources, and complete tasks regardless of location. However, digital divide remains a significant issue. The affordability of data plans and the availability of stable internet connections are critical factors that can influence the extent to which students benefit from the resources (Mtega & Benard, 2022).

The integration of mobile devices with internet-based educational resources offers several advantages in terms of accessibility, engagement and academic performance. For example, a study by Lin and Lan (2020) found that students who used mobile devices to access online learning materials showed higher engagement levels and demonstrated improved academic outcomes compared to those who relied on traditional methods. This finding is supported by a study conducted by Lai & Bower (2019), which highlighted positive effects of mobile learning on student performance and engagement, particularly when students could access content in a more flexible and individualized manner. Moreover, the combination of mobile learning and internet-based resources fosters collaborative learning. Through social media platforms, messaging apps and online discussion forums, students can interact with peers and instructors in real-time, exchange ideas and collaborate on projects (Chen et al., 2016). Additionally, internet-based resources offer instant access to up-to-date information, enabling students to engage with cutting-edge developments in their fields of study. This is particularly important in rapidly evolving fields, such as technology, medicine and science, where textbooks can quickly become outdated.

Methodology

Design

This study employed a cross-sectional mixed-methods research design. Combining quantitative and qualitative approaches, which, helped to do away with the limitations of each method and to produce more reliable and well-founded inferences by mixing multiple forms of data, which supports the overall study purpose (Fàbregues & Guetterman, 2025).

Population and Sampling

Data was collected from in-service student teachers in the School of Education pursuing the Bachelor of Education (BED) program at Kyambogo University, who had taken the core course ETB 2102: Educational Communication and Technology, which requires the use of electronic media. These students were also assumed to have a long experience working with electronic media compared to other groups of teacher trainees. The majority of the students were from the working class, and therefore can afford to buy their own electronic devices. Purposive sampling was deemed most suitable for selecting a total of two 280 students taking the course ETB 2102: Educational Communication and Technology as a core course at the University (Kyambogo University, n.d.)

Instruments

The study used a questionnaire with 12 items, which elicited information on the use of mobile learning devices and students' access to internet-based educational resources. A closed-ended questionnaire structured on a three-point scale rubric was used: Disagree (1), Neutral (2), and Agree (3). Respondents were given adequate time to give well-thought-out answers. For qualitative data, a

total of eight interviews were conducted with purposively selected student leaders from Bachelor of Education groups. The interviews explored opportunities and benefits students realized in the use of mobile learning devices to access IBERs. In all, the eight interview schedules were conducted within one week. The students' responses were recorded by the researchers on a standard coding sheet. The qualitative component of the study aimed to explore how student teachers used mobile devices and the enabling conditions. Therefore, it was relevant to interview students to assist the researchers in tapping reflective responses that went further than the responses specifically acquired from the Likert items, which could not allow probing into answers (Creswell & Poth, 2018).

Data Quality Control

Data quality was ensured through piloting the tool at a public university in Uganda. The reliability test yielded the Cronbach's alpha value of 0.849. Content validity index stood at 0.781. These results were above the threshold values of 0.7, which guarantees that valid and reliable data was collected as suggested by Lasanthika et al. (2023).

Data Analysis

Quantitative data was analyzed using descriptive (univariate) statistics to summarize the survey responses and bivariate (Pearson correlation) statistics to examine relationships between mobile learning device use and access to IBER. The qualitative data from interviews was analyzed using the thematic analysis method. The thematic analysis followed a six-step process: 1) familiarization; 2) coding; 3) generating themes; 4) reviewing themes; 5) defining and naming themes; and 6) reporting, as defined by Braun & Clarke (2006).

Findings and Discussion

The section is organized into two parts. The first part presents respondents' demographic characteristics, while the second part reports the findings on the relationship between the use of mobile learning devices and students' access to internet-based educational resources at Kyambogo University.

Demographic Information

The demographic information in Table 1 presents gender, age and area of specialization of the respondents.

Table 1: Demographic Information

Items		Frequency	Percentage
Gender	Male	177	63
	Female	103	37
	Total	**280**	**100**
Age bracket	25 and below	206	74
	25 years and above	74	26
	Total	**280**	**100**
Specialization	Humanities	140	50
	Sciences	140	50
	Total	**280**	**100**

Table 1 indicates that, out of the 280 respondents, 177 (63%) were male and 103 (37%) were female, showing that males constituted the majority of the sample. With respect to age distribution, 206 respondents (74%) were aged 25 years and below while 74 respondents (26%) were aged above 25 years. In terms of area of specialization, the respondents were evenly distributed, with 140 (50%) drawn from the humanities and an equal number, 140 (50%), from science-related disciplines.

Research Question 1: What are the benefits of using mobile learning devices for accessing internet-based educational resources?

The findings in Table 2 (p. 31) show that the most widely recognized benefits of mobile learning devices relate to students' capability, confidence and speed rather than to clear academic gains. A large majority agreed that students can use mobile learning devices to access IBER (63.8%), and that they feel more secure using these devices (61.2%), suggesting strong technical self-efficacy and a sense of psychological safety when using personal devices for learning purposes; this mirrors evidence that m-learning settings can foster confidence, emotional security and positive engagement among the student teachers.

Nearly half (45.4%) agreed that learning is quicker on campus with mobile devices, indicating perceived efficiency and time-saving through instant access to online materials, consistent with literature that highlights convenience, flexibility and quicker information access as key benefits of mobile learning. However, students were more careful about deeper outcomes: 59.9% disagreed that they had realized academic excellence through the use of mobile devices; over a half disagreed that they are always pleased (56.6%) or thorough (55.9%) when using them. Around a half felt they had not actually gained proficiency despite their basic capability. Furthermore, only 31.6% felt always successful and 27.6% felt they had freedom in using mobile devices while just 20.4% viewed the university lab as a suitable place for using them, suggesting that institutional constraints, infrastructure concerns and environmental barriers may hinder the full realization of mobile learning benefits.

Table 2: The Use of Mobile Learning Devices to Access Internet-Based Educational Resources

SN	Item in the Questionnaire	Disagree		Neutral		Agree	
		f	%	f	%	f	%
1	I have gained proficiency in using mobile learning devices to access IBER	142	50.7	76	27.0	63	22.4
2	I feel more secure in using mobile learning devices to access IBER	35	12.5	74	26.3	171	61.2
3	I have achieved academic excellence through using mobile learning devices to access IBER	168	59.9	81	28.9	31	11.2
4	I am always willing to use to access IBER	164	58.6	83	29.6	33	11.8
5	Students have capability in using mobile learning devices to access IBER	26	9.9	74	26.3	179	63.8
6	I am thorough in using mobile learning devices to access IBER	157	55.9	72	25.7	52	18.4
7	My school lab is more convenient for using mobile learning devices in accessing IBER	140	50.0	83	29.6	57	20.4
8	Learning is faster at campus with using mobile learning devices to access IBER	85	30.3	68	24.3	127	45.4
9	I am anxious in using mobile learning devices to access IBER	125	44.7	96	34.2	59	21.1
10	I am always successful in using mobile learning devices to access IBER	90	32.2	101	36.2	88	31.6
11	I have freedom in using mobile learning devices to access IBER	103	36.8	99	35.5	77	27.6
12	I am always pleased with using mobile learning devices to access IBER	158	56.6	55	19.7	23.7	23.7

The results from the survey revealed that student teachers at the School of Education mainly perceived mobile learning devices as beneficial in enhancing their capability, confidence and speed in accessing IBER, rather than as a strong driver of learning excellence. For instance, a large proportion agreed that they could use mobile devices to access IBER, felt secure when using them, and perceived learning as faster on campus with mobile devices, which aligns with previous studies showing that mobile technologies can promote students' motivation, engagement, convenience and flexibility in learning (Ahmad, 2018; Camilleri & Camilleri, 2020; Dempsey et al., 2018; Mirembe et al., 2019; Pratama & Scarlatos, 2020). However, most students were not in support that mobile learning devices had enabled them to achieve academic excellence. They were less positive about always being pleased or thorough when using them, supporting earlier findings that although mobile learning is widely adopted and valued, its direct impact on academic achievement is often mixed (Ahmad, 2018; Camilleri & Camilleri, 2020; Dempsey et al., 2018; Pratama & Scarlatos, 2020). This implies that while at Kyambogo University, mobile learning devices are actively used and appreciated for access and efficiency, their contribution to high academic performance remains relatively modest.

The results suggested that despite the perceived benefits, there are still constraints in accessing and using IBER effectively among the student teachers at the School of Education. Although students reported feeling secure when accessing IBER and observed that mobile devices help them reach online materials, relatively few viewed the institution's lab

as a convenient setting for using mobile devices and only a minority were consistently pleased with accessing IBER from fixed university facilities. This pattern supports prior studies, which indicate that limitations in infrastructure, connectivity and the design of institutional spaces can hinder optimal use of internet-based educational resources and reduce students' satisfaction with digital access (Chen et al., 2016; Lin & Lan, 2020; Nabukenya et al., 2025). Consequently, access to IBER among students remains a significant challenge that deserves further enhancement at the university level to fully support collaborative and technology-mediated learning, for example by leveraging social media, messaging applications and online environments to facilitate real-time interaction, idea sharing and group work among students and instructors (Chen et al., 2016; Lin & Lan, 2020; Nabukenya et al., 2025).

Findings from interviews revealed that the use of mobile learning devices available for teacher training made the traditional face-to-face academic programs more pleasant. The participants expressed their feeling that mobile computers had helped them access IBERs better than desktop computers found in the school of education labs. Generally, the participants expressed that the use of mobile devices had improved. A student, for instance, revealed that the use of mobile computers and desktop computers was important in accessing online academic materials, stating, "However, unlike the immovable desktops, with my iPad, I can access online academic content at any time. With mobile devices, I don't get bored even if I take hours of interaction." Regarding how the participants used mobile learning devices for academics, the participants believed that the use of mobile learning devices enabled them to achieve better results and access e-materials. These participants concurred that the ability to access the university's LMS to view individual semester scores was made easy through mobile learning devices. One participant went ahead to affirm that:

> The use of mobile learning devices has helped me get better scores; it has just made it easier for me to submit my coursework on time. It has helped me get better grades because of the way I use it. For example, I have obtained pictures that will make my school practice presentation better. It might also be better to download internet-based videos via social media like YouTube and later retrieve them rather than confining them to 2D images, all to improve my grade for school practice.

When asked how possession of mobile learning devices affected students' access to IBERs, students indicated that possessing a mobile learning device helps them to easily access IBERs and develop positive attitudes towards learning. This could also be attributed to the fact that mobile learning devices kept the students engaged most of the time. As provided with clear guidelines, the students are compelled to undertake online self-study with their lecturers and fellow students and the motivation to find out the content needed for the course. This was evident in one student who said, "I am exactly certain of what to do, and there are no excuses for not submitting my assignments on time. I enjoy looking up more academic e-materials, which is better than using hardcopy books." With the use of mobile learning devices, students believed that they were made more accountable for getting work done on time. Those students who accessed IBERs by using mobile learning devices held positive attitudes generally towards an online mode of instruction. This was affirmed by one student who said:

> Since I resorted to using my mobile phone to access online learning materials for completing the given assignment for my course, I find it easy to submit my work on time for assessment, from any location and at any time I wish. My submission is done on time.

The assertion portraying the student teacher's experience is in alignment with the mobile learning principles, where flexible access to resources like IBERs enhances self-paced learning and accountability. Mobile integration reduces academic delays, enabling anytime, anywhere engagement that boosts completion rates for coursework as evidenced in teacher education settings at Kyambogo University. This positive outcome emphasizes how mobile learning tools transform the would-be passive learners into active ones.

Research Question 2: What is the relationship between the use of mobile learning devices and access to internet-based educational resources?

The second research question called for testing of the following null hypothesis: There is no significant relationship between the use of mobile learning devices and access to internet-based educational resources. The result is presented in Table 3.

Table 3: Correlation between the Use of Mobile Learning Devices and Access To Internet-Based Resources

		Mobile Learning Devices	Access to IBER
Mobile	Pearson's correlation	1	0.278**
Learning	Sig 2-tailed		0.005
Devices	N	280	280
Access to IBER	Pearson's correlation	0.278**	1
	Sig 2-tailed	0.005	
	N	280	280

***Correlations significant at the 0.05 level, 2-tailed

Table 3 reveals Pearson's correlation coefficient findings showing a weak but statistically significant positive relationship between the use of m-learning devices and access to IBER. Specifically, an r value of 0.278 indicates a small yet positive association in which the higher the use of mobile learning devices, the higher the access to IBER, with the p-value of 0.005.

The increased use of mobile learning devices is associated with a corresponding increase in access to IBER; however, the strength of this relationship is relatively weak. In practical terms, the two variables tend to move in the same direction, but the effect is low. Therefore, the study rejected the null hypothesis, concluding that there is a significant relationship between the use of mobile learning devices and students' access to internet-based educational resources. This finding supported previous studies by scholars, such as Alsaadat (2017) and Safar (2018), who observed that the use of mobile computers had a significant positive effect on students' prompt access to online resources and academic achievement. While determining the impact and usefulness of a mobile learning device program for students' learning and academic excellence at Kuwait University, Safar (2018) realized that mobile learning device intervention had a positive effect on undergraduates' grades.

Conclusions and Recommendations

Conclusions

The study concludes that the use of mobile learning devices among student teachers at Kyambogo University primarily enhances their capability, confidence and speed in accessing Internet-Based Educational Resources (IBER). However, this increased access does not necessarily translate into strong perceptions of academic excellence, largely due to limited user proficiency, low satisfaction levels and institutional constraints, such as inconvenient laboratory environments and restricted freedom of device use. The findings further reveal a weak but statistically significant positive relationship between mobile learning device use and access to IBER, indicating that increased device use is associated with improved access, albeit with a relatively small effect size.

Recommendations

The study recommends that University management, through the School of Education, strengthen pedagogical and technical support for mobile learning. This can be achieved through targeted capacity-building initiatives for staff and students, the provision of clear institutional guidelines and improvements in Wi-Fi connectivity and computer laboratory design. Such measures would enable students' existing familiarity and confidence with mobile devices to translate more effectively into deeper digital proficiency and improved academic outcomes when accessing Internet-Based Educational Resources (IBER). In addition, the University's ICT policy should explicitly address the integration of mobile learning devices into teaching, assessment and access strategies for IBER. This includes the development of mobile-friendly learning management systems, facilitated access to cost-free scholarly databases and the structured academic use of social media platforms. Collectively, these interventions would leverage the demonstrated positive, though modest relationship between mobile device use and IBER access, thereby systematically enhancing students' engagement with online academic resources.

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