

Smartphone usage for accessing electronic resources among distance learners at the Open University of Tanzania: a UTAUT perspective

Christian Mubofu & Vincent Msonge

To cite this article: Christian Mubofu & Vincent Msonge (03 Sep 2026): Smartphone usage for accessing electronic resources among distance learners at the Open University of Tanzania: a UTAUT perspective, Open Learning: The Journal of Open, Distance and e-Learning, DOI: [10.1080/02680513.2026.2729180](https://doi.org/10.1080/02680513.2026.2729180)

To link to this article: <https://doi.org/10.1080/02680513.2026.2729180>

 View supplementary material 

 Published online: 03 Sep 2026.

 Submit your article to this journal 

 View related articles 

 View Crossmark data 



Smartphone usage for accessing electronic resources among distance learners at the Open University of Tanzania: a UTAUT perspective

Christian Mubofu^a and Vincent Msonge^b

^aLibrary and Publication Department, The Mwalimu Nyerere Memorial Academy, Dar es Salaam, Tanzania;

^bDepartment of Management Sciences, The Institute of Finance Management, Dar es Salaam, Tanzania

ABSTRACT

In an increasingly digital educational environment, smartphones have emerged as important learning tools, especially for distance learning students. This study investigated the use of smartphones for accessing electronic resources among distance learners at the Open University of Tanzania (OUT). Specifically, it examined the types of electronic resources accessed and the barriers hindering their effective use. Adopting a cross-sectional research design and the Unified Theory of Acceptance and Use of Technology (UTAUT) as a theoretical lens, this study collected data from 75 distance learners selected via purposive sampling. A mixed-methods approach was employed, utilising a structured questionnaire with Likert-scale and open-ended questions to gather quantitative and qualitative insights. The study found that the majority of students rely heavily on smartphones to access core academic resources such as course materials, university announcements, e-books, and journals, as well as recorded lectures, establishing smartphones as indispensable tools for academic content consumption and institutional communication. However, usage significantly declines for high-stakes interactive tasks such as assignment submission and online quizzes, highlighting functional limitations. Furthermore, the study identified unreliable internet connectivity, high data costs, device limitations, and uneven digital literacy as critical challenges. The study recommends the need for improved digital infrastructure and targeted institutional support.

ARTICLE HISTORY

Received 14 July 2025

Accepted 4 August 2026

KEYWORDS

Smartphone usage; distance learners; electronic resources; Open University of Tanzania; UTAUT

Introduction

The 21st century has witnessed unprecedented technological advancements which have profoundly reshaped various facets of human existence, including the education sector. Among these innovations, smartphones have emerged as pivotal tools, fundamentally altering how individuals interact with information and learning environments. The global proliferation of these devices is undeniable, with over 6 billion smartphone subscriptions worldwide and mobile technologies generating 5% of global GDP (GSMA, 2025). These

CONTACT Christian Mubofu  christian.mubofu@mnma.ac.tz; mubofuc@gmail.com  Library and Publication Department, The Mwalimu Nyerere Memorial Academy, Dar es Salaam, Tanzania

 Supplemental data for this article can be accessed online at <https://doi.org/10.1080/02680513.2026.2729180>

© 2026 The Open University

devices integrate powerful computing capabilities, ubiquitous internet access, and versatile multimedia functionalities into a single, highly portable platform making them the primary gateway to the internet for many, especially in developing regions (GSMA Intelligence [GSMA], 2024). While initially conceived for communication, their evolution has incorporated a vast array of applications including email, web browsing, and multimedia services significantly enhancing usability across diverse fields, notably education.

Consequently, the adoption of smartphones within education, particularly distance learning, has gained widespread acceptance globally. Students leverage these devices to access online classes, download electronic resources, attend virtual lectures, and participate in assessments. This trend is especially pronounced in nations with robust digital ecosystems, such as the USA, Finland, and South Korea, where educational institutions have actively developed and implemented comprehensive mobile learning programmes (Sung et al., 2016). In these contexts, students benefit from deep digital literacy, reliable online infrastructure, and substantial institutional investment in educational technology. Furthermore, the critical role of mobile technology in ensuring educational continuity became starkly evident during the 2020–23 COVID-19 pandemic. Institutions in countries like the United Kingdom and Australia significantly accelerated the development and deployment of mobile learning platforms not only as an emergency response but also as a sustained strategy beyond the immediate crisis (Bond et al., 2021). For distance learning specifically, smartphones offer the potential to bridge significant gaps, catering to learners who face geographical, academic, or professional barriers that preclude participation in traditional face-to-face education (Maritim & Mushi, 2012).

Within this global landscape, Tanzania has actively pursued the expansion of education through technology, with recent studies confirming the deep embedding of mobile devices across educational tiers. Research shows their use in primary education during crises (Kafanabo, 2024), for teacher development (Kondoro et al., 2023), and in broader higher education contexts (Saidi et al., 2025). The Open University of Tanzania (OUT), established in 1992, is a leader in distance learning. Aligning with these national trends that recognise mobile learning's capacity to transcend conventional classroom limitations, OUT and other Tanzanian institutions have undertaken various initiatives to integrate technology into education delivery. These efforts include developing digital learning platforms, facilitating online classes, and optimising course materials for mobile accessibility, all aimed at enhancing the distance learning experience (Luvanga & Sanga, 2024; Mhache, 2013). However, as Mushi (2025) notes, the full potential of mobile learning, particularly for specific cohorts like distance learners, remains nuanced and influenced by contextual trust and infrastructural factors, a gap this study directly addresses.

Despite these concerted efforts and global momentum, significant challenges persist in the effective utilisation of smartphones for accessing electronic learning resources within the Tanzanian distance learning context. Research indicates that while smartphones offer a convenient gateway to educational content, their effectiveness is frequently hampered by a constellation of issues. Key barriers include persistently poor internet connectivity, varying levels of digital literacy among students, and device incompatibility problems (Mtebe & Raisamo, 2014; Mwangasa, 2026). Focusing specifically on OUT, a study by Mhache (2013) corroborates these findings, revealing that distance learners encounter substantial difficulties accessing and utilising electronic resources. These difficulties stem from factors such as slow internet speeds, the limited availability

of computers with reliable internet access (highlighting the reliance on smartphones despite their limitations), and a concerning lack of awareness regarding the existence and location of available e-resources.

Therefore, while the integration of smartphones into the distance learning environment at higher education institutions like OUT holds considerable promise for democratising access to electronic resources, the extent and effectiveness of their actual use for scholarly purposes remain inadequately understood. Preliminary evidence suggests a discrepancy; smartphones are widely employed for communication and basic information retrieval, but their utilisation for accessing core scholarly resources, such as electronic journals, academic databases, and digital libraries, appears significantly limited (Mahai, 2022; Mwangasa, 2026; Reginard & Singano, 2017). This limitation is attributable to the aforementioned infrastructural and economic challenges, including constrained internet access, prohibitively high data costs, and frequent power outages, which collectively impede consistent and reliable smartphone use for demanding educational tasks (Mtebe & Raisamo, 2014). Compounding these issues is the variable level of digital literacy among students; many lack the necessary skills to effectively navigate, evaluate, and utilise complex mobile learning platforms and online academic resources (Samzugui & Mwinyimbegu, 2013).

Given this complex interplay of potential and persistent obstacles, there is a clear need for focused investigation. Specifically, identifying the precise barriers that distance learning students at institutions like the Open University of Tanzania encounter when attempting to use smartphones for accessing essential electronic resources is crucial. A deeper understanding of these specific challenges will yield invaluable insights, informing strategies to harness mobile technology more effectively and equitably to support the unique demands of distance education in Tanzania. The specific objective of this study is to examine the usage of smartphones by distance learning students in accessing electronic resources at the OUT. To achieve this overarching aim, the study pursues two specific objectives:

- (i) To assess the types of electronic resources accessed by distance learning students via smartphones;
- (ii) To identify the barriers hindering effective smartphone use for accessing e-resources among distance learners at OUT.

Literature review

Smartphones have become important devices, especially in accessing electronic resources among distance learning students (Mubofu & Malekani, 2022). Distance learners commonly access electronic books, journals, dissertations and theses, research guides, internet services, and past examination papers via smartphones. These resources support rapid learning among distance learning students and also provide access to content beyond the traditional classroom setting via smartphone devices. Similarly, Matheus (2021) reported that students frequently utilised e-journals, e-books, e-newspapers, online databases, and past examination papers through their smartphones. These resources serve as critical academic materials, especially for distance learning students. Marasinghe (2025) also identified a broad range of e-resources accessed by distance

learners, including e-journals, e-books, search engines, e-reference sources, e-magazines, e-newspapers, e-databases, and OPAC. These studies show that smartphones offer not only access to formal academic materials but also to supplementary information that enhances learning especially for distance learning students.

Despite the widespread application of smartphones, different researchers report barriers that continue to hinder their effective use for accessing academic electronic resources. Matheus (2021) describes major challenges such as slow internet access, network problems, the small screen size of smartphones, lack of training on how to access e-resources, lack of searching skills, and the weakness of smartphone batteries. These challenges persist in the Tanzanian context, where recent studies highlight that determinants of mobile adoption among university students include facilitating conditions and effort expectancy (Saidi et al., 2025), and where the usability of mobile-based Learning Management Systems remains a critical area for development (Kondoro et al., 2023). These technical and user-related challenges often reduce the quality of students' learning experiences. Building on these challenges, Mubofu and Malekani (2022) reported a more comprehensive range of obstacles faced by distance learners in accessing e-resources. These included high data costs, information overload, inadequate skills to evaluate information, password and login frustrations, lack of instructional resources, lack of free full text, lack of a distance librarian assigned to support remote students, lack of information search skills, and lack of a university account to access digital library resources. These findings indicate that the issue is not only technological but also structural, involving institutional policies, support systems, and digital infrastructure.

Furthermore, Usman and Yunus (2023) point out barriers that hinder distance learners from effectively accessing library resources. These include a lack of ICT skills among distance learners, the poor quality of library websites (for example, frequent stops and limited services), a lack of internet facilities in institutional libraries, and a lack of digital resources in libraries. Collectively, these barriers significantly limit students, including distance learning students' ability to access and utilise electronic resources, especially through smartphones.

Theoretical framework

This study adopts the UTAUT, which explains that user acceptance and usage of information technology includes the adoption of technological devices such as smartphones. The theory assists in understanding users' behaviour towards new technologies, particularly in educational settings. The theory proposes four core determinants of intention and usage. These are performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003). For this study, two primary determinants are emphasised, including performance expectancy as well as effort expectancy.

Social influence and facilitating conditions were deliberately not analysed as separate constructs in this study, for two related reasons. First, the sampling strategy purposively targeted distance learners who were already active users of digital devices for accessing academic resources. As participants had therefore already passed the initial decision to adopt smartphones, constructs that chiefly explain the formation of an initial intention to begin using a technology, particularly social influence, were judged less central to a study concerned with explaining variation in an already established pattern of use rather than

the decision to adopt in the first place (Xue et al., 2024). Second, systematic evidence on UTAUT applications in higher education indicates that performance expectancy and effort expectancy are the most consistently tested and most influential predictors of behavioural intention and usage among student populations, whereas facilitating conditions and social influence display comparatively weaker and less consistent effects across studies (Xue et al., 2024). Restricting the theoretical lens to performance expectancy and effort expectancy therefore allowed the study to examine in depth the two determinants most directly implicated in explaining why smartphone usage is high for some academic tasks and markedly lower for others, rather than spreading a comparatively small qualitative and quantitative dataset across all four constructs.

Performance of expectancy (perceived usefulness)

This construct refers to the degree to which an individual believes that using a system will help them to attain gains in job performance (Venkatesh et al., 2003). Within the UTAUT literature on smartphone-based learning specifically, performance expectancy has consistently emerged as the strongest predictor of behavioural intention and usage, a pattern confirmed by a systematic review of studies applying UTAUT to smartphone technology acceptance (Ahmed et al., 2023) and by empirical work among postgraduate distance and part-time students, which found performance expectancy to be the strongest single predictor of smartphone use for mobile learning (Onaolapo & Oyewole, 2018). In the context of this study, performance expectancy is operationalised as the perceived academic benefits that distance learners derive from using their smartphones, such as enhanced access to learning materials, improved communication, and greater flexibility. We hypothesise that high usage rates for specific academic tasks (e.g. accessing course materials and announcements) will be strongly correlated with high performance expectancy, as students recognise the direct utility of smartphones for these activities.

Effort expectancy (perceived ease of use)

This construct refers to the degree of ease associated with the use of the system (Venkatesh et al., 2003). Empirical studies of smartphone-based mobile learning similarly identify effort expectancy as a significant driver of use, with ease of navigating mobile interfaces and compatibility between institutional platforms and mobile devices shaping the extent to which students engage in more demanding, interactive academic tasks (Onaolapo & Oyewole, 2018). Related work in the Tanzanian higher education context also links the usability of mobile-based learning systems to continued use (Kondoro et al., 2023). In this study, effort expectancy relates to the perceived ease of using a smartphone for various academic tasks. We posit that tasks requiring complex interaction with platforms (e.g. submitting assignments, taking quizzes) will be associated with lower effort expectancy. This is anticipated to be influenced by factors such as non-intuitive mobile interfaces, platform incompatibility, and the physical constraints of smartphones, which collectively increase the perceived effort and subsequently reduce usage for these specific functions. Applying these two UTAUT constructs, this study provides a theoretical lens to interpret the variation in smartphone usage patterns across different academic tasks, moving beyond mere description to explain the 'why' behind the observed behaviours.

Methodology

Research design and approach

This study adopted a cross-sectional research design to collect data at a single point in time from distance learners at the Open University of Tanzania, following established methodological practices for examining current trends and relationships (Setia, 2016). The research employed a predominantly quantitative approach using structured Likert-scale surveys to statistically analyse smartphone usage patterns and barriers, while incorporating limited qualitative data through open-ended questions to provide contextual insights, an approach supported by contemporary educational technology research that emphasises the value of combining measurable outcomes with explanatory depth (Creswell & Creswell, 2023). This mixed-methods design enabled both the quantification of e-resource access frequencies and the qualitative exploration of students' experiences, ensuring comprehensive findings that address the study's objectives while maintaining methodological rigour appropriate for technology adoption studies in educational contexts.

Sample size and sampling procedures

Given the highly specific and accessible target population of 96 active distance learners within the Open University of Tanzania's WhatsApp group, a census approach (surveying the entire population) was initially considered optimal for representativeness. However, acknowledging practical constraints on achieving a 100% response rate, a target sample size was established. While an online sample size calculator (Calculator.net, 2025) suggested a theoretical minimum of approximately 75 respondents for a population of 10,000 at a 95% confidence level with a plus or minus 5% margin of error, this standard calculation is less directly applicable to our small, well-defined population and non-probability sampling strategy. Recognising the population size of 96, a sample of 75 would represent 78.1% of the total group, effectively requiring near-census participation. Consequently, the study employed purposive sampling (Campbell et al., 2020; Etikan & Bala, 2017), strategically targeting participants who actively use digital devices (smartphones, tablets, laptops, or desktops) to access academic resources. This method ensured the selection of individuals possessing rich, firsthand experience directly relevant to the research subject, thereby prioritising depth of insight and contextual relevance over strict statistical generalisability inherent in probability sampling for such a small population. The final sample size was pragmatically determined by the number of willing participants meeting the purposive criteria within the accessible group, aiming for the highest feasible response rate from the target population of 96. To address potential non-response bias, the characteristics of the 21 non-respondents were inferred from the known demographics of the WhatsApp group. The non-respondent pool was broadly similar to the respondent group in terms of programme level distribution (estimated at approximately 60% Master's students and approximately 40% PhD). However, based on limited profile information, the non-respondents appeared to skew slightly towards the 46 and above age bracket, suggesting that our sample may be marginally under-representative of the oldest cohort of learners.

Ethical considerations

This study received ethical approval from the Directorate of Research and Consultancy of the Mwalimu Nyerere Memorial Academy (Reference No. MNMA/RC/00025E/25). Prior to data collection, all participants were fully informed of the study's purpose, procedures, potential risks, and benefits. Informed consent was obtained from each participant before their inclusion in the study, with participation being entirely voluntary and participants informed of their right to withdraw at any stage without consequence. To protect participant anonymity and confidentiality, no personally identifiable information was collected or reported; data were coded and anonymised during collection, transcription, and analysis, and were stored securely with access restricted to the research team, while findings are presented in aggregate form and any illustrative quotations used have been anonymised to ensure that no individual participant can be identified. All procedures were conducted in accordance with relevant institutional guidelines and ethical standards for research involving human participants.

Data collection methods and instruments

A questionnaire comprising both closed and open-ended questions was designed for data collection. The closed-ended questions used a five-point Likert scale and were organised thematically to align with the specific objectives of the study. The questionnaire was pilot-tested with 10 distance learners (not part of the final sample) to assess clarity, relevance, and reliability. Based on the pilot, minor wording adjustments were made to improve comprehension. The reliability of the scaled sections was confirmed using Cronbach's Alpha, which yielded a high internal consistency of $\alpha = 0.87$ for the 'Types of Electronic Resources' section and $\alpha = 0.91$ for the 'Barriers' section, both well above the accepted threshold of 0.7. Content validity was established through a thorough review of relevant literature and consultation with two experts in educational technology. The questionnaire was developed using Google Forms and distributed through the official WhatsApp group of distance learners at the Open University of Tanzania, who are the primary stakeholders in the use of smartphones to access e-resources for academic purposes. Respondents were given three weeks to complete the questionnaire, after which the link was closed to allow the researchers to proceed with data analysis.

Data analysis and presentation

The data were analysed using the Statistical Package for the Social Sciences (SPSS), where descriptive statistics such as frequencies and percentages were used to summarise the responses. For the qualitative data from open-ended questions, a thematic analysis was conducted. This involved a multi-step process: first, two researchers independently familiarised themselves with the responses and generated initial codes. These codes were then discussed and consolidated into a unified coding framework. The researchers then independently applied this framework to the data. Inter-coder reliability was calculated using Cohen's Kappa, resulting in a score of $\kappa = 0.81$, indicating a high level of agreement. Finally, the codes were grouped into overarching themes that captured the

main challenges and suggestions raised by the participants. The findings are presented in the form of tables and charts for clarity and ease of interpretation.

Findings

This section reports the descriptive results of the survey. Interpretation of these results, including their relationship to the performance expectancy and effort expectancy constructs of the UTAUT model and to prior literature, is presented in the Discussion section that follows.

Demographic and usage profile of respondents

Age group distribution

Table 1 presents the age distribution of the 75 respondents. Just under half of the sample (49.3%) fell within the 36 to 45 age group, followed by the 26 to 35 age group (22.7%), the 46 and above age group (18.7%), and the 18 to 25 age group (9.3%).

Programme of study distribution

Table 2 shows that 56.0% of respondents were Master's students and 44.0% were PhD students, indicating a relatively balanced distribution across the two levels of postgraduate study.

Frequency of smartphone use for academic purposes

As shown in **Table 3**, an overwhelming majority of respondents (69.3%) reported using their smartphones daily for academic purposes, while 16.0% reported occasional use, 9.3% weekly use, 4.0% monthly use, and 1.3% rare use.

Table 1. Age group distribution (N = 75).

Age Group	Frequency	Percentage
18 to 25	7	9.3%
26 to 35	17	22.7%
36 to 45	37	49.3%
46 and above	14	18.7%

Source: Survey of OUT Distance Learners, 2025.

Table 2. Programme of study distribution (N = 75).

Programme Level	Frequency	Percentage
Master's	42	56.0%
PhD	33	44.0%

Source: Survey of OUT Distance Learners, 2025.

Table 3. Frequency of smartphone usage (N = 75).

Frequency	Count	Percentage
Daily	52	69.3%
Weekly	7	9.3%
Occasionally	12	16.0%
Monthly	3	4.0%
Rarely	1	1.3%

Source: Survey of OUT Distance Learners, 2025.

Table 4. Age group vs. smartphone usage frequency (N = 75).

Age Group	Daily (%)	Weekly (%)	Occasionally (%)	Monthly (%)	Rarely (%)	Total
18 to 25	5 (71.4%)	2 (28.6%)	0 (0%)	0 (0%)	0 (0%)	7
26 to 35	12 (70.6%)	1 (5.9%)	3 (17.6%)	1 (5.9%)	0 (0%)	17
36 to 45	25 (67.6%)	2 (5.4%)	8 (21.6%)	2 (5.4%)	0 (0%)	37
46 and above	10 (71.4%)	2 (14.3%)	1 (7.1%)	0 (0%)	1 (7.1%)	14

Source: Survey of OUT Distance Learners, 2025.

Cross-tabulation: age group and usage frequency

Table 4 cross-tabulates age group against frequency of use. Daily usage ranged narrowly between 67.6% and 71.4% across all four age groups, with the highest daily use recorded among the 18 to 25 group and the 46 and above group (both 71.4%), followed by the 26 to 35 group (70.6%) and the 36 to 45 group (67.6%).

Cross-tabulation: programme level and usage frequency

Table 5 shows that daily usage was similarly high for Master's students (69.0%) and PhD students (69.7%), with only small differences across the remaining frequency categories.

Types of electronic resources accessed via smartphones

Table 6 reports the levels of agreement with six statements describing specific academic uses of smartphones. Accessing online course materials (94.7% agreement) and university announcements (93.3%) recorded the highest combined agreement, followed by downloading e-books or journals (86.7%), watching recorded lectures (85.3%), and using smartphone apps such as Moodle or the OUT e-library (82.7%). Submitting assignments or taking online quizzes recorded the lowest combined agreement, at 66.7%.

Table 5. Programme level vs. smartphone usage frequency (N = 75).

Programme Level	Daily (%)	Weekly (%)	Occasionally (%)	Monthly (%)	Rarely (%)	Total
Masters	29 (69.0%)	4 (9.5%)	7 (16.7%)	2 (4.8%)	0 (0%)	42
PhD	23 (69.7%)	3 (9.1%)	5 (15.2%)	1 (3.0%)	1 (3.0%)	33

Source: Survey of OUT Distance Learners, 2025.

Table 6. Smartphone usage for academic purposes (N = 75).

Academic Activity	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total (SA +A)
Access online course materials (PDFs, slides, lecture notes)	35 (46.7%)	36 (48.0%)	2 (2.7%)	2 (2.7%)	0 (0.0%)	94.7%
Download academic e-books or journals	28 (37.3%)	37 (49.3%)	7 (9.3%)	2 (2.7%)	1 (1.3%)	86.7%
Use smartphone apps (Moodle, OUT e-library) for learning	24 (32.0%)	38 (50.7%)	9 (12.0%)	3 (4.0%)	1 (1.3%)	82.7%
Watch recorded lectures or educational videos	29 (38.7%)	35 (46.7%)	8 (10.7%)	2 (2.7%)	1 (1.3%)	85.3%
Access university announcements and updates	33 (44.0%)	37 (49.3%)	4 (5.3%)	1 (1.3%)	0 (0.0%)	93.3%
Submit assignments or take online quizzes	16 (21.3%)	34 (45.3%)	17 (22.7%)	8 (10.7%)	0 (0.0%)	66.7%

Source: Survey of OUT Distance Learners, 2025.

Table 7. Barriers to smartphone use for e-resources (N = 68).

Barrier	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean Score
Poor internet connectivity limits the ability to access e-resources	20 (29.4%)	26 (38.2%)	8 (11.8%)	8 (11.8%)	6 (8.8%)	3.68
High mobile data costs prevent regular academic use	28 (41.2%)	20 (29.4%)	6 (8.8%)	8 (11.8%)	6 (8.8%)	3.82
Struggle with navigating e-resource platforms on a smartphone	12 (17.6%)	17 (25.0%)	11 (16.2%)	18 (26.5%)	10 (14.7%)	3.04
Smartphone technical limitations hinder access	12 (17.6%)	19 (27.9%)	12 (17.6%)	15 (22.1%)	10 (14.7%)	3.12
Power outages frequently disrupt smartphone usage	16 (23.5%)	21 (30.9%)	6 (8.8%)	15 (22.1%)	10 (14.7%)	3.26
Lack of sufficient training on smartphone use for academics	11 (16.2%)	18 (26.5%)	8 (11.8%)	19 (27.9%)	12 (17.6%)	2.96

Mean scores based on 5-point Likert scale: 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1 = Strongly Disagree.
Source: Survey of OUT Distance Learners, 2025.

Barriers to smartphone use for e-resources

The study also examined the challenges that distance learners face when using smartphones to access and utilise electronic resources. [Table 7](#) summarises the responses of 68 participants who answered this section of the questionnaire. High mobile data costs recorded the highest mean score ($M = 3.82$), followed by poor internet connectivity ($M = 3.68$), power outages ($M = 3.26$), smartphone technical limitations ($M = 3.12$), difficulty navigating e-resource platforms ($M = 3.04$), and lack of sufficient training ($M = 2.96$), which recorded the lowest mean score.

Discussion

This section interprets the findings reported above, drawing explicitly on the performance expectancy and effort expectancy constructs of the UTAUT framework, as well as on prior literature, to explain the observed patterns of smartphone use and the barriers that constrain it.

Demographic patterns in smartphone adoption for distance learning

The finding that distance learners aged 36 to 45 constitute the largest segment of the sample (49.3%) suggests that many respondents are mature students who are likely balancing higher education with professional responsibilities and family life, which reflects the flexible nature and appeal of distance learning programmes for working adults. This dominance can be linked to the core appeal of distance learning for this demographic: the flexibility to balance higher education with established professional careers and family responsibilities. Unlike the traditional 18 to 25 cohort, who may prioritise on-campus experiences, individuals in their late 30s and 40s often seek upskilling or career changes without sacrificing their current employment or family commitments, making the Open University of Tanzania's model particularly attractive. The relatively low representation of learners aged 18 to 25 (9.3%) suggests that younger individuals may still prefer conventional, on-campus education, a trend that contrasts with the broader demographic often associated with digital learning innovations in Global North contexts (Sung et al., 2016) and aligns with findings on the profile of non-traditional learners in developing regions (Zhou & Cheng, 2025). Additionally, the notable proportion of learners aged 46 and above (18.7%) highlights the growing trend of lifelong learning and the pursuit of education at any stage of life.

The relatively balanced distribution between Master's students (56%) and PhD students (44%) suggests that the use of smartphones for academic activities is relevant and significant across both levels of postgraduate education, reflecting a consistent demand for flexible and accessible learning tools, particularly for research, communication, and access to scholarly resources.

Notably, daily smartphone usage is consistently high across all age groups (ranging between 67.6% and 71.4%) and across both programme levels (69.0% and 69.7%), dispelling the common assumption that older learners or those pursuing more advanced qualifications may be less inclined or less comfortable using mobile technologies. Read through the UTAUT lens, this consistency across demographic subgroups suggests that performance expectancy, the perceived academic benefit of using a smartphone, operates broadly across age and programme level in this sample, rather than being concentrated in a particular subgroup; the barriers discussed later in this section, rather than demographic differences in perceived usefulness, appear to be the more decisive factor shaping the intensity of use.

Smartphone use for academic resource access and performance expectancy

The findings in Table 6 reveal a distinct hierarchy in smartphone utilisation for academic tasks among distance learners, highlighting a pronounced preference for resource access over interactive functions. Students overwhelmingly leverage smartphones for fundamental activities: accessing online course materials (94.7%) and university announcements (93.3%) demonstrate near-universal adoption, positioning the device as an indispensable tool for real-time information retrieval and connectivity. High usage extends to downloading e-books and journals (86.7%) and watching recorded lectures (85.3%), confirming smartphones as primary gateways for core learning content consumption. While engagement with institutional platforms like Moodle and e-libraries

remains strong (82.7%), its placement below simpler access tasks suggests potential friction in mobile platform usability or functionality.

This hierarchy maps closely onto the performance expectancy construct. Tasks that offer the most direct and easily recognised academic benefit, retrieving materials, checking announcements, and consuming recorded content, are precisely the tasks with the highest reported use. This is consistent with the hypothesis that high performance expectancy drives high usage for these activities (Venkatesh et al., 2003) and with evidence that performance expectancy is typically the strongest predictor of smartphone based learning behaviour (Ahmed et al., 2023; Onaolapo & Oyewole, 2018).

A significant drop, however, is observed for higher-stakes, interactive tasks: only 66.7% of students use smartphones for submitting assignments or taking quizzes. This stark contrast becomes even more telling when compared with trends in developed nations. While students in countries like the USA or Finland use smartphones for a wider range of academic tasks due to robust digital infrastructure and affordable data, the Tanzanian context reveals a 'participation gap'. The decline in usage for assignments and quizzes is not merely a preference but a pragmatic response to the unique barriers documented in this study. High data costs make uploading large assignment files financially risky, and unreliable connectivity poses a direct threat to successfully submitting work or completing a timed quiz without interruption, challenges that are far less prevalent in the contexts studied by Sung et al. (2016).

Barriers to smartphone use and effort expectancy

The analysis in Table 7 reveals that infrastructure-related barriers constitute the most significant obstacles to smartphone use for e-resources among distance learners. High mobile data costs emerged as the primary barrier ($M = 3.82$), with 70.6% of respondents agreeing or strongly agreeing that data costs prevent regular academic smartphone use. This finding aligns with existing research on digital divide challenges in developing countries, where telecommunications infrastructure and affordability remain critical issues (Ssekakubo et al., 2011). It highlights a fundamental disparity; whereas studies from countries like South Korea detail the pedagogical benefits of ubiquitous mobile learning (Sung et al., 2016), the primary concern for Tanzanian distance learners remains basic economic and infrastructural access, a recurring theme in analyses of the Global South's digital education landscape (Zhou & Cheng, 2025). Poor internet connectivity ranked as the second most significant barrier ($M = 3.68$), with 67.6% of participants reporting connectivity issues that limit their ability to access e-resources.

These infrastructural barriers can be understood as external constraints that inflate effort expectancy for data intensive or time sensitive academic tasks: even when a student perceives clear academic benefit (high performance expectancy) in submitting an assignment or taking a quiz online, unreliable connectivity and the cost of data increase the perceived effort and risk of doing so through a smartphone, which helps explain the participation gap identified above (Onaolapo & Oyewole, 2018; Venkatesh et al., 2003). Unlike in developed countries where data is often inexpensive and abundant, this cost barrier forces Tanzanian students to be highly selective in their academic smartphone use, directly raising effort expectancy for, and thereby reducing engagement with, data-intensive or interactive tasks.

In contrast, statements identifying user-related barriers showed lower agreement levels, indicating that learners possess reasonable technical competence and adaptability. The lowest-rated barrier was insufficient training on smartphone use for academics ($M = 2.96$), with only 42.7% agreeing this was a problem, suggesting that digital literacy levels among distance learners may be higher than anticipated. Navigation difficulties with e-resource platforms ($M = 3.04$) and smartphone technical limitations ($M = 3.12$) also received moderate ratings, indicating these are concerns but not insurmountable obstacles. Power outages ($M = 3.26$) represented a moderate barrier, reflecting infrastructure challenges beyond connectivity.

Read against the effort expectancy construct, this pattern indicates that the effort barrier facing these learners is predominantly structural and economic rather than skill based; students report comparatively low difficulty navigating platforms or operating their devices, but comparatively high difficulty overcoming the cost and reliability of connectivity. This distinction carries a clear, actionable implication: institutional interventions should first and foremost target infrastructural and economic constraints, since these are the factors most directly inflating effort expectancy for the tasks students already regard as useful. A primary recommendation would be for OUT to pre-load core course materials onto affordable, durable SD cards or USB drives, or to develop a lightweight mobile application that allows offline access to essential e-resources. This would directly mitigate the crippling effects of high data costs and poor connectivity, empowering students to use the resources they can already access, but more consistently and affordably.

Theoretical synthesis: revisiting the UTAUT model

Taken together, the findings support and refine the two-construct application of UTAUT adopted in this study. Performance expectancy appears strong and fairly uniform across the sample, evidenced by the near-universal use of smartphones for accessing course materials, announcements, and recorded lectures, and by the consistency of daily use across age groups and programme levels. Effort expectancy, by contrast, appears to vary sharply by task, and this variation tracks closely with the infrastructural and economic barriers identified in Table 7 rather than with students' digital skills. In other words, the usage hierarchy documented in this study is best explained not by students failing to recognise the value of smartphones for interactive academic tasks, but by structural conditions, principally data costs and connectivity, that raise the effort required to act on that recognised value.

This reading is consistent with reviews of UTAUT in higher education, which find that performance expectancy and effort expectancy are typically the strongest and most frequently confirmed predictors of technology use among students, while also cautioning that the relative weight of each construct is shaped by context (Xue et al., 2024). It also extends existing UTAUT-based work on smartphone use for mobile learning (Ahmed et al., 2023; Onalapo & Oyewole, 2018) to a resource-constrained distance education setting, suggesting that in such settings effort expectancy is driven less by the intrinsic usability of mobile interfaces than by the surrounding data and power infrastructure within which those interfaces are used. This contributes to a developing, context-sensitive understanding of the UTAUT model: infrastructural conditions in low-resource settings may function

as an external moderator of effort expectancy, a nuance that the original model, developed in well-resourced organisational contexts (Venkatesh et al., 2003), does not explicitly capture.

Conclusion

This paper has discussed the usage of smartphones among distance learners in Tanzania. The study reveals a clear usage of smartphones among distance learning students, with a strong preference for accessing electronic resources. Study results further emphasise the role of performance expectancy whereby students recognise smartphones as important tools for retrieving course materials, announcements, e-books, and journals, as well as recorded lectures. Furthermore, effort expectancy presents user related barriers such as infrastructure issues including high data cost, poor connectivity, and unreliable power supply as dominant barriers limiting the full application of smartphones in accessing e-resources. These constraints, which are far less prevalent in the contexts studied by scholars like Sung et al. (2016), critically shape the unique patterns of mobile learning adoption in Tanzania, moving the challenge beyond mere acceptance to overcoming foundational infrastructural hurdles, thereby illustrating the contextual dependency of technology adoption models as noted by Zhou and Cheng (2025).

In theoretical terms, the study demonstrates that performance expectancy and effort expectancy are not independent of the environment in which a technology is used: even where performance expectancy is consistently high, as it was across this sample, low effort expectancy driven by external infrastructural conditions can still suppress usage for specific, higher-stakes academic tasks. Future applications of UTAUT in similarly resource-constrained distance education settings would benefit from treating infrastructural context explicitly as a factor shaping effort expectancy, rather than assuming it operates in the same way as in the well-resourced settings in which the model was originally developed.

To enhance the effectiveness of smartphone usage for accessing electronic resources among distance learning students, the following recommendations are made:

- Improve digital infrastructure and internet connectivity: Stakeholders such as government agencies and telecommunications service providers should invest heavily in expanding stable internet coverage and reducing data costs for distance learning students to support learning activities.
- Provision of digital literacy skills and technical support: Targeted training programmes should be implemented to improve distance learning students' digital skills, especially in navigating smartphone educational platforms. Ongoing technical support should also be offered to assist learners with device as well as platform related challenges.
- Provide alternative power solutions for students: Institutions, in addition to policy-makers, should promote access to alternative energy solutions tailored to students in distance areas. This could involve distributing alternative sources of power, such as solar charging kits.
- Installation of mobile-enhanced learning systems: Higher learning institutions, including OUT, should prioritise the development and deployment of learning

management systems as well as digital tools that are compatible with smartphone devices. This will improve the user interface for small devices and support cross-device functionality.

The study was conducted at the Open University of Tanzania only, which may limit the generalisability of the study findings to other institutions that offer distance learning education, both within Tanzania and beyond. However, this study provides valuable insights into the application of smartphones in accessing electronic resources among distance learners. Moreover, the study determined a range of academic activities conducted via smartphones, but did not deeply assess how different academic disciplines or levels of study might influence smartphone use, as well as related challenges.

A further limitation concerns the theoretical scope of the study. Because the analysis was confined to performance expectancy and effort expectancy, for the reasons outlined in the Theoretical Framework, it does not capture the potential impact of social influence or facilitating conditions on smartphone use. Peer and institutional norms (social influence) or the availability of organisational support such as data bundles, network infrastructure, or device subsidies (facilitating conditions) may still shape usage patterns in ways this study was not designed to detect. Future research applying the full four-construct UTAUT model, ideally with a larger probability-based sample, would help establish whether these two additional constructs meaningfully add to the explanatory power of the two-construct model used here.

Future studies could broaden the scope by including multiple distance learning institutions, increasing the sample size and incorporating a wider range of academic disciplines and learners' profiles. Such an investigation would provide a more comprehensive and representative understanding of smartphone integration into distance education across Tanzania's higher learning institutions.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes on contributors

Dr. Christian Mubofu is a Senior Lecturer and librarian at The Mwalimu Nyerere Memorial Academy (MNMA), Dar es Salaam, Tanzania. His expertise includes information dissemination, preservation and conservation of library and archival resources, digital libraries, research support services, and scholarly communication. He has published in local and international peer-reviewed journals and is experienced in capacity building on Artificial Intelligence (AI) tools for research, particularly in literature reviews, academic writing, reference management, research productivity, scholarly communication, and responsible AI use in research.

Vincent Msonge is a Senior Lecturer and researcher at The Institute of Finance Management, Dar es Salaam, Tanzania. He holds a PhD in Information Studies and possesses extensive experience in teaching, research and scholarly publishing. His research expertise spans electronic resources management, information dissemination, collection development and management, and utilisation and promotion of information repositories. Dr Msonge also engages in interdisciplinary research in business communication skills. He has published widely in local and international peer-reviewed journals.

References

- Ahmed, M. S., Everatt, J., Fox-Turnbull, W., & Alkhezzi, F. (2023). Systematic review of literature for smartphones technology acceptance using unified theory of acceptance and use of technology model (UTAUT). *Social Networking*, 12(2), 29–44. <https://doi.org/10.4236/sn.2023.122002>
- Bond, M., Buntins, K., Bedenlier, S., & Zawacki-Richter, O. (2021). Emergency remote teaching in higher education: Mapping the first global online semester. *International Journal of Educational Technology in Higher Education*, 18(1), 1–24. <https://doi.org/10.1186/s41239-021-00282-x>
- Calculator.net. (2025). *Sample size calculator*. <https://www.calculator.net/sample-size-calculator.html>
- Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., Bywaters, D., & Walker, K. (2020). Purposive sampling: Complex or simple? Research case examples. *Journal of Research in Nursing*, 25(8), 652–661. <https://doi.org/10.1177/1744987120927206>
- Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). SAGE.
- Etikan, I., & Bala, K. (2017). Sampling and sampling methods. *Biometrics & Biostatistics International Journal*, 5(6), 215–217. <https://doi.org/10.15406/bbij.2017.05.00149>
- GSMA. (2025). *The mobile economy 2025*. <https://www.gsma.com/solutions-and-impact/connectivity-for-good/mobile-economy/wp-content/uploads/2025/02/030325-The-Mobile-Economy-2025.pdf>
- GSMA Intelligence. (2024). *The state of mobile internet connectivity 2024*. GSMA. <https://www.gsma.com/r/wp-content/uploads/2024/10/The-State-of-Mobile-Internet-Connectivity-Report-2024.pdf>
- Kafanabo, E. J. (2024). The use of mobile phone technology in teaching and learning for primary school pupils during COVID-19 school closure in Tanzania. *Papers in Education and Development*, 42(1), 1–22. <https://doi.org/10.56279/ped.v42i1.1>
- Kondoro, A. W., Maro, S., Mtebe, J. S., Haßler, B., & Proctor, J. (2023). Usability testing of a mobile-based learning management system for teacher continuous professional development in Tanzania. *International Journal of Education and Development Using ICT*, 19(2), 75–92. <https://files.eric.ed.gov/fulltext/EJ1402872.pdf>
- Luvanga, B. G., & Sanga, P. L. (2024). Prospects of open and distance learning at the Open University of Tanzania post-COVID-19 pandemic. *International Journal on Open and Distance E-Learning*, 10(1), 26–42. <https://doi.org/10.58887/ijodel.v10i1.288>
- Mahai, L. S. (2022). Overcoming the odds: Online learning experiences from Open University of Tanzania's regional centre rural-based students. *University of Dar Es Salaam Library Journal*, 17(1), 114–128. <https://doi.org/10.4314/udslj.v17i1.8>
- Marasinghe, I. (2025). Use of electronic information resources by distance learners of the Open University of Sri Lanka. *Library Philosophy and Practice*, (e-journal), 8176. <https://digitalcommons.unl.edu/libphilprac/8176>
- Maritim, E. K., & Mushi, H. M. K. (2012). Mobile technologies for enhancing distance learning in Tanzania: An exploratory study. *Huria: Journal of the Open University of Tanzania*, 13(2), 123–138.
- Matheus, E. (2021). An investigation into the use of smartphones in accessing electronic resources at the University of Namibia [Unpublished master's thesis]. University of Namibia. <https://repository.unam.edu.na/items/b45f7f88-d4de-4b9a-bc8b-e7832ccaaf39>
- Mhache, E. P. (2013). Twenty years of the Open University of Tanzania in the development of education in the country: The role of OUT in improving people's welfare. *Huria: Journal of the Open University of Tanzania*, 14(1), 65–76.
- Mtebe, J. S., & Raisamo, R. (2014). Investigating students' behavioral intention to adopt and use mobile learning in higher education in East Africa. *International Journal of Education and Development Using Information and Communication Technology (IJEDICT)*, 10(3), 4–20. <http://files.eric.ed.gov/fulltext/EJ1059061.pdf>
- Mubofu, C., & Malekani, A. (2022). Accessibility of library resources and support services by distance learners. *Journal of Library and Information Services in Distance Learning*, 15(4), 267–279. <https://doi.org/10.1080/1533290X.2021.2021345>

- Mushi, R. M. (2025). Trust and AI adoption for mobile learning in higher education: Evidence from Tanzanian universities. *Advances in Mobile Learning Educational Research*, 5(2), 1597–1610. <https://doi.org/10.25082/AMLER.2025.02.014>
- Mwangasa, G. (2026). The role of mobile technology in enhancing learning amongst open and distance education learners: A case of Institute of adult education in Tanzania. *IAE Journal of Research and Development*, 2(1), 128. <https://doi.org/10.61408/ijored2026v02i01.06>
- Onaolapo, S., & Oyewole, O. (2018). Performance expectancy, effort expectancy, and facilitating conditions as factors influencing smartphone use for mobile learning by postgraduate students of the University of Ibadan, Nigeria. *Interdisciplinary Journal of E-Skills and Lifelong Learning*, 14, 95–115. <https://doi.org/10.28945/4085>
- Reginard, Z. R., & Singano, R. R. (2017). Challenges of ICT integration among distance learners at the Open University of Tanzania: A case of tanga regional centre. *JIPE*, 9(2), 96.
- Saidi, K. P., Jumanne, J. A., Makwinya, N. M., & Lyimo, N. N. (2025). Determinants of mobile devices adoption amongst students: A case of Sokoine University of agriculture, Tanzania. *East African Journal of Education and Social Sciences*, 6(1), 12–25. <https://www.ajol.info/index.php/eajess/article/view/290802>
- Samzugi, A. S., & Mwinyibegu, C. M. (2013). Accessibility of open educational resources for distance education learners: The case of the Open University of Tanzania. *Huria: Journal of the Open University of Tanzania*, 14(1), 76–88.
- Setia, M. S. (2016). Methodology series module 3: Cross-sectional studies. *Indian Journal of Dermatology*, 61(3), 261–264. <https://doi.org/10.4103/0019-5154.182410>
- Ssekakubo, G., Suleman, H., & Marsden, G. (2011, October). Issues of adoption: Have e-learning management systems fulfilled their potential in developing countries? In *Proceedings of SAICSIT 2011, knowledge, innovation and leadership in a diverse, multidisciplinary environment, annual conference of the South African institute of computer scientists and information technologists* (pp. 231–238).
- Sung, Y. T., Chang, K. E., & Liu, T. C. (2016). The effects of integrating mobile devices with teaching and learning on students' learning performance: A meta-analysis and research synthesis. *Computers and Education*, 94, 252–275. <https://doi.org/10.1016/j.compedu.2015.11.008>
- Usman, K., & Younus, M. (2023). Examine the challenges and barriers hindering distance learners' access to academic library resources. *Journal of Education and Social Studies*, 4(3), 813–820. <https://doi.org/10.52223/jess.2023.4342>
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view1. *MIS Quarterly*, 27(3), 425–478. <https://doi.org/10.2307/30036540>
- Xue, L., Rashid, A. M., & Ouyang, S. (2024). The unified theory of acceptance and use of technology (UTAUT) in higher education: A systematic review. *SAGE Open*, 14(1). <https://doi.org/10.1177/21582440241229570>
- Zhou, Z., & Cheng, Q. (2025). Effects of online and offline social support on problematic smartphone use among Chinese adolescents: Mediating role of needs frustration. *Behaviour & Information Technology*, 45(11), 1–13. <https://doi.org/10.1080/0144929X.2025.2585328>