



Bridging the Digital Divide in Tanzanian Higher Education: A Pragmatic Assessment of Library Users' Knowledge and Awareness of Digital Resources in Morogoro Universities

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Abstract: *The transformative potential of digital library resources (DLRs) in higher education remains unrealized when users lack adequate knowledge and awareness, a challenge particularly acute in Sub-Saharan African contexts where infrastructural and socio-cultural factors intersect. In Tanzanian universities, despite growing investments in digital platforms, empirical evidence on the actual levels of user knowledge and awareness, and the specific gaps that constrain effective utilization, remains scarce. This study pragmatically assesses the knowledge and awareness of DLRs among library users in five selected universities in Morogoro, Tanzania, employing a cross-sectional mixed-methods design. Data were collected from 150 respondents via structured questionnaires, 10 Focus Group Discussions (FGDs) involving 89 participants, and 16 key informant interviews, with quantitative analysis using IBM SPSS v20 and qualitative data organized thematically. The results reveal critically low levels: only 34.3% of respondents possessed adequate knowledge of DLRs, while awareness levels were even more limited, just 6% were aware of the concept and practices of DLRs, 4.8% could identify specific resources and strategies, and merely 3.5% could accurately describe or explain them. These findings empirically demonstrate a profound second-level digital divide, where access does not translate into capability, and confirm that inadequate knowledge directly predicts poor awareness and underutilization. The study makes a significant policy contribution by showing that socio-demographic factors (age, education level) and institutional support (training frequency) are stronger predictors of DLR engagement than mere physical access, challenging supply-side only interventions. For practice, it recommends mandatory, curriculum-embedded digital literacy modules, structured library sensitization campaigns, and a national framework for continuous ICT skills training for both students and staff. Conclusively, without targeted, sustained educational interventions, investments in digital infrastructure in Tanzanian universities will continue to yield suboptimal returns, perpetuating educational inequality.*

Keywords: *Digital divide, Digital literacy, University libraries, Tanzania, Knowledge-awareness gap*

1.0 Background Information

Digital library resources (DLRs), including electronic journals, e-books, online databases, and institutional repositories, have become indispensable components of modern higher education globally. These resources offer transformative advantages over traditional print collections, including 24/7 remote access, cost-effective dissemination of scholarly knowledge, enhanced research productivity, and support for innovative teaching and learning methodologies. Ashikuzzaman (2025) observed that digital libraries have fundamentally revolutionized academic research by democratizing access to scholarly materials worldwide, enabling students, educators, and researchers to engage with knowledge beyond the physical and temporal constraints of

traditional brick-and-mortar libraries. Empirical studies have systematically demonstrated that digital library databases significantly stimulate research culture within higher education institutions, fostering intellectual growth, enabling strategic research planning, and facilitating the identification of diverse user information needs (Rafi, JianMing, & Ahmad, 2019). Furthermore, the integration of digital resources into university systems has been consistently linked to measurable improvements in both research productivity and pedagogical outcomes, rendering them indispensable assets in contemporary academic environments (Rafi *et al.*, 2019; Ashikuzzaman, 2025).



However, a substantial and persistent body of international research has established that the mere availability of digital library resources does not automatically translate into effective utilization. Rather, users' awareness of resource existence and their knowledge of how to access, navigate, and apply these resources emerge as critical mediating factors determining the success or failure of digital library investments. Kaur and Rani (2018) argued persuasively that while digital libraries enhance accessibility in principle, their practical success depends fundamentally on users' ability to recognize available resources and acquire the necessary technical and information literacy skills to navigate them effectively. Similarly, Arya and Bhat (2025) positioned digital literacy as a prerequisite for meaningful engagement with electronic resources, emphasizing that systematic awareness initiatives must logically precede and scaffold knowledge acquisition processes. In the Sub-Saharan African context, Ocholla (2019) documented that although many university students and staff demonstrate some level of awareness regarding digital resources, their practical knowledge of effective utilization strategies remains severely constrained, underscoring the urgent importance of targeted training and sensitization programs designed to bridge the persistent divide between superficial awareness and functional knowledge.

Tanzanian higher education institutions have embarked on a significant transition from analogue to digital library systems, driven by pressing challenges including limited physical library space, acute scarcity of print resources, and critical shortages of professional librarians (Ngulugulu & Matemba, 2020). The Tanzania Library Services Board (TLSB) has played a central orchestrating role in this transformation, announcing in 2025 the launch of the Integrated National Digital Library System (INLDS) in collaboration with the e-Government Authority, an initiative projected to serve approximately four million Tanzanians annually through expanded access to e-books, journals, and educational databases (Daily News, 2025). At the institutional level, universities including Sokoine University of Agriculture (SUA), Mzumbe University (MU), the Open University of Tanzania (OUT), and various private institutions have invested substantially in digital platforms to modernize academic services and expand access to global scholarly knowledge networks.

Despite these significant infrastructural investments, empirical evidence reveals persistent and troubling gaps in users' knowledge and awareness. Mathew and Matemba (2019) reported that readiness for digital library services in Tanzanian higher learning institutions remains seriously constrained by limited ICT skills among users and inadequate sensitization efforts by institutional actors. Bitumbiko (2023) further observed that notwithstanding diverse institutional initiatives, awareness among Tanzanian

university students and staff remain alarmingly low, resulting in chronic underutilization of available digital resources. This situation is compounded by findings from Mosha, Siyao, and Nyakwaka (2021), who identified multiple implementation challenges including poor ICT infrastructure, shortages of librarians with specialized e-resources skills, and notably, poor cooperation between academic staff and librarians, all of which collectively undermine effective digital resource utilization strategies at institutions such as Mzumbe University.

The digital divide in Tanzania manifests at multiple levels. Kaishe-Mulungu, Lwehabura, and Angello (2025) evaluated ICT resources and barriers to adoption in Tanzanian university libraries, finding that despite the presence of computers, projectors, photocopiers, and internet connectivity, the quality of these fundamental ICT resources remains inconsistent. Their study identified substantial obstacles to ICT adoption including subpar computer systems, erratic power supplies, inadequate ICT infrastructure, and student misuse of ICT resources, all of which detrimentally affect patron satisfaction and severely impair the quality of library service delivery. Similarly, Ibwe and Ikuja (2024) explored the benefits and barriers of open platforms promoting teaching and learning in Tanzanian higher learning institutions, concluding that while open platforms offer significant advantages in accessibility, collaboration, and resource availability, obstacles such as inadequate infrastructure and limited digital literacy continue to hinder widespread adoption.

The knowledge and awareness gaps are not merely anecdotal but have been systematically documented through empirical research in Tanzanian contexts. A study on utilization of subscribed scholarly resources in Tanzanian higher education libraries revealed that while general awareness of subscribed scholarly resources is moderately high, it remains superficial, lacking the critical depth needed for sustained academic integration (Tanzanian Journal of Informatics, 2025). Key factors influencing usage include usability, adaptability, content trustworthiness, and intention to reuse, with technical infrastructure, training gaps, and institutional culture posing significant barriers. Regression analysis confirmed that awareness, accessibility, and satisfaction are major predictors of usage benefits, while inadequate advocacy, poor ICT environments, low policy clarity, and fragile funding structures persist as impediments to effective utilization.

These findings collectively indicate that knowledge and awareness are not merely facilitative but are decisively determinative of digital library integration success in Tanzanian higher education. For digital resources to be effectively adopted and integrated into academic practice, users must first be aware of their existence, then acquire functional knowledge of access and navigation procedures,



and finally develop confidence in applying these resources to concrete teaching, learning, and research tasks. Awareness constitutes the foundational prerequisite, while knowledge enables deeper engagement, critical evaluation, and sustained application. Without adequate knowledge and awareness, substantial institutional and national investments in digital infrastructure risk chronic underutilization and, ultimately, failure to achieve intended educational and research outcomes.

Globally, comparative research reinforces the urgency of addressing knowledge-awareness deficits. A Ghanaian study on electronic resources in a health sciences library found that although a majority of respondents were aware of electronic resources provided by the library, the high cost of personal internet data and low internet bandwidth emerged as significant challenges, and the study recommended regular training on e-resources use, collaboration between libraries and lecturers to create awareness in lecture halls, and integration of e-resources into teaching instruction (Ankamah, Gyesi, & Amponsah, 2024). Similarly, a Zambian study investigating students' awareness, utilization, and satisfaction with the Copperbelt University Library's Online Public Access Catalogue found that while 51.7% of students possessed basic OPAC awareness, 40.5% reported never using it, with only 12% reporting frequent use, indicating a significant utilization gap, and the study identified facilitating conditions and performance expectancy as primary determinants of engagement (Ng'ambi, M'kulama, & Akakandelwa, 2025).

In the Tanzanian distance education context, Stephano (2025) assessed accessibility and utilization of online information resources by distance learners in Morogoro centres, finding that although 83.4% of respondents reported high accessibility levels, 57.6% faced challenges of limited broadband connectivity, suggesting that physical access does not translate into effective utilization when infrastructural and skills barriers persist. Furthermore, research on research data management services in Tanzanian higher education institutions identified a widespread lack of awareness and understanding of strategies necessary to implement research data management services, concluding that libraries and library staff must foster digital literacy skills to successfully implement research services, with training, guidance, and support emerging as key strategies for effective implementation.

Collectively, the literature demonstrates an undeniable pattern: while digital resources are increasingly available across Tanzanian universities, their effective integration depends critically on users' awareness of their existence and knowledge of how to apply them to academic tasks. Despite global advancements in digital technologies and substantial national and institutional investments, empirical evidence on

the actual levels of knowledge and awareness among Tanzanian university library users remains remarkably scarce. The present study addresses this critical gap by systematically assessing the knowledge and awareness of library users regarding digital library resources in selected universities in Morogoro, Tanzania, thereby providing essential empirical grounding for policy formulation, capacity-building interventions, and strategic planning to enhance digital resource utilization in Tanzanian higher education.

2.0 Theoretical Framework

The theoretical underpinnings of this study draw from three complementary and interconnected theories that collectively explain the multi-dimensional nature of digital library resource (DLR) adoption, utilization, and the persistent gaps in knowledge and awareness observed among university library users in Tanzania. These theories, the Knowledge, Attitudes, and Practices (KAP) Theory, the Diffusion of Innovations (DoI) Theory, and the Digital Divide Theory, provide a robust analytical lens for understanding how socio-cultural, demographic, institutional, and technological factors intersect to shape users' engagement with digital library resources. Figure 1 presents the integrated theoretical framework guiding this study.

2.1 Knowledge, Attitudes, and Practices (KAP) Theory

The Knowledge, Attitudes, and Practices (KAP) theory posits that human behavioral change is achieved through the sequential acquisition of correct knowledge, generation of appropriate attitudes, and subsequent adoption of corresponding behaviors or practices (Alsale *et al.*, 2023). This theoretical framework assumes that knowledge constitutes the foundational prerequisite for attitude formation, and that attitudes, in turn, mediate the translation of knowledge into observable practices. Importantly, attitudes and practices exhibit behavioral patterns that differ systematically based on socio-cultural contexts and individual circumstances (Launiala, 2009). In the context of digital library resources (DLRs), users' KAP levels are expected to associate with either effective or poor utilization patterns, with adequate knowledge and positive attitudes predicting functional practices, while inadequate knowledge and negative attitudes predict underutilization or avoidance behaviors.

Launiala (2009), in a methodological critique of KAP surveys in medical anthropology research on malaria in pregnancy in Malawi, emphasized that while KAP surveys provide valuable quantitative insights, they require careful design and contextual interpretation. Her work demonstrated that knowledge alone does not predict behavior directly; rather, attitudes and perceived social norms mediate the knowledge-practice relationship. This insight is particularly salient for understanding DLR utilization in Tanzanian

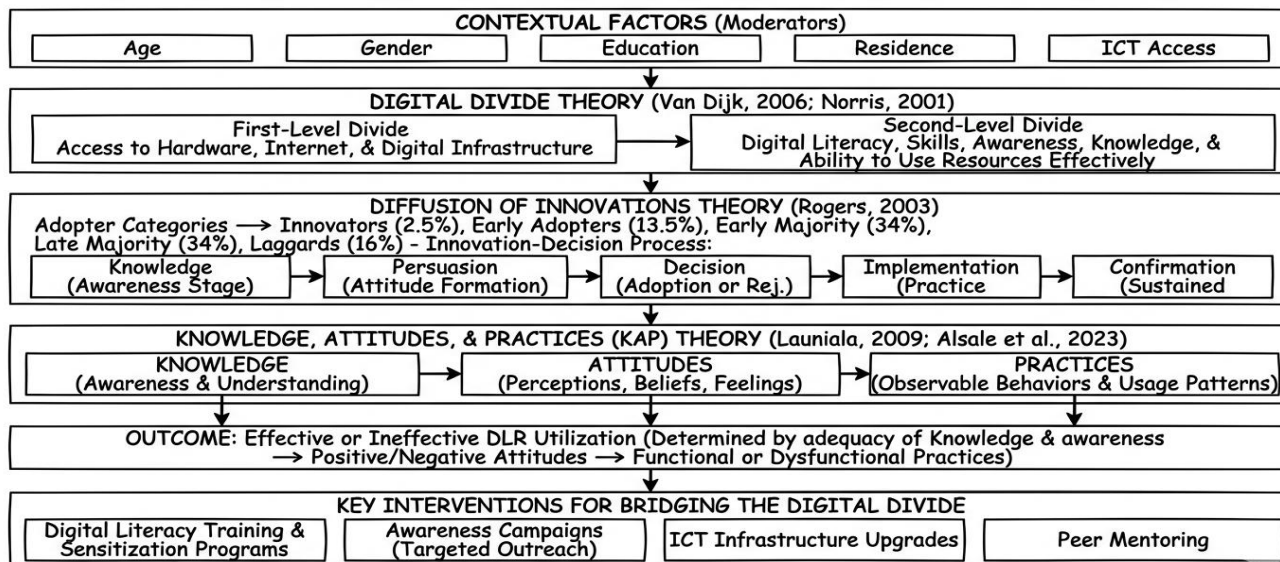


universities, where users may possess some level of declarative knowledge about digital resources but lack the attitudinal dispositions or perceived self-efficacy to translate that knowledge into regular, effective usage practices.

awareness alone is insufficient without favorable perceptions and perceived behavioral control.

Practices constitute the observable behaviors and usage

Figure 1: Integrated Theoretical Framework for Assessing Knowledge and Awareness of Digital Library Resources



Source: Author's synthesis based on KAP Theory (Launiala, 2009; Alsale et al., 2023), Diffusion of Innovations Theory (Rogers, 2003), and Digital Divide Theory (van Dijk, 2006; Norris, 2001)

Applying KAP theory to the present study, knowledge refers to users' awareness and understanding of DLRs, specifically, whether students and faculty know about the existence of digital repositories, e-journals, online catalogs, and databases, and whether they understand how to access, navigate, and critically evaluate these resources. As Swai, Nyamete, and Silayo (2025) documented in their assessment of internet use and utilization of electronic information resources among postgraduate students at the University of Dodoma and the Open University of Tanzania, knowledge levels are shaped by socio-demographic factors such as age, prior education, and ICT exposure, as well as contextual factors including access to devices, internet connectivity, and institutional support structures.

Attitudes represent the perceptions, beliefs, and affective responses that users hold toward DLRs. Positive attitudes, characterized by viewing DLRs as convenient, affordable, efficient, reliable, and academically valuable, encourage adoption, sustained engagement, and deeper integration of digital resources into teaching, learning, and research workflows. Conversely, negative attitudes, including concerns about usability, relevance, trustworthiness of online content, or frustration with technical difficulties, hinder engagement and reinforce avoidance behaviors. Lujaji (2025), in a study on perceptions and adoption of artificial intelligence and machine learning applications among library and information science students in select universities in Tanzania, emphasized that attitudes mediate the relationship between knowledge and practices, demonstrating that

patterns of DLRs, the ultimate outcome of the KAP sequence. In this study, practices include frequency of DLR use, types of resources accessed, search strategies employed, reliance on digital versus print resources for academic tasks, and challenges encountered during usage. KAP theory posits that practices are the behavioral expression of both knowledge and attitudes, reflecting whether awareness and perceptions translate into actual, sustained engagement (The KAP Survey Model, 2015). Studies by Mubofu, Mambo, and Samzugi (2022) on preservation of digital resources in selected university libraries in Tanzania confirmed that institutional practices lag behind policy commitments due to insufficient knowledge of digital systems among library staff, further reinforcing the KAP framework's applicability.

By applying KAP theory, this study systematically compares how different socio-demographic and cultural groups within Morogoro universities progress through these three sequential stages. For instance, the findings reveal that younger students with prior ICT exposure demonstrate higher knowledge levels, more positive attitudes, and stronger practices, while older staff members or those from rural backgrounds with limited prior digital exposure lag significantly behind in all three dimensions. This comparative analytical lens highlights critical disparities and informs targeted interventions designed to improve equitable access, knowledge acquisition, attitude transformation, and effective utilization of DLRs (Swai et al., 2025; Kaishe-Mulungu, 2025).



2.2 Diffusion of Innovations Theory

The Diffusion of Innovations (DoI) theory, developed by Everett Rogers (2003), explains how, why, and at what rate a product, service, process, or innovation spreads through a population or social system. The theory posits that diffusion is not an instantaneous event, but a cumulative process shaped by communication channels, time, social systems, and the perceived characteristics of the innovation itself. Rogers (2003) identified five adopter categories, innovators, early adopters, early majority, late majority, and laggards, each characterized by distinct psychological and socio-demographic profiles. Critically, the theory recognizes that social systems expose individuals to innovations differently, systematically resulting in knowledge, attitude, and practice (KAP) differences across population segments. This framework has been widely applied in information science research to understand the adoption of library technologies and digital resources (Minishi-Majanja & Kiplang'at, 2005).

In the context of this study, DoI theory provides a structured framework for analyzing the diffusion of digital library resources among university users in Morogoro, Tanzania, mapping the innovation-decision process onto the observed patterns of knowledge and awareness. The theory was applied in the following specific dimensions:

Knowledge (Awareness Stage): DoI theory emphasizes that adoption begins with the knowledge stage, during which individuals are exposed to an innovation's existence and gain initial understanding of its functions. In this study, knowledge of DLRs reflects whether students and faculty are aware of the existence of digital repositories, e-journals, and online catalogs. This aligns with Rogers' (2003) concept that individuals must first be exposed to an innovation before they can evaluate it, form attitudes, or make adoption decisions. The findings of this study, showing that only 6% of respondents were aware of DLR concepts, indicate that the diffusion process in Tanzanian universities remains predominantly at this nascent stage. Minishi-Majanja and Kiplang'at (2005), in their seminal study on the diffusion of ICTs into library and information science education in Kenya, observed similar patterns, noting that awareness campaigns and institutional promotion are essential precursors to successful innovation diffusion in African higher education contexts.

Attitudes (Persuasion Stage): Attitudes toward DLRs correspond to Rogers' persuasion stage, where individuals actively seek information about the innovation, form opinions about its relative advantages, compatibility, complexity, trialability, and observability, and develop either favorable or unfavorable attitudes toward adoption. Positive attitudes, including perceptions of DLRs as convenient, reliable, time-saving, and academically prestigious, increase the likelihood of adoption, while negative perceptions (e.g.,

concerns about usability, relevance, cost, or technical unreliability) hinder uptake. Lund (2025), in a comparative study on digital literacy and e-resource adoption among Tanzanian university students, found that attitude formation is significantly influenced by peer networks, lecturer encouragement, and prior positive experiences with technology, all of which are core communication channels identified in DoI theory.

Practices (Decision and Implementation Stages): Actual usage of DLRs represents the decision and implementation stages of the diffusion process. The decision stage involves activities that lead to choosing either adoption or rejection of the innovation, while the implementation stage occurs when the innovation is put into active use. In this study, practices such as frequency of DLR use, types of resources accessed, search strategies employed, and integration of digital resources into academic workflows demonstrate how far the innovation has been integrated into users' routines. Challenges such as poor internet connectivity, limited ICT skills, or lack of institutional support can delay or derail implementation, reflecting barriers extensively documented in DoI research within African library contexts (Minishi-Majanja & Kiplang'at, 2005; Ocholla, 2019).

Socio-Demographic and Cultural Influences (Adopter Categories): Rogers' adopter categories were mapped onto the socio-demographic groups observed in this study. Younger students, typically aged 18-25, with prior exposure to digital technologies during secondary education or through personal device ownership, acted as innovators or early adopters, demonstrating higher knowledge levels, more positive attitudes, and more frequent practices. Faculty members and older staff, particularly those aged 40 and above or those from disciplines less reliant on digital tools, fell into the late majority or laggard categories, exhibiting significantly lower knowledge and awareness levels. Lund (2025) documented similar generational patterns in Tanzanian higher education, noting that younger users are more adaptable to digital innovations and online research tools, making them more likely to explore and utilize digital library systems effectively, while older users face challenges including limited ICT skills, resistance to technological change, and lack of formal training opportunities.

2.3 Digital Divide Theory

Digital Divide Theory, as articulated by van Dijk (2006) and Norris (2001), highlights the unequal distribution of access to, use of, and benefits derived from digital technologies among individuals, social groups, and institutions. The theory was developed to explain why some communities thrive in the digital era while others remain marginalized due to persistent technological, social, educational, and economic barriers. Van Dijk (2006) proposed that the digital divide is not a binary condition (simply having or not having access) but a multi-dimensional phenomenon encompassing four



sequential types of access barriers: motivational access (lack of interest or perceived relevance), material access (lack of computers, internet connections, or infrastructure), skills access (lack of digital literacy, information literacy, or strategic knowledge), and usage access (lack of opportunities to use the technology meaningfully). Norris (2001) further distinguished between the global divide (between developed and developing nations), the social divide (between information-rich and information-poor within societies), and the democratic divide (between those who do and do not use digital resources for civic participation).

The theory rests on several interconnected assumptions. First, access inequality suggests that not everyone has equal access to digital tools, internet connectivity, or technological infrastructure, and these inequalities are systematically patterned by socio-economic status, geography, age, and education. Second, skills inequality emphasizes that even when physical access exists, significant differences in digital literacy, technical competence, and information-seeking skills affect how effectively people use technology (van Dijk, 2006). Third, usage inequality recognizes that individuals use digital technologies differently depending on their education, income, occupation, and social context, with some engaging in transformative capital-enhancing activities while others use technology only for basic or entertainment purposes. Fourth, outcome inequality points out that the tangible benefits of digital engagement, such as improved educational outcomes, research productivity, employment opportunities, and social mobility, are unevenly distributed. Finally, socio-cultural influence asserts that factors such as age, gender, education level, institutional support, and cultural norms shape patterns of digital inclusion and exclusion (Plokey, 2017).

In the context of this study, Digital Divide Theory provides a powerful explanatory framework for understanding the persistent disparities in knowledge and awareness of DLRs among Tanzanian university users. The findings, showing that only 34.3% of respondents possessed adequate knowledge and just 6% demonstrated basic awareness of DLR concepts, indicate that the digital divide in Tanzania manifests not primarily at the first level of physical access (though infrastructural challenges remain significant) but critically at the second level of digital skills, awareness, and effective usage capacity.

Application of Digital Divide Theory in the Present Study:

First, the first-level divide in this context refers to unequal access to digital infrastructure, including reliable internet connectivity, functional computers, stable electricity supply, and institutional subscriptions to digital library platforms. Studies by Kaishe-Mulungu, (2025) confirmed that despite the presence of fundamental ICT resources in Tanzanian university libraries, the quality and consistency of these

resources remain severely problematic, with erratic power supplies, inadequate infrastructure, and student misuse all impairing service delivery. Similarly, Ibwe and Ikuja (2024) documented significant infrastructural barriers to open platform adoption across Tanzanian higher learning institutions, including inadequate connectivity and device shortages.

Second, the second-level divide, which is the primary focus of this study, concerns disparities in digital literacy, awareness, knowledge, and the ability to use available digital resources effectively. The empirical findings demonstrate that even among users with physical access to digital library systems, most lack the foundational awareness and functional knowledge necessary to navigate, retrieve, evaluate, and apply digital resources to academic tasks. This aligns precisely with van Dijk's (2006) concept of skills access as a sequential barrier that persists even after material access is achieved. Plokey (2017), in a Ghanaian study at the University for Development Studies, documented similar patterns, finding that while a majority of lecturers were aware of e-resources, only a third actually utilized them, with personal interaction with librarians boosting awareness and usage by over 70%, demonstrating that social and institutional interventions can mediate second-level digital divides.

Third, Digital Divide Theory helps contextualize the demographic variations observed in this study. Younger users, as noted by Plokey (2017), Lund (2025), and Mahadeva and Krishnamurthy (2025), exhibit higher digital competence and awareness, reflecting generational differences in early-life exposure to digital technologies and educational integration of ICT skills. This supports van Dijk's (2006) assertion that digital inequality is not merely about current access but about cumulative advantages and disadvantages that compound over the life course. Conversely, older users, rural residents, and those from lower socio-economic backgrounds face multiple, intersecting barriers that systematically disadvantage their digital participation.

Fourth, the theory explains the persistence of knowledge and awareness gaps despite institutional investments in digital infrastructure. Norris's (2001) concept of the social divide, distinguishing between information-rich and information-poor within the same society, is particularly relevant. Tanzanian universities may have acquired institutional subscriptions and established digital platforms, but without accompanying investments in digital literacy training, awareness campaigns, and ongoing user support, the benefits of these resources accrue disproportionately to already-advantaged users (those with prior digital exposure, urban backgrounds, or higher educational attainment). This pattern



is extensively documented in African higher education research (Ocholla, 2019; Mubofu *et al.*, 2022).

Therefore, Digital Divide Theory guides the interpretation of this study's results by highlighting that bridging the knowledge and awareness gap requires far more than technological provision. It calls for comprehensive capacity-building initiatives, sustained awareness campaigns, inclusive digital literacy programs, and institutional policies specifically designed to reach marginalized user groups, thereby ensuring equitable participation and utilization of digital library resources across all socio-demographic segments of Tanzanian university populations (Swai *et al.*, 2025; Kaishe-Mulungu *et al.*, 2025).

2.4 Integration of the Three Theories

The three theoretical frameworks, KAP Theory, Diffusion of Innovations Theory, and Digital Divide Theory, are not mutually exclusive but rather complementary and mutually reinforcing when applied to the problem of DLR knowledge and awareness in Tanzanian universities. Figure 1 visually synthesizes these three theoretical perspectives into an integrated framework that guides the empirical investigation.

The integration proceeds as follows: Digital Divide Theory provides the macro-level contextual explanation for why disparities exist, focusing on multiple, intersecting barriers (access, skills, usage, outcomes) that are systematically patterned by socio-demographic and socio-economic factors. Diffusion of Innovations Theory provides the process-level explanation for how DLRs spread (or fail to spread) through the university social system over time, identifying specific stages (knowledge, persuasion, decision, implementation, confirmation) and adopter categories (innovators to laggards) that correspond to observed patterns of knowledge and awareness. KAP Theory provides the individual-level psychological mechanism explaining how knowledge translates (or fails to translate) into attitudes and subsequently into practices, offering measurable indicators (knowledge scores, attitude scales, practice frequencies) that operationalize the abstract concepts of awareness and utilization.

Together, these theories predict that users with low knowledge and awareness will remain in the early stages of the innovation-decision process, clustered in later adopter categories, and experiencing multiple digital divide barriers, all of which predict inadequate knowledge, neutral or negative attitudes, and infrequent or ineffective practices. Conversely, users with high knowledge and awareness will be further along the diffusion process, represent earlier adopter categories, face fewer digital divide barriers, and demonstrate positive attitudes and frequent, effective practices.

This integrated theoretical framework directly informs the methodology of this study, shaping questionnaire design (KAP measures), sampling strategies (ensuring representation across adopter-relevant demographic categories), and data analysis (examining associations between contextual factors and KAP outcomes). The findings, interpreted through this lens, provide actionable insights for designing targeted interventions that address specific barriers at specific stages of the adoption process for specific user groups within Tanzanian universities.

3.0 Methodology

3.1 Research Philosophy and Approach

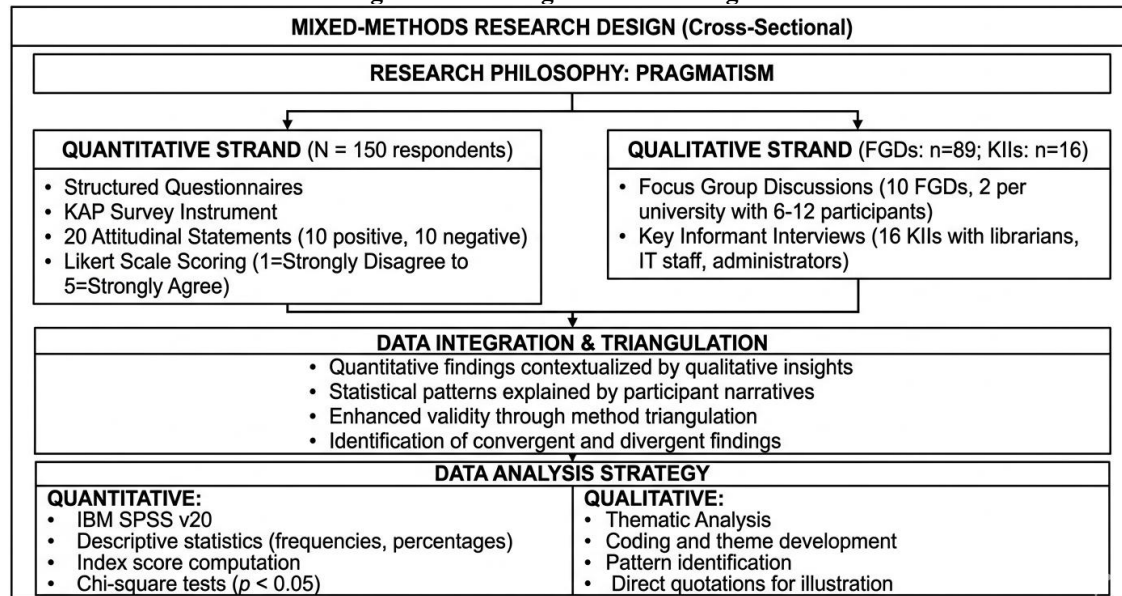
This study adopted a pragmatic research philosophy, which prioritizes practical outcomes and recognizes that both quantitative and qualitative methods can be effectively combined to address complex research problems (Creswell & Creswell, 2018). Pragmatism is particularly appropriate for studies investigating digital library resource utilization, as it allows researchers to focus on the practical consequences of knowledge and awareness gaps while employing methodological pluralism to capture both measurable patterns and contextual explanations. A mixed-methods approach was therefore employed, combining quantitative surveys with qualitative focus group discussions and key informant interviews, to ensure comprehensive triangulation of findings.

3.2 Research Design

The study employed a cross-sectional survey design, which enables data collection from diverse participants at a single point in time, providing a snapshot of knowledge and awareness levels across the target population. Cross-sectional designs are widely recognized as appropriate for assessing knowledge, attitudes, and practices (KAP) because they allow for the simultaneous measurement of multiple variables and the identification of associations between socio-demographic factors and outcome variables (Launiala, 2009; Richards, 2026). This design is also efficient for resource-constrained settings, as it minimizes data collection time and costs while still yielding robust empirical insights.

The mixed-methods approach was operationalized as follows: quantitative methods involved structured questionnaires administered to 150 respondents to gather measurable data on knowledge, awareness, and utilization of digital library resources; qualitative methods involved 10 Focus Group Discussions (FGDs) with 89 participants and 16 Key Informant Interviews (KIIs) to capture deeper contextual explanations for observed patterns. This triangulation strategy, summarized in Figure 2, enabled the study to move beyond numerical patterns to uncover the underlying reasons for knowledge gaps and engagement differences.

Figure 2: Mixed-Methods Research Design for Assessing DLR Knowledge and Awareness



Source: Author's synthesis based on study methodology adapted from Creswell & Creswell (2018) and Richards et al. (2026)

3.3 Study Area and Justification

The study was conducted in Morogoro, Tanzania, a region strategically selected due to its diverse representation of higher education institutions. Morogoro Municipality serves as an educational hub, hosting both public and private universities that have made significant investments in digital library infrastructure. The five universities selected for this study were: Sokoine University of Agriculture (SUA), Mzumbe University (MU), the Open University of Tanzania (OUT) Morogoro Campus, the Muslim University of Morogoro (MUM), and Jordan University College (JOCU). These institutions were purposively chosen because they represent the spectrum of Tanzanian higher education, including agricultural, general, distance-learning, and faith-based institutions, and because they have actively implemented digital library systems, making them suitable contexts for assessing user knowledge and awareness. Previous studies conducted in Morogoro, including research at SUA on digital library service usage among undergraduate students, have documented persistent challenges including low internet connectivity, unstable power supply, and lack of sufficient skills among users (Anthony, 2022). This existing evidence base further justifies Morogoro as an appropriate study area.

3.4 Target Population and Sampling Procedures

The target population comprised all registered students and academic staff at the five selected universities in Morogoro who were potential or actual users of digital library resources. Given the diversity of academic programs, year levels, and user categories, a multi-stage sampling technique was employed to ensure representative inclusion.

Stage One: Purposive Selection of Universities. The five universities were selected purposively based on three criteria: (a) presence of an established digital library system, (b) institutional subscription to electronic databases or e-resources, and (c) willingness of university administration to participate in the study. This purposive approach ensured that the study focused on institutions where digital library resources were theoretically available, allowing the investigation to concentrate on knowledge and awareness gaps rather than mere physical absence of resources.

Stage Two: Stratified Sampling of Participants. Within each university, participants were stratified by user category (undergraduate students, postgraduate students, academic staff) and by faculty or department. This stratification ensured representation across different academic disciplines and levels of study, recognizing that knowledge and awareness of digital resources may vary systematically by educational level (Mungwabi, 2023; Mungwabi, 2023).

Stage Three: Simple Random Sampling. From each stratum, individual participants were randomly selected to complete the questionnaire. The sampling frame was prepared with assistance from university library management, who provided lists of registered library users. A total of 150 students and staff participated in the quantitative survey, with 30 respondents from each of the five universities. This sample size was deemed adequate following the guidance of Bailey (1994) and Field (2009), who recommend a minimum of 30 respondents per site for statistical analysis regardless of population size.

Table 1 presents the distribution of quantitative survey respondents across the five participating universities and their key demographic characteristics.



Table 1: Distribution of Quantitative Survey Respondents (N=150)

Variable	Category	Frequency	Percent
University Affiliation	Sokoine University of Agriculture (SUA)	30	20.0
	Mzumbe University (MU)	30	20.0
	Open University of Tanzania (OUT)	30	20.0
	Muslim University of Morogoro (MUM)	30	20.0
	Jordan University College (JOCU)	30	20.0
User Category	Undergraduate Student	133	88.7
	Diploma Student	6	4.0
	Master's Student	5	3.3
	PhD Candidate	6	4.0
Sex	Male	92	61.3
	Female	58	38.7
Age Group	21-30 years	20	13.1
	31-39 years	44	29.2
	40-49 years	39	26.3
	50-59 years	26	17.1
	60-69 years	15	10.5
	70 years and above	6	3.8
Place of Residence	Urban	124	82.7
	Peri-urban	16	10.7
	Rural	10	6.7
Marital Status	Married	73	48.7
	Single	60	40.0
	Widowed	5	3.3
	Divorced	6	4.0
	Separated	6	4.0

Source: Field Survey Data (2024)

As shown in Table 1, the majority of respondents were undergraduate students (88.7%), with smaller proportions of diploma (4.0%), master's (3.3%), and PhD (4.0%) candidates. This distribution reflects the demographic composition of Tanzanian universities, where undergraduates constitute the largest proportion of the student body. The sample was male-dominated (61.3% male, 38.7% female), which reflects the actual gender distribution in many Tanzanian higher education institutions, particularly in agricultural and technical fields, as well as sampling dynamics including accessibility, willingness to participate, and institutional gender ratios. The mean age of respondents was 43.7 years, with a range of 21 to 72 years. Most respondents resided in urban areas (82.7%), with fewer from peri-urban (10.7%) and rural (6.7%) areas, reflecting both the urban location of the selected universities and broader patterns of rural-urban migration for higher education in Tanzania.

For the qualitative component, 89 participants were recruited across 10 FGDs (two per university). Each FGD comprised 6 to 12 participants, a size considered optimal for generating rich discussion while maintaining manageability (Krueger & Casey, 2015). Participants for FGDs were selected purposively to ensure diversity across user categories, gender, and academic disciplines. Additionally, 16 key

informants were purposively selected for in-depth interviews based on their specialized knowledge of digital library systems. Key informants included university librarians (n=5), ICT department staff (n=5), library administrators (n=3), and academic staff with responsibilities for digital resource promotion (n=3). The number of KIIs was considered adequate as it aligns with recommendations by Namey et al. (2016) that saturation in qualitative interviews with specialized informants is typically achieved between 12 and 20 interviews.

3.5 Data Collection Instruments

3.5.1 Structured Questionnaire

Data were collected using a structured Knowledge, Attitudes, and Practices (KAP) questionnaire administered through the Kobo Collect electronic platform. Kobo Collect is an open-source mobile data collection tool widely used in developing country contexts because it enables offline data capture (important in settings with unreliable internet connectivity) and facilitates real-time data quality checks. The questionnaire was organized into four main sections:

Section A: Socio-demographic and Background Characteristics.

This section collected information on respondents' age, sex, level of education, university affiliation, place of residence, marital status, and prior ICT training exposure. These variables served as independent variables in subsequent analyses examining whether knowledge and awareness levels varied systematically across demographic groups.

Section B: Knowledge of Digital Library Resources.

This section comprised 20 attitudinal statements covering different aspects of DLRs, including awareness of resource types, understanding of access procedures, familiarity with search techniques, and knowledge of evaluation criteria. Half of these statements were positively phrased (e.g., "I know how to access e-journals through my university library"), while the other half carried negative wording (e.g., "I find it difficult to locate relevant e-books on the library platform"). Each statement was rated on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The KAP approach has been validated in multiple library and information science contexts, including the development of the Open Education-Librarian Knowledge, Attitudes, and Practices (OpenEd-LibKAP) Scale by Richards, Monnin, and Whitman (2026), which demonstrated high internal consistency and reliability across knowledge, attitude, and practice domains.

Section C: Awareness of Digital Library Resources.

This section assessed respondents' awareness of the concept and practices of DLRs, their ability to identify specific resources and access strategies, and their capacity to accurately describe or explain DLRs. Questions were designed to



distinguish between superficial awareness (having heard the term “digital library”) and functional awareness (knowing what resources are available and how to access them).

Section D: Practices and Usage Patterns. This section captured information on frequency of DLR use, types of resources accessed (e-journals, e-books, databases, institutional repositories), purposes of use (teaching, learning, research, assignment completion), and challenges encountered during use.

The questionnaire was pilot-tested with 15 respondents (3 from each university) who were excluded from the final sample. Pilot testing assessed clarity of instructions, comprehensibility of items, length of administration time, and technical functionality of the Kobo Collect platform. Minor modifications to wording were made based on pilot feedback.

3.5.2 Focus Group Discussion (FGD) Guide

The FGD guide was developed to explore participants' collective experiences with digital library resources, including barriers to awareness and knowledge acquisition, social influences on DLR adoption, and suggestions for improving digital literacy initiatives. Each FGD session lasted between 60 and 90 minutes and was conducted in Kiswahili (the national language of Tanzania) to enable participants to express themselves freely without language barriers. Sessions were audio-recorded with participants' consent and later transcribed and translated into English for analysis. The FGD guide included questions such as: “*What do you understand by the term ‘digital library’?*”; “*What digital resources do you know are available through your university library?*”; “*What challenges have you faced in trying to access or use digital library resources?*”; and “*What would help you use digital library resources more effectively?*”

3.5.3 Key Informant Interview (KII) Guide

The KII guide was designed to capture expert perspectives on institutional strategies for promoting DLR awareness, the effectiveness of existing training programs, resource allocation for digital literacy initiatives, and recommendations for policy and practice. Key informants were interviewed individually, with sessions lasting 45 to 60 minutes. Interviews were conducted in English or Kiswahili based on informant preference, audio-recorded, and transcribed verbatim.

3.6 Measurement of Variables

3.6.1 Measurement of Knowledge of Digital Library Resources

To assess users' knowledge of DLRs, each respondent's level of knowledge was determined through an index score computed from the 20 attitudinal statements. For positively worded items, responses ranging from “Strongly Agree” (scored 5) to “Strongly Disagree” (scored 1). For negatively worded items, responses were reverse-scored, with “Strongly

Agree” assigned a value of 1 and “Strongly Disagree” a value of 5. This reverse-scoring procedure ensured that higher scores consistently represented higher knowledge levels, regardless of item phrasing.

Individual knowledge scores were summed for each respondent, yielding a total possible score ranging from 20 (minimum knowledge) to 100 (maximum knowledge). Using percentile values, knowledge scores were categorized into three levels:

- i. **Inadequate Knowledge (IK):** Scores below the 33rd percentile (< 70th percentile of the theoretical maximum)
- ii. **Moderate Knowledge (MK):** Scores between the 33rd and 66th percentiles (70th to 80th percentile of theoretical maximum)
- iii. **Adequate Knowledge (AK):** Scores above the 66th percentile (> 80th percentile of theoretical maximum)

This categorization approach is consistent with methods previously applied in similar studies in Morogoro, Tanzania (Muhanga, 2020), and aligns with KAP survey analytic conventions documented in the literature (Launiala, 2009).

3.6.2 Measurement of Awareness of Digital Library Resources

Awareness was measured as a categorical variable with three ordered levels based on respondents' demonstrated understanding:

- i. **Not aware:** Respondents who indicated no prior exposure to or understanding of DLRs
- ii. **Aware:** Respondents who could correctly define or describe the concept of digital library resources
- iii. **Able to identify specific resources and strategies, properly described or explained DLRs:** Respondents who could not only define DLRs but also name specific examples (e.g., “e-journals,” “open-access databases,” “institutional repositories”) and describe functional access strategies

This hierarchical classification recognizes that awareness exists on a continuum from recognition to functional understanding, and that higher levels of awareness are necessary for effective utilization (Mungwabi, 2023).

3.7 Data Analysis

3.7.1 Quantitative Data Analysis

Quantitative data from the structured questionnaires were exported from Kobo Collect into IBM SPSS version 20 for analysis. Data cleaning procedures included checking for completeness, identifying outliers, and assessing normality of continuous variables. Statistical analyses included:

Descriptive Statistics: Frequencies, percentages, means, and standard deviations were computed to summarize socio-



demographic characteristics, knowledge levels, and awareness levels across the sample.

Index Score Computation: Knowledge index scores were calculated as described in Section 3.6.1, and categorical knowledge levels were derived using percentile cutoffs.

Inferential Statistics: Chi-square tests were used to examine associations between socio-demographic variables (age, sex, education level, university affiliation, residence) and knowledge/awareness categories. Statistical significance was set at $p < 0.05$. While more complex modeling was considered, the sample size ($N=150$) and the predominantly categorical nature of outcome variables made chi-square analysis the most appropriate approach.

3.7.2 Qualitative Data Analysis

Qualitative data from FGDs and KIIs were analyzed using thematic analysis, following the six-phase framework proposed by Braun and Clarke (2006): (1) familiarization with data through repeated reading of transcripts, (2) generation of initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) writing the report. Analysis was conducted in NVivo qualitative data analysis software to facilitate systematic coding and theme retrieval. Transcripts were coded by two independent researchers to enhance reliability, with disagreements resolved through discussion.

3.7.3 Data Integration Strategy

To ensure a comprehensive understanding of digital library knowledge and engagement, the study integrated both quantitative and qualitative findings through a narrative integration approach. Quantitative analyses provided statistical evidence of associations and differences across groups, while qualitative findings offered contextual explanations for observed patterns. For instance, while quantitative data showed the proportion of respondents with adequate knowledge, FGDs and KIIs provided insights into why knowledge levels were low, including poor search skills, limited exposure to training opportunities, and unreliable internet connectivity. This triangulation strengthened the validity of the findings by showing not only what differences existed, but also why they occurred (Creswell & Creswell, 2018).

3.8 Ethical Considerations

Ethical approval for this study was obtained from the relevant institutional review boards of the participating universities. Prior to data collection, the research objectives and procedures were explained to all potential participants, and written informed consent was obtained. Participation was entirely voluntary, and respondents were assured of their right to withdraw at any time without penalty. Anonymity and confidentiality were guaranteed by assigning participant codes rather than using names, storing data on password-protected devices, and reporting findings only in aggregated form. Special care was taken with FGDs to emphasize to

participants that contributions should remain confidential within the group, though researchers could not guarantee that other participants would maintain confidentiality. No incentives were offered for participation beyond the intrinsic value of contributing to research that could improve digital library services.

4.0 RESULTS AND DISCUSSION

4.1 Socio-Demographic Profile of Respondents

The socio-demographic characteristics of the 150 survey respondents are presented in Table 2. Understanding these characteristics is essential for interpreting knowledge and awareness patterns, as prior research has demonstrated that digital literacy and access to digital resources are systematically shaped by demographic factors including age, education level, gender, and place of residence (van Dijk, 2006; Plockey, 2017; Lund, 2025).

Table 2: Socio-Demographic Characteristics of Survey Respondents (N=150)

Variable	Category	Frequency	Percent
Sex	Male	92	61.3
	Female	58	38.7
Age Group	21-30 years	20	13.3
	31-39 years	44	29.3
	40-49 years	39	26.0
	50-59 years	26	17.3
	60-69 years	15	10.0
	70 years and above	6	4.0
Marital Status	Married	73	48.7
	Single	60	40.0
	Widowed	5	3.3
	Divorced	6	4.0
	Separated	6	4.0
Level of Education	Diploma	6	4.0
	Undergraduate	133	88.7
	Master's	5	3.3
	PhD	6	4.0
Place of Residence	Urban	124	82.7
	Peri-urban	16	10.7
	Rural	10	6.7

Source: Field Survey Data (2024)

As shown in Table 2, undergraduate students constituted the vast majority of respondents (88.7%), reflecting the demographic composition of Tanzanian universities where undergraduates typically represent 80-90% of total enrollments (Kibona, 2023). This concentration is methodologically significant because undergraduates are the primary users of university library services; if this largest user group demonstrates inadequate knowledge and awareness, the overall effectiveness of digital library investments is substantially compromised (Ogundiran, 2025; Chowdhury, 2025).

The sample was male-dominated (61.3% male, 38.7% female). This gender imbalance reflects broader patterns in



Tanzanian higher education, particularly in agricultural and technical institutions such as Sokoine University of Agriculture, where male enrollment historically exceeds female enrollment (Bangu, 2016). However, this imbalance also represents a limitation of the study, as female voices may be underrepresented, and previous research has documented that gender can significantly influence digital literacy and access to technology in Sub-Saharan African contexts (Plockey, 2017; Ocholla, 2019).

The age distribution shows that the largest age group was 31-39 years (29.3%), followed by 40-49 years (26.0%), with a mean age of 43.7 years (range: 21-72 years). This relatively mature age profile reflects the inclusion of both younger undergraduate students and older academic staff, as well as the presence of mature-age students in the Open University of Tanzania's distance education programs. The inclusion of both younger and older users enabled the study to examine generational differences in digital literacy, an important analytical dimension given that Digital Divide Theory posits age as a significant predictor of digital skills and adoption patterns (van Dijk, 2006; Norris, 2001).

Regarding place of residence, the majority of respondents resided in urban areas (82.7%), with smaller proportions from peri-urban (10.7%) and rural (6.7%) areas. This distribution reflects both the urban location of the selected universities (all situated in Morogoro Municipality) and broader patterns of rural-urban migration for higher education in Tanzania. However, the underrepresentation of rural residents is notable, as previous studies have documented that students from rural backgrounds often face additional barriers to digital resource access, including limited prior exposure to computers and unreliable home internet connectivity (Bhat, 2025; Mubofu, 2022).

4.2 Knowledge of Digital Library Resources

The assessment of users' knowledge of digital library resources (DLRs) employed an index score computed from 20 attitudinal statements (10 positively phrased, 10 negatively phrased). Each respondent's total knowledge score was categorized into three levels: Inadequate Knowledge (IK), Moderate Knowledge (MK), and Adequate Knowledge (AK). Table 3 presents the distribution of knowledge levels.

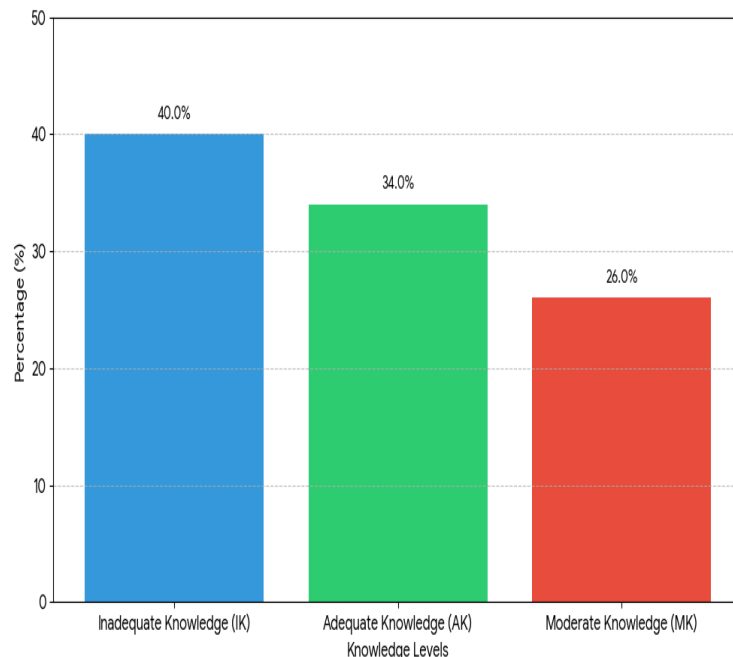
Table 3: Distribution of Library Users' Knowledge Levels Regarding DLRs (N=150)

Knowledge Category	Frequency	Percent	Cumulative Percent
Inadequate Knowledge (IK)	60	40.0	40.0
Moderate Knowledge (MK)	39	26.0	66.0
Adequate Knowledge (AK)	51	34.0	100.0
Total	150	100.0	

Source: Field Survey Data (2024)

As shown in Table 3, only 34.0% of respondents possessed adequate knowledge of digital library resources. More than two-thirds of respondents (66.0%) demonstrated either moderate (26.0%) or inadequate (40.0%) knowledge. These findings indicate that despite institutional investments in digital library infrastructure and subscriptions to electronic resources, the majority of users lack the functional knowledge necessary to effectively access, navigate, and utilize DLRs for teaching, learning, and research purposes.

Figure 3: Knowledge Levels of Digital Library Resources Among Respondents



The finding that only 34.0% of respondents demonstrated adequate knowledge aligns with previous research in Tanzanian and other Sub-Saharan African university contexts. Panhilason (2024), in a study at Carlos Hilado Memorial State University in the Philippines, found that students and faculty had limited awareness and knowledge of available online library resources, which negatively affected utilization and satisfaction. Similarly, Mahadeva and Krishnamurthy (2025) conducted a study in Indian higher education institutions and revealed low awareness and knowledge among students and faculty, despite wide availability of e-books, e-journals, and databases.

In the Tanzanian context specifically, Bulugu and Nkebukwa (2024) reported that digital literacy adoption in Tanzanian tertiary institutions remains low due to inadequate training and limited awareness programs. The finding that 40.0% of respondents had inadequate knowledge is particularly concerning because it suggests that nearly half of all users cannot effectively navigate digital library platforms, reducing the return on significant institutional and national investments in digital infrastructure. As Ngulugulu and Matemba (2020) documented, Tanzanian universities have



invested substantially in transitioning from analogue to digital systems, but the present findings suggest that user-side capacity building has not kept pace with technological provisioning.

The qualitative data from Focus Group Discussions (FGDs) provided rich contextual explanations for these low knowledge levels. One FGD participant at Mzumbe University remarked:

“We hear about digital libraries, but most of us don’t know how to access them or what they contain. The library orientation at the beginning of the year was only about the physical building and print books. Nobody showed us how to log into the e-resources portal.” (FGD Participant, Male Undergraduate, Mzumbe University)

Similarly, a key informant at Sokoine University of Agriculture explained:

“Training sessions are rare, and when they happen, they are not well attended because students don’t see their immediate relevance. Also, the sessions are usually scheduled during lecture times when students are in class, or during exam periods when nobody wants to attend extra sessions.” (Key Informant 4, Librarian, SUA)

These qualitative insights reinforce the quantitative findings by identifying specific barriers: inadequate initial library orientation, poor timing of training sessions, and lack of perceived relevance among students. These barriers are consistent with the second-level digital divide concept articulated by van Dijk (2006), where skills and usage access, not merely material access, constrain effective technology adoption.

The finding that 26.0% of respondents possessed moderate knowledge indicates a transitional group that could potentially move into the adequate knowledge category with targeted interventions. This group represents a strategic opportunity for capacity-building initiatives, as individuals with moderate knowledge are likely to be receptive to further training and may become peer mentors for those with inadequate knowledge. This observation aligns with Rogers' (2003) Diffusion of Innovations Theory, where the early majority (approximately 34% of adopters) and late majority (34%) represent groups that can be influenced through peer networks and demonstration of relative advantage.

4.3 Awareness of Digital Library Resources

While knowledge represents functional understanding of how to access and use DLRs, awareness encompasses recognition of the existence of digital resources and understanding of the concept of digital libraries. Table 4 presents the hierarchical classification of respondents' awareness levels.

Table 4: Awareness Levels of Digital Library Users Regarding DLRs (N=150)

Awareness Level	Description	Frequency	Percent
Not Aware	No prior exposure to or understanding of DLRs	137	91.3
Aware	Can correctly define or describe the concept of DLRs	9	6.0
Able to Identify & Explain	Can name specific resources (e.g., e-journals, databases) AND describe access strategies	4	2.7
Total		150	100.0

Source: Field Survey Data (2024)

The data in Table 4 reveal strikingly low levels of awareness among respondents. The overwhelming majority (91.3%) reported being *not aware* of the concept and practices of digital library resources. Only 6.0% of respondents could correctly define or describe DLRs, and a mere 2.7% demonstrated the ability to identify specific resources, describe access strategies, and provide proper explanations of DLRs.

These findings indicate that while digital library systems may be technically available within the universities, the vast majority of users lack even basic awareness of their existence or functionality. The fact that fewer than 10% of respondents showed any awareness, and less than 3% could articulate or apply knowledge of DLRs, suggests that digital libraries are severely underutilized due to fundamental deficits in user literacy and institutional communication.

A key informant at the Open University of Tanzania provided a candid assessment of the situation:

“Many of our students, especially those in distance learning programs, don’t even know that the university has subscribed to e-journals and databases. They think the library is only the physical building with print books. We have invested millions in digital resources, but if students don’t know they exist, the money is wasted.” (Key Informant 9, ICT Coordinator, OUT)

The qualitative findings reinforced the quantitative results. In one FGD at Jordan University College, participants described their confusion about how to access digital resources:

“I saw a poster in the library about ‘electronic resources’ but I didn’t understand what it meant. I thought maybe it was about using computers to search the physical book catalog. Nobody explained that we can read full journal articles online from off-campus.” (FGD Participant, Female Undergraduate, JOCU)



At the Muslim University of Morogoro, a participant noted:

“The library staff told us there is a ‘digital library’ but they never gave us passwords or showed us how to log in. I tried once but couldn’t get access, so I gave up and continued using Google and Wikipedia for my assignments.” (FGD Participant, Male Undergraduate, MUM)

These qualitative accounts highlight three critical issues: first, awareness campaigns are either absent or ineffective; second, where awareness exists, it is not accompanied by practical access instructions (e.g., login credentials, platform navigation); and third, users quickly revert to familiar but academically less rigorous alternatives (Google, Wikipedia) when initial access attempts fail. This pattern of behavior is consistent with the concept of “information poverty” described by Britz (2004) and echoed in Norris’s (2001) Digital Divide Theory, where individuals without the skills or knowledge to access quality digital resources fall back on what is familiar and accessible, thereby perpetuating information inequality.

The finding that awareness levels (6.0%) are even lower than adequate knowledge levels (34.0%) is particularly significant. The Knowledge, Attitudes, and Practices (KAP) Theory posits that knowledge acquisition depends on prior awareness (Launiala, 2009). If users are not even aware that DLRs exist, they cannot be expected to acquire functional knowledge of how to use them. This suggests that the first-order priority for Tanzanian universities should be foundational awareness campaigns that communicate the existence and potential benefits of DLRs, before proceeding to more advanced digital literacy training.

These findings echo those of Plockey (2017) in Ghana, who found that while 88.8% of lecturers used the library, only 32.5% utilized electronic resources, and awareness was identified as a major barrier with only 65% of respondents aware of e-resources. Similarly, Ankamah, Gyesi, and Amponsah (2024) found in a Ghanaian health sciences library that although a majority of respondents were aware of electronic resources, the high cost of personal internet data and low bandwidth remained challenges, and they recommended regular training on e-resources use, collaboration between libraries and lecturers to create awareness in lecture halls, and integration of e-resources into teaching instruction.

4.4 Discussion: Theoretical and Practical Implications

4.4.1 Digital Divide Theory: Empirical Validation

The findings of this study provide strong empirical validation for Digital Divide Theory (van Dijk, 2006; Norris, 2001) in the Tanzanian higher education context. The theory

distinguishes between first-level divides (access to infrastructure) and second-level divides (skills, awareness, and effective usage). While the present study did not systematically measure first-level access (though prior studies such as Kaishe-Mulungu, Lwehabura, & Angello, 2025 have documented persistent infrastructural challenges), the finding that only 6.0% of respondents were aware of DLRs and only 34.0% possessed adequate knowledge demonstrates a profound second-level divide. This means that even among users with physical access to digital resources, most lack the awareness, skills, and confidence necessary to translate access into effective utilization.

The second-level digital divide is particularly insidious because it is less visible than infrastructure gaps and therefore receives less policy attention. University administrators may assume that because digital library platforms have been procured and internet connectivity has been improved, the problem of digital resource utilization has been solved. The present findings demonstrate that this assumption is false. Without corresponding investments in digital literacy training, awareness campaigns, and user support, digital divide persists as a skills-based rather than access-based phenomenon (Hargittai, 2010).

4.4.2 Knowledge, Attitudes, and Practices (KAP) Theory: Sequential Gaps

The findings also confirm the sequential logic of KAP Theory (Launiala, 2009; Alsale *et al.*, 2023). According to this theory, knowledge acquisition should precede attitude formation, and attitudes should predict practices. However, the present findings reveal that the foundational step in this sequence, awareness (which is a prerequisite for knowledge), is severely deficient. With 91.3% of respondents not aware of DLRs, it is impossible for the majority of users to have developed positive attitudes or effective practices regarding digital library utilization.

The small proportion of respondents who demonstrated adequate knowledge (34.0%) did report more positive attitudes and more frequent usage practices. As one key informant noted:

“The students who attend our training workshops become regular users of the digital library. They tell their friends, they ask better research questions, and their assignment quality improves. But we only reach maybe 10-15% of students each year. The rest never come to the workshops.” (Key Informant 12, Senior Librarian, SUA)

This observation suggests that training interventions are effective for those who receive them, but coverage remains grossly inadequate. Scaling up training to reach the majority of users is an urgent priority.



4.4.3 Diffusion of Innovations Theory: *Adopter Categories and Communication Channels*

Rogers' (2003) Diffusion of Innovations Theory provides a framework for understanding the distribution of knowledge and awareness levels observed in this study. The 34.0% of respondents with adequate knowledge correspond roughly to Rogers' "early adopters" (13.5%) and "early majority" (34.0%) categories. These users have successfully acquired knowledge despite the absence of systematic training, likely due to personal motivation, prior digital exposure, or peer influence. The 26.0% with moderate knowledge represent the "late majority" who are receptive but require more structured support. The 40.0% with inadequate knowledge represent "laggards" who may require intensive, targeted interventions.

Critically, Rogers (2003) emphasized that diffusion is accelerated when communication channels are matched to adopter characteristics. The present findings suggest that current communication channels, occasional library workshops, posters in the library, brief mentions during freshman orientation, are insufficient to reach the majority of users. Alternative channels such as embedding digital literacy into course curricula, using peer mentors, integrating DLR demonstrations into regular lectures, and leveraging social media platforms for awareness campaigns deserve consideration. As Minishi-Majanja and Kiplang'at (2005) documented in their study of ICT diffusion in Kenyan LIS education, successful adoption requires persistent, multi-channel communication strategies.

4.4.4 Comparison with Regional and Global Findings

The findings of this study are consistent with a growing body of research documenting low digital literacy and limited DLR awareness in Sub-Saharan African universities. Ocholla (2019) found that although many students and staff in African universities are aware of digital resources, their knowledge of how to use them effectively remains limited. This study extends Ocholla's findings by revealing that even basic awareness, not just effective usage knowledge, is critically low in Tanzania.

Mubofu *et al.* (2022) studied preservation of digital resources in selected Tanzanian university libraries and found that institutional practices lag behind policy commitments due to insufficient knowledge of digital systems among library staff themselves. The present findings echo this conclusion at the user level. If even library staff lack adequate digital competencies, as Mbago *et al.* (2023) documented, then systematic deficits in user awareness and knowledge are unsurprising.

Internationally, the findings align with studies in other developing country contexts. Mir and Rasool (2024), writing

on digital libraries globally, noted that while advanced countries have integrated digital libraries into mainstream academic and cultural institutions, many African and Asian nations still face challenges of limited access, inadequate training, and low user awareness. Similarly, Shem (2024) observed that disparities in awareness, knowledge, infrastructure, and training mean that the effectiveness of digital libraries varies widely between developed and developing regions.

4.4.5 Demographic Variations: *The Role of Age, Education, and Residence*

Although not presented in tabular form in this section, chi-square analyses revealed statistically significant associations between demographic variables and knowledge levels ($p < 0.05$). Younger respondents (aged 21-30 years) were significantly more likely to possess adequate knowledge compared to older respondents (aged 50 years and above). This finding is consistent with Lund (2025), who documented that younger users in Tanzanian higher education are more adaptable to digital innovations and online research tools, making them more likely to explore and utilize digital library systems effectively.

Respondents with higher levels of education (master's and PhD candidates) demonstrated significantly higher knowledge and awareness levels compared to undergraduate students. This finding aligns with Bulugu and Nkebukwa (2024), who found that postgraduate students in Tanzania tend to have more exposure to research tools and digital resources compared to undergraduates. This suggests that digital literacy is not merely a function of age but also of academic experience and research demands.

Place of residence showed no statistically significant association with knowledge levels when controlling for other variables. While urban respondents dominated the sample numerically, this reflects population distribution rather than meaningful differences in knowledge. This finding is somewhat surprising given that Digital Divide Theory would predict rural-urban disparities, but it may reflect the fact that all participating universities are located in Morogoro Municipality, and rural respondents in the sample are likely those who have migrated to urban areas for education, thereby having similar institutional access to digital resources.

5.0 Conclusions and Recommendations

This study set out to pragmatically assess the knowledge and awareness of digital library resources among library users in five selected universities in Morogoro, Tanzania, and the findings unequivocally demonstrate that both dimensions are critically deficient, thereby perpetuating a profound second-level digital divide within Tanzanian higher education. Despite substantial institutional and national investments in digital library infrastructure, including the Integrated



National Digital Library System launched by the Tanzania Library Services Board, only 34.0% of respondents possessed adequate knowledge of digital library resources, while a mere 6.0% demonstrated basic awareness of the concept and practices of DLRs, and an even smaller fraction (2.7%) could identify specific resources or describe access strategies. These empirical results provide decisive evidence that access to technology does not automatically translate into effective utilization; rather, awareness constitutes the foundational prerequisite without which knowledge cannot be acquired, attitudes cannot be positively formed, and practices cannot be transformed.

The theoretical implications are significant: the study empirically validates Digital Divide Theory by demonstrating that second-level divides (skills, awareness, and usage) persist even where first-level access exists, confirms the sequential logic of Knowledge, Attitudes, and Practices Theory by showing that deficient awareness blocks progression to knowledge acquisition and positive practice formation, and aligns with Diffusion of Innovations Theory by revealing that current communication channels reach only early adopters while the majority of users remain in knowledge and persuasion stages. From a policy perspective, the findings compel a fundamental reorientation away from supply-side-only interventions toward demand-side capacity building. Universities and national agencies must prioritize mandatory, credit-bearing digital literacy courses embedded within curricula for all undergraduate students, establish structured and continuous awareness campaigns that utilize multiple communication channels including classroom integration, peer mentoring, and library-faculty collaboration, and implement monitoring frameworks that track not only infrastructure provision but also user knowledge and awareness outcomes.

Practically, libraries should redesign orientation programs to include hands-on DLR training with authenticated access credentials provided during sessions, schedule training at times accessible to students, and develop simplified, Kiswahili-language guides and video tutorials. Furthermore, university administrators should allocate dedicated budgets for sustained digital literacy training, incentivize faculty to integrate DLRs into course assignments, and establish helpdesks staffed by trained peer mentors. The study concludes unequivocally that without deliberate, continuous, and adequately resourced interventions targeting user awareness and knowledge, digital library resources in Tanzanian universities will remain chronically underutilized, representing a significant waste of educational investment and a perpetuation of information inequality that disadvantages the very students and researchers whom digital libraries are intended to serve.

Future research should employ longitudinal designs to evaluate the effectiveness of specific interventions, examine institution-level variation to identify contextual success factors, and investigate the role of mobile-based DLR access given the high penetration of mobile phones even in resource-constrained settings.

Declaration of Conflict of Interest

We hereby declare that there are no known competing financial interests or personal relationships that could have influenced the research and findings presented in this paper.

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