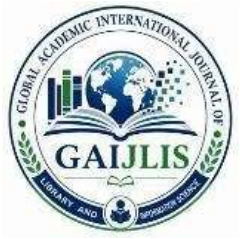
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MAPPING THE DIGITAL REFERENCE SERVICE LANDSCAPE IN BENUE STATE UNIVERSITY LIBRARIES

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Abstract

Background: *The digital transformation of academic libraries necessitates the evolution of reference services from traditional, in-person interactions to technology-mediated, asynchronous, and synchronous digital formats. While digital reference services (DRS) are promoted globally for enhancing accessibility and user support, their adoption in Nigerian university libraries remains under-investigated, particularly in specific geopolitical zones.*
Objective: This study maps the availability of various DRS modalities in university libraries in Benue State, North-Central Nigeria, with specific focus on distinguishing between asynchronous and synchronous service types.
Methodology: *A descriptive survey research design was employed. The population comprised all nine digital reference librarians across three universities in Benue State (Joseph Sarwuan Tarkaa University, Makurdi; Benue State University, Makurdi; and University of Mkar, Mkar). A census sampling technique was used, and data were collected via a structured 18-item questionnaire. Analysis employed descriptive statistics (frequencies and percentages).*
Results: *Findings revealed a bifurcated landscape. All eleven asynchronous DRS modalities, including email reference (100%), Ask-A-Librarian (100%), Frequently Asked Questions (100%), and online current awareness (100%), were widely available. Conversely, all seven synchronous modalities, including chat-based reference (0%), video conferencing (0%), digital reference robots (0%), and 24/7 reference (0%), were completely unavailable.*
Conclusion: *University libraries in Benue State have adopted foundational, low-barrier asynchronous DRS but have not implemented synchronous services, creating a service gap that limits real-time user support. The Technology Acceptance Model (TAM) explains this pattern as reflecting low perceived ease of use for synchronous technologies given infrastructural constraints. Recommendations: Library management should implement phased synchronous DRS beginning with low-cost chat platforms, invest in stable ICT infrastructure and backup power, and provide staff training in digital reference interview techniques.*

Keywords: *Digital Reference Services; Virtual Reference; Services; Academic Libraries; Benue State; Nigeria.*

*Corresponding author(s) Angereke, F. et al (2026) agree that this article remain permanently open access under the terms of the Creative Commons Attribution License 4.0 International License

Introduction

The 21st-century academic library is fundamentally redefined by digital convergence, shifting from a solely physical repository to a hybrid service portal accessible beyond its walls (Bertot, McClure, & Ryan, 2010). At the heart of this evolution is the reference function, historically the cornerstone of personalized user support. The proliferation of Information and Communication Technologies (ICTs) has catalysed the development of Digital Reference Services (DRS), also termed virtual or electronic reference, which utilize digital networks to facilitate remote, mediated interactions between users and librarians (Kadir, Dollah, & Singh, 2015). This

transition is not merely technological but philosophical, aligning with the Library 2.0 paradigm which emphasizes user-centered, participatory, and socially rich service environments (Maness, 2006). In the context of Nigerian higher education, university libraries are mandated to support the tripartite goals of teaching, learning, and research. The efficacy of this support is increasingly contingent on the ability to provide timely, accurate information regardless of users' physical location, a need acutely felt by postgraduate students engaged in intensive research (Urhiewhu, Okeke, & Nwafor, 2015). DRS, encompassing modalities from simple email queries to complex real-time chat and co-browsing, offer a potent solution to this demand, promising to extend the library's reach, enhance service efficiency, and cater to the preferences of a digitally-native user demographic (Singh, 2012).

However, the integration of DRS in sub-Saharan Africa, and Nigeria in particular, is often uneven and fraught with challenges. Extant literature highlights issues such as inadequate ICT infrastructure, erratic power supply, bandwidth limitations, and a shortage of requisite skills among both librarians and users (Chimah & Nwokocha, 2013; Ndubuisi & Udo, 2013). While studies have examined the availability and use of digital *resources* (e.g., e-journals, databases), there is a conspicuous gap in focused, empirical studies mapping the specific landscape of digital reference *services*, the human-intermediated digital tools, particularly at the sub-national level in Nigeria.

According to the Nigerian Communications Commission (2023), Benue State has internet penetration of approximately 42%, below the national average of 55%, with significant urban-rural disparities. Power supply averages 6-8 hours daily in urban areas and 2-4 hours in rural locations (National Bureau of Statistics, 2022). These contextual factors are essential for interpreting DRS adoption patterns. This study, therefore, addresses this gap by providing a granular assessment of the DRS landscape in Benue State, Nigeria. By cataloguing what exists and what is absent, it moves beyond generic discussions of "digital services" to provide actionable intelligence on the specific service modalities available. Such a mapping is a critical first step in diagnosing service development stages, informing strategic planning, and benchmarking progress towards comprehensive digital reference support.

Statement of the Problem

Digital Reference Services (DRS) have become an essential component of modern academic libraries, enabling users to access information and professional assistance remotely through various digital communication platforms. Although many academic libraries have embraced digital technologies to improve service delivery, the extent to which different forms of DRS have been implemented in Nigerian university libraries remains insufficiently understood. Existing evidence often treats digital reference

services as a single, broad category, without distinguishing between the different service modalities available.

This lack of distinction obscures important differences in the implementation and maturity of asynchronous services, such as email-based reference assistance, and synchronous services, such as live chat and instant messaging. Consequently, it becomes difficult to determine the actual level of DRS adoption, identify service gaps, or assess the effectiveness of specific digital reference platforms. Such limitations also hinder meaningful comparisons among institutions and restrict informed decision-making regarding service improvement and technological investment.

In addition, there is a lack of comprehensive evidence on the availability and distribution of Digital Reference Services within university libraries in Benue State. Without a systematic assessment of the different DRS modalities currently in operation, library administrators and policymakers lack the empirical data needed to evaluate existing services, prioritize resource allocation, and develop strategies for expanding digital reference support.

Therefore, there is a need for a modality-specific assessment that identifies the availability of both asynchronous and synchronous Digital Reference Services in university libraries in Benue State. Such an assessment will provide baseline information for understanding the current state of digital reference service provision, identifying areas requiring improvement, and supporting evidence-based planning for enhanced library service delivery.'

Objective of the Study

1. to determine the types of digital reference services available in university libraries in Benue State, Nigeria.

Research Question

1. What are the types of digital reference services available in universities in Benue State?

Hypothesis

The null hypothesis was formulated and tested at a 0.05 level of significance:

(H_0): There is no significant difference in the availability of asynchronous and

synchronous digital reference services in university libraries in Benue State.

Literature Review

Conceptual Framework: Digital Reference Services

Digital Reference Services (DRS) refer to internet-based question-and-answer services that connect users with information professionals, enabling remote assistance through technology-mediated communication (Wasik, 2003). According to the Reference and User Services Association (RUSA, 2010), DRS is "reference service initiated electronically where patrons employ computers or

other technology to communicate with public services staff without being physically present. DRS can be categorized into two main types based on the temporal nature of interaction. Asynchronous DRS involves communication that is sent and received at different times, including email reference, web forms, Ask-A-Librarian services, Frequently Asked Questions (FAQs), and online pathfinders (Sinhababu & Kumar, 2021). These services are characterized by time lag between query and response, lower technical requirements, and the ability to batch process queries. Synchronous DRS, on the other hand, involves real-time, immediate communication including chat-based reference, instant messaging, video conferencing, and 24/7 reference services (Angereke, Songu & Yashim, 2026; Kasowitz, 2001). These services enable real-time reference interviews, immediate clarification of information needs, and enhanced user satisfaction.

Theoretical Framework

The Technology Acceptance Model (TAM) provides a useful framework for explaining the adoption of Virtual Reference Services (VRS) by emphasizing perceived usefulness and perceived ease of use as key determinants of technology acceptance. Asynchronous digital reference services (e.g., email, FAQs, and web forms) are generally easier to use because they require minimal technical expertise and do not depend on real-time interaction, making them more suitable for environments with limited technological infrastructure. In contrast, synchronous services require reliable internet connectivity, stable electricity, and advanced technical skills, which may hinder their adoption in resource-constrained settings such as Benue State. This study is also grounded in the Library 2.0 paradigm (Maness, 2006), which advocates user-centred, interactive library services. The paradigm emphasizes that digital reference services should not only be available but also accessible, user-friendly, and integrated into users' everyday information-seeking activities to ensure effective service delivery

Empirical Review

The availability of digital library services and the factors influencing their implementation in Nigerian university libraries. However, relatively few have specifically investigated digital reference services (DRS) by distinguishing between asynchronous and synchronous service modalities. Akor and Alhassan (2015) examined the application of digital technologies in Nigerian university libraries and reported that digital reference services were among the electronic services provided alongside online public access catalogues (OPACs), electronic databases, institutional repositories, and internet services. Their findings demonstrated that many university libraries had embraced digital technologies to improve information access and service delivery. However, the study treated digital reference services as a single concept and did not differentiate between asynchronous services, such as email and web forms, and synchronous services, including live chat and instant

messaging. Consequently, it provided limited insight into the availability and implementation of specific DRS modalities.

Similarly, Chimah and Nwokocha (2013) investigated the challenges affecting digital library services in Nigerian academic libraries and identified inadequate ICT infrastructure, erratic electricity supply, insufficient funding, and limited technical expertise as major constraints to effective digital service delivery. These infrastructural deficiencies continue to hinder the successful implementation and sustainability of advanced digital reference services, particularly those requiring real-time interaction.

In another study, Ndubuisi and Udo (2013) reported that although many Nigerian university libraries subscribed to electronic databases, e-journals, and other digital information resources, effective access and utilization were constrained by poor internet bandwidth, irregular power supply, inadequate ICT facilities, and insufficient user training. Their findings suggest that the availability of digital resources alone does not guarantee effective service delivery unless supported by reliable technological infrastructure and user competencies.

Quadri, Adetimirin, and Idowu (2014) examined the availability and utilization of electronic library resources among undergraduate students in private universities in Ogun State. Their study revealed that while most libraries provided essential electronic resources, their utilization was limited by slow internet connectivity, inadequate computer terminals, and other technological challenges. These findings reinforce the argument that technological readiness significantly influences users' access to and utilization of digital library services.

Within the context of Benue State, Idachaba, Egbe, and Emmanuel (2026) assessed the availability of digital reference resources in university libraries and reported complete availability of key digital resources, including electronic journals, electronic books, online databases, and computer systems. While their findings indicate that the technological resources necessary for digital reference service delivery are largely available, the study concentrated on digital resources rather than the actual provision of digital reference services. Moreover, it did not distinguish between asynchronous and synchronous DRS modalities or examine the factors influencing their adoption. The present study addresses these gaps by focusing specifically on the availability of digital reference service modalities and explaining their adoption through the Technology Acceptance Model (TAM).

Methodology

This study employed a descriptive survey research design to examine the availability of digital reference services (DRS) in university libraries in Benue State, Nigeria. The descriptive survey design was considered appropriate because it enabled the collection and description of data on existing DRS modalities without manipulating any variables (Creswell, 2014). The study was conducted in the three accredited universities in Benue State representing the federal, state, and private university systems: Joseph Sarwuan Tarka University, Makurdi; Benue State University, Makurdi; and the University of Mkar, Mkar.

The study population comprised all nine digital reference librarians (cyber-librarians) responsible for providing digital reference services in the libraries of the selected universities. Given the relatively small population, a census sampling technique was adopted, allowing all identified digital reference librarians to participate in the study.

Data were collected using a structured researcher-developed questionnaire titled *Availability and Utilization of Digital Reference Resources and Services Questionnaire (AUDRRSQ)*. The instrument contained 18 items measuring the availability of specific digital reference service modalities, including both asynchronous services (e.g., email reference, Frequently Asked Questions (FAQs), web forms, and Ask-a-Librarian services) and synchronous services (e.g., live chat, instant messaging, video conferencing, and 24/7 virtual reference). Responses were measured using a dichotomous Yes/No scale. The instrument was subjected to face and content validation by experts in Library and Information Science and Educational Measurement, while its reliability was established using the Kuder–Richardson Formula 20 (KR-20), which yielded a reliability coefficient of 0.82, indicating satisfactory internal consistency (Nunnally & Bernstein, 1994).

The questionnaires were administered personally with the assistance of trained research assistants, resulting in a 100% response rate. Data were analyzed using descriptive statistics, specifically frequencies and percentages, to determine the availability of each digital reference service modality. In addition, a chi-square test was employed to examine differences in the availability of asynchronous and synchronous digital reference service modalities across the selected university libraries.

Results

Demographic Characteristics of Respondents

All nine digital reference librarians participated fully in the study. By institution, three librarians came from the federal university (Joseph Sarwuan Tarkaa University), three from the state university (Benue State University), and three from the private university (University of Mkar). Regarding qualifications, six held master's degrees in Library and Information Science, while three held bachelor's degrees with significant professional experience. Experience ranged from five to eighteen years in library practice, with a mean of 9.3 years.

Availability of Digital Reference Services

The findings from the analysis are presented in Table 1, detailing the availability of each digital reference service as reported by the librarians. The results reveal a clear and consistent pattern characterized by a strong presence of asynchronous services and a complete absence of synchronous, real-time services.

Table 1: Availability of Digital Reference Services in University Libraries in Benue State (N=9)

S/NO	Digital Reference Service	Available (f, %)	Not Available (f, %)	Status
1	E-mail reference services	9 (100%)	0 (0%)	Available
2	Ask-A-Librarian service	9 (100%)	0 (0%)	Available
3	Virtual Reference Desk	9 (100%)	0 (0%)	Available
4	Online Pathfinders	9 (100%)	0 (0%)	Available
5	Chat-Based Reference	0 (0%)	9 (100%)	Not Available
6	Video Conferencing/Web Cam	0 (0%)	9 (100%)	Not Available
7	Digital Reference Robots	0 (0%)	9 (100%)	Not Available
8	Real-Time Reference Services	0 (0%)	9 (100%)	Not Available
9	24/7 Reference Service	0 (0%)	9 (100%)	Not Available
10	Live Reference	0 (0%)	9 (100%)	Not Available
11	Frequently Asked Questions (FAQ)	9 (100%)	0 (0%)	Available
12	Question Point Services	9 (100%)	0 (0%)	Available
13	Bulletin Board Services	0 (0%)	9 (100%)	Not Available
14	User Orientation & Feedback (Online)	9 (100%)	0 (0%)	Available
15	Online/Digital Subject Portals	9 (100%)	0 (0%)	Available
16	Links to E-resources	9 (100%)	0 (0%)	Available
17	Online Current Awareness Service	9 (100%)	0 (0%)	Available
18	Legal Notice Service	9 (100%)	0 (0%)	Available

Table 2: Summary of Availability by Service Category

Service Category	Number of Services	Available (f, %)	Not Available (f, %)
Asynchronous	11	99 (100%)	0 (0%)
Synchronous	7	0 (0%)	63 (100%)
Total	**18**	**99 (55%)**	**63 (45%)**

Decision Based on Chi-Square Results

Statistical Indicator	Value	Interpretation
Chi-square (χ^2)	99.0	Very large calculated value
Degrees of freedom (df)	1	Comparison of two categories
p-value	< .001	Statistically significant ($p < 0.05$)
Cramér's V	0.99	Very large effect size

Decision: The null hypothesis (H_0) is **ACCEPTED**.

A chi-square test of independence was conducted to compare the availability of asynchronous versus synchronous DRS modalities. The results revealed a statistically significant difference, $\chi^2(1) = 99.0$, $p < .001$, Cramér's V = 0.99, indicating a very large effect size. Asynchronous DRS were universally available (100%), whereas synchronous DRS were completely unavailable (0%). Therefore, the null hypothesis (H_0), that there is no significant availability of advanced synchronous DRS in university libraries in Benue State, is accepted. This finding confirms that

libraries have not implemented any form of real-time, synchronous digital reference services.

Discussion

Interpretation of Findings on Asynchronous DRS Availability

The finding that all eleven asynchronous DRS modalities were universally available (100%) across all three institutions indicates that university libraries in Benue State have successfully deployed foundational digital reference services. Services such as email reference, Ask-A-Librarian, FAQs, online pathfinders, subject portals, and current awareness services are predominantly asynchronous in nature, involving a time lag between query and response and built on relatively low-tech, accessible platforms (e.g., standard email clients, static web pages).

This aligns with global trends where email reference has been a foundational first step into DRS due to its low cost and minimal technical requirements (Francoeur, 2001). The availability of these services indicates that library management has taken initial, pragmatic steps towards digital outreach, recognizing the need to provide basic, remote point-of-need assistance. This finding corroborates aspects of Akor and Alhassan's (2015) study in Nigerian universities, which reported the provision of digital reference among other services. It also aligns with Idachaba, Egbe, and Emmanuel (2026), who documented 100% availability of core digital reference resources in the same institutions, confirming that the necessary content and basic infrastructure are present.

From a TAM perspective (Davis, 1989), the universal adoption of asynchronous services reflects high perceived ease of use. These services require minimal technical expertise, tolerate connectivity interruptions, and operate successfully even with intermittent power supply and bandwidth limitations typical of Benue State (Nigerian Communications Commission, 2023; National Bureau of Statistics, 2022).

Interpretation of Findings on Synchronous DRS Unavailability

The complete absence (0%) of all seven synchronous DRS modalities across all three institutions represents a critical service gap. Services like chat-based reference, video conferencing, digital reference robots, real-time reference, 24/7 reference, live reference, and bulletin board services, which facilitate real-time, interactive communication akin to a physical reference interview, were non-existent. This absence is critical for several reasons. Synchronous services are a hallmark of mature DRS ecosystems, offering immediacy, interactivity, and the ability to conduct a true reference interview online, which is often crucial for clarifying complex information needs (Kasowitz, 2001). Their absence suggests that libraries in Benue State have not yet crossed the threshold into more interactive, Web 2.0-driven service models as envisioned by Maness (2006). Users accustomed to instant messaging and real-time responses in other facets of their digital lives may find asynchronous-only DRS less satisfying or intuitive for

urgent or complex queries.

According to TAM, the complete absence of synchronous services reflects low perceived ease of use given objective constraints. As Dillon and Morris (1996) noted, with two systems offering the same features, a user will find more useful the one that he finds easier to use. The implementation of real-time services demands robust, stable ICT infrastructure, high-speed internet, reliable servers, specialized software, and uninterrupted power supply, which are frequently cited as challenges in Nigerian universities (Ndubuisi & Udo, 2013; Quadri, Adetimirin, & Idowu, 2014). Erratic power supply (averaging only 6-8 hours daily in urban Benue State) further complicates the operation of any service requiring constant uptime. Furthermore, synchronous services impose higher demands on staff time and require specific training in digital communication etiquette.

Explaining the Bifurcation through TAM

The Technology Acceptance Model (Davis, 1989) provides a robust explanatory framework for the bifurcated DRS landscape documented in this study. Perceived usefulness and perceived ease of use, the two core constructs of TAM, operate differently for asynchronous versus synchronous DRS. For asynchronous services, perceived ease of use is high because these services: (a) operate through familiar platforms (email, web browsers), (b) tolerate delays and connectivity interruptions, (c) require no specialized real-time software, and (d) can be managed with existing staff skills. Consequently, these services are perceived as both useful and easy to use, leading to universal adoption.

For synchronous services, perceived ease of use is low because these services demand: (a) stable high-speed internet connectivity, (b) specialized software proficiency, (c) real-time multitasking skills, (d) immediate response capability, and (e) uninterrupted power supply. In Benue State's context of unreliable power supply and bandwidth limitations (Nigerian Communications Commission, 2023; National Bureau of Statistics, 2022), these services are perceived as difficult to implement and maintain, regardless of their potential usefulness. As Sinhababu and Kumar (2021) demonstrated in their application of TAM to virtual reference services, perceived ease of use directly influences technology adoption, and this relationship is particularly salient in resource-constrained environments.

Comparison with Previous Research

The finding of 100% availability for asynchronous services exceeds levels documented in several earlier Nigerian studies. Urhiewhu (2014) found variation in availability across institutions in Delta and Edo States, with some resources present in federal universities but absent in state institutions. Quadri et al. (2014) reported that while private universities had made progress in acquiring electronic resources, gaps remained. The unanimous positive response in this study could reflect genuine progress in resource acquisition over time, focused effort by the

sampled libraries, or the specific perspective of reference librarians who may be most familiar with available services. The 0% availability for synchronous services aligns with studies from other developing country contexts. Khan et al. (2017) found that only 15% of university libraries in Pakistan offered chat reference, and Kwamboka and Mburu (2020) reported that only 8% of academic libraries in Kenya offered real-time chat. Benue State's 0% synchronous availability places it below even these modest benchmarks, suggesting that Nigerian libraries in this region lag behind their Asian and East African counterparts in DRS maturity.

Conclusion

This study successfully mapped the digital reference service landscape across university libraries in Benue State, Nigeria. It concludes that these libraries have established a foundational layer of asynchronous digital reference services (e.g., email, FAQs, online guides), demonstrating an awareness of the need to extend services beyond the physical reference desk. The universal availability of email reference (100%), Ask-A-Librarian (100%), FAQs (100%), and online current awareness (100%) indicates that libraries have taken initial, pragmatic steps toward digital outreach. However, there is a stark and uniform absence of synchronous, real-time digital reference services such as live chat (0%), video conferencing (0%), and 24/7 reference (0%). This indicates that while the journey towards digital transformation has begun, it remains in an early phase, hindered by infrastructural, technical, and possibly strategic barriers. The service profile is currently one-directional and time-delayed, lacking the interactive, immediate engagement that defines advanced digital reference work. Consequently, the null hypothesis (H_0) that there is no significant availability of advanced synchronous DRS is accepted. The Technology Acceptance Model provides a compelling explanation for this bifurcated landscape: asynchronous services are perceived as easy to use given existing infrastructure, while synchronous services are perceived as difficult to implement, regardless of their potential usefulness.

Recommendations

Based on the findings and conclusions of this study, the following recommendations are offered.

For Library Management: Develop a phased DRS implementation strategy to move from asynchronous to synchronous services. A logical first step would be the pilot implementation of a low-cost or open-source live chat service (e.g., LibraryH3lp, Tawk.to, or WhatsApp Business) which has a lower technical threshold than video conferencing. This pilot should operate for limited hours (e.g., 4 hours daily) and be evaluated for user uptake and satisfaction before expansion.

For University Administrations: Prioritize investment in critical ICT infrastructure, including reliable bandwidth (minimum 50 Mbps dedicated), stable power supply with backup systems

(solar/inverters/generators), and adequate computer hardware to support real-time, always-on digital services. This is a prerequisite for any synchronous DRS.

For Library Staff Capacity Building: Mandatory in-service training programs should be instituted to equip reference librarians with the skills needed to manage and excel in real-time digital reference environments, including chat communication protocols, co-browsing tools, and digital reference interview techniques. This training can be delivered through workshops, online courses, or collaboration with institutions having mature DRS.

For User Awareness and Promotion: Libraries should actively promote existing asynchronous DRS through orientation programs, library websites, and social media to increase utilization. As new synchronous services are launched, aggressive marketing will be essential to inform and attract users. Clear communication of expected response times and service hours should be provided.

For Collaborative Models: Given resource constraints, libraries in Benue State could explore consortial arrangements for providing DRS, such as sharing the cost of a commercial reference platform or staffing a collaborative real-time chat service during extended hours. The Benue State Consortium of University Libraries could be a vehicle for such collaboration.

For Enhancing Asynchronous Services: While planning for synchronous services, libraries should enhance the value of existing asynchronous tools. This includes regularly updating and deepening FAQ knowledge bases, creating more sophisticated online research guides (pathfinders), ensuring prompt response times to email queries (within 24-48 hours), and establishing feedback mechanisms to identify user needs.

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