

RETHINKING INFORMATION NEEDS IN THE DIGITAL AGE: AN EXPLORATION OF USER BEHAVIOR, EXPECTATIONS, AND ENGAGEMENT IN DIGITAL LIBRARIES.

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Abstract:

Purpose: This research is aimed at investigating the changing information needs, behaviors and expectations of the users in the digital age, especially the digital libraries. It aims to comprehend how technological innovations including artificial intelligence, metadata systems and digital platforms are altering the search, access and interaction patterns of information by the user. It will also compare user experience and behavioral patterns in online space with a view of addressing the African academic environment where digital transformation is re-defining access to knowledge. In this way, it will create knowledge that can be used to enhance the design of digital libraries, the approaches used to engage users and establish policies to guarantee the fair and effective utilization of digital information sources.

Design/Methodology/Approach: This research paper assumes the exploratory type of research design, which will help the investigator to gain extensive knowledge on the nature of changes in information needs, user behavior, and engagement within digital libraries setting. The exploratory paradigm is suitable since the informational-need phenomenon in the digital era is dynamic, multidimensional, and constantly influenced by the new technologies and user demands (Trixa, 2024; Shahrzabi, 2024). This design allows the researcher to inquire into complicated patterns of interaction and meaning in opposition to testing set hypotheses..

Findings: Overall, the research concludes that the need of information and the behavior of users are changing due to the digital transformation, and digital libraries should change constantly to stay relevant. Digital libraries can serve the knowledge access, engagement, and innovation of the digital age more effectively by combining the idea of user-centered design, AI-enhanced personalization, and inclusive policies.

Implication: Overall, the conclusions of this research are oriented to a revolutionary approach to digital libraries as the mediators of information experience instead of storage systems. Through the alignment of theory, practice, and policy, libraries will be able to create the environments that will promote equitable access to knowledge, increase digital engagement, and maintain communication within a rapidly changing digital environment.

Originality/Value: In short, the research has a strong value because of its originality in concept, topical representation, and practical implementation. It does not only contribute to scholarly discussion on the definition and development of information needs, but also it gives practical information to digital librarians, policymakers, and educators who need to ameliorate digital information landscape in a fast-changing global knowledge economy.

Keywords: Information Requirements, Digital Libraries, User Behavior, Information Involvement, Digital Transformation, Knowledge Access.

Paper type: Exploratory Research.

Introduction

The high rate of growth of digital technologies in the last twenty years has significantly transformed the way people search, perceive and consume information. In libraries that were once characterized by

the physical collections and face-to-face assistance, libraries have become multifaceted digital ecosystems mediating access to massive amounts of heterogeneous data, enabling remote and synchronous interactions between users, and managing

tools of discovery, personalization, and assessment. Here, it is important to know the nature of information requirements, the reasoning behind the perceived gap in knowledge and what they are eager to narrow the gap that is considered the gap between what they already know and what they want to know in the effort to design effective digital library services.

However, the notion itself does not stand still or have a one-dimensional character: it is disputed, multi-dimensional, and more and more mediated by the technological, social, and ethical forces (Taylor, 1968; Wilson, 1981). This introduction provides the context of information needs in the digital era, the main theoretical considerations and empirical evidence on how the user behaviour, expectations and interaction have evolved, and also outlines significant gaps that drive the research question of rethinking how information needs should be reconsidered in libraries of the digital age. Scholars have been arguing over the definition of what information need is as an internal cognitive condition, observable behaviour, or a socio-contextual construction performed through interaction with information systems since the formative work of Taylor, (1968), who outlined information needs along a continuum of visceral to formalised needs (Taylor, 1968). These arguments were furthered by Wilson (1981) who related needs to problem situations and sought behaviour by saying that needs usually occur as the secondary phenomena which manifest when individuals strive to address more basic tasks or goals (Wilson, 1981). This sense-making view of Dervin and his model successors shifted again the focus away from more static needs to meaning-making processes within concrete contexts, and

prefigured the interpretation work of the user as he or she navigates information landscapes.

Modern scholarship keeps adding to these roots but puts them in new places as per the affordances and constraints of systems based on networks run by algorithms. Researchers note that the information requirements are now a joint creation of the users, platforms (search engines, discovery layers), and institutionalized policies (access, privacy, paywalls), which, in turn, determine what is knowable, findable, and actionable (Borlund, 2019; Hoeber, 2022). The digital environment is altering not just the expression of needs (e.g. by using keywords, clicks, saved searches) but the definition of what is sufficient to be satisfied, a factor of immediacy, signs of credibility, personalization, and additions to a format (e.g., video, datasets, preprints). The primary trends, which are interconnected, are the manifestation of information needs today. To begin with, complete accessibility and the abundance of information has caused a paradoxical response in the sense of need among users. Access to search engines, social media, and institutional repositories on demand often presents users with information overload or satisficing behaviour i.e. accepting the first result that is acceptable instead of a comprehensive search (Hoeber, 2022). Meanwhile, the data proliferate and introduce new needs, none of which existed previously: such as, the need to test the bias of the algorithm, to check the provenance, or to get a sense of the privacy of the data.

Second, the relevance and serendipity expectations have been changed by personalization and recommender systems. Users are more and more demanding systems that learn based on the previous

behaviour and present resources that are tailored to each individual; however, personalization also brings with it the issue of filter bubbles, fairness, and transparency. Evidence on empirical studies on digital library personalization suggests that there has been an increase in demand of adaptive interfaces; nevertheless, unresolved tensions regarding privacy and the accountability of the algorithm (systematic literature review, 2025). These dynamics re-pattern information demand: the wish of a user can be introduced or even created by the recommendation algorithms, making it difficult to distinguish between the demanded needs and the assumptions about the interests.

Third, the spread of the information types and channels multimedia, datasets, code repositories, open educational resources and social media changes the articulation of needs and approaches through which users use it. Multi-modal delivery (e.g. summaries, data visualization, instructional videos) is now expected, and digital libraries have to mediate between formats and licensing regimes in order to meet complex practical and pedagogical needs (Frontiers, 2024). Friction (format compatibility, metadata inconsistency) of heterogeneous formats is a novel factor that determines the success or failure of needs fulfillment.

Empirical research over the past five years demonstrates a number of user behaviour patterns that are of relevance to the information needs. The search depth and strategy are still largely dependent on motivation and the complexity of a task. When encountering complex, ill-structured problems, graduate students and researchers tend to employ more iterative and multi-source search behaviours and make use of more advanced tools (institutional

repositories, subject databases) in comparison with users of simple factual queries (Hoerber, 2022). On the other hand, users with less time or expertise often formulate their needs in the form of short, keyword-based queries, and tend to use heuristic evaluation of retrieved answers (e.g., based on snippet, author name or platform reputation). Speed, relevance, and usability expectations have increased: customers are planning the interfaces with the least amount of friction (single sign-on, integrated discovery), expected to have rapid relevance-related cues, and need to be able to quickly evaluate (citations, abstracts, altmetrics). Research on the use of digital libraries reveals that low-quality metadata, unpredictable areas of search, and ineffective authentication systems are also common deterrents of interaction, despite the fact that the content is technically accessible (Ijarets/2023; institutional studies 20242025).

The level of engagement is also conditioned by information literacy and digital competencies: users who have a higher level of critical assessment are more tenacious, require primary sources, and are less likely to be fed by surface findings; the lack of literacy opens the possibility of misinterpretation or unthinking distribution of low-quality content. The information literacy literature highlights its importance in attaining significant satisfaction of the information in the digital age and that it is the duty of libraries to incorporate literacy supports in discovery processes (Frontiers, 2024).

Lastly, the research on the subject has indicated that infrastructural limitations (bandwidth, access to devices), local language requirements, and institutional policy (open access practices) play an important role in the articulation and

fulfillment of information requirements using various geographic settings, such as research directed on institutions in Africa. These socio-technical discrepancies emphasize the idea that single-size fits designs of digital libraries will be unable to serve different user expectations across settings (Chima, 2025; Olaniyi, 2024).

The above shifts suggest a number of theoretical reconsiderations. To start with, the information need should be treated by researchers as a distributed phenomenon that arises due to the interactions between user, task, and system as opposed to an intrapsychic state. This relational perspective agrees with sense-making and socio-technical approaches that place emphasis on context, mediation and practice (Borlund, 2019). Second, since algorithmic layers are now closely engaged in determining what users see, the theories of information require should take into consideration the approaches of human-computer interaction, recommender-system, and ethics, not only in what users desire, but also in how platforms contribute to the formation of such desires. Third, it is necessary that methodological pluralism: log analysis and clickstream data should give macro-level trends of behaviour, whereas qualitative analysis (think-aloud protocols, interviews, diary studies) of needs and the interpretive labour that users engage in.

Even though there is a growing number of empirical studies, there are a number of gaps. A significant portion of the current research is focused on transactional search measures (clicks, time-on-task) or system performance and little is focused on the normative aspects of information need how values, ethics, and institutional requirements (e.g., equitable access, preservation) influence what is considered an adequate

response. Geographic and disciplinary focus is also inclined: the recent systematic reviews indicate a lack of studies in the Global South setting and insufficient analysis of non-textual formats (datasets, software) in the need and fulfilment discourse (systematic review, 2025). Lastly, with personalization becoming a popular subject of research in the context of commerce, one needs a better understanding of its consequences in the academic and public digital libraries where transparency and academic ideals are central.

These loopholes warrant an exploratory research project that re-conceptualizes information requirements in the digital era that focus on the user experience, situational and moral considerations. Overall, to reconsider information requirements in the digital era, it is necessary to go beyond the fixed definitions of information by considering a dynamic, relation-oriented definition that can embrace mediation by technology, the diversity of forms, and the variability of socio-institutional differences. The proposed exploratory project aims to operationalize the proposed rethinking by synthesizing theory and empirically investigating the issue, but with the end-game of informing socially responsible and user-centred digital library practices.

Redefining the Information Requirements in the Digital era: Conceptual Anchors and new Issues.

The information need concept has been an information science pillar, but its definition and operationalisation has changed many times because the socio-technical change is changing how individuals discover, judge and use information. Traditional formulations - e.g. levels of information need formulated by Taylor and problem-situation model of Wilson - focus on internal

cognitive states and the way they are connected to the observable behaviour of seeking (Taylor, 1968; Wilson, 1981). Newer theoretical treatments build on these perceptions by considering information need as an interactionally located, processual, and relational phenomenon generated in engagement with information artefacts, systems and communities (Dervin, 1998; Borlund, 2019). Scholars have also been keen on emphasizing that information needs are co-constructed in the digital age: they are the product of user objectives, platform capabilities (search engine, discovery engine, recommender engine), institutional policy (access control, license control), and social circumstances in general (misinformation climates, pedagogical expectations) (Borlund, 2019; Yu, 2024).

This re-evaluation is also not just semantic. In the case of distributed and mediated needs, research questions take the form of what do users want to become how do system design, social-institutional context, and individual competencies generate, mediate or thwart articulated needs. This has a consequential implication on digital libraries: the design, evaluation and policy should consider all three cognitive states of users, as well as the algorithmic logics that reveal resources, and the ethical requirements that are enforced by access and visibility (Ijarets, 2024; Jomsri, 2024).

The Evolving Information Age of The Digital Age

The information environment has radically reconfigured over the last decade due to networked infrastructures, platform ecosystems and new forms of content. There is an abundance of information (accessibility of huge amounts of text, data, multimedia, and dynamic web). There is a high user demand to be immediate, personalized, and

multi-formatted. According to the scholars, abundance has transformed the user cognition and behaviours: they get more involved in the satisficing strategies, they use relevance cues that are revealed in the algorithms, and they expect to get summaries or visualisations that help to quickly understand the information (Shahrzabi, 2024; Trixa, 2024). Simultaneously, platform logics have spilled over into what users perceive in the form of algorithmic intermediaries (social feeds, recommender systems, and so on), also casting normative questions of discoverability and diversity of perspectives (systematic reviews on personalization, 2025). Such dynamics cause articulation and fulfilment of information needs to be a socio-technical procedure where the intention of the user, interface design, and the mediation of algorithms are closely intertwined.

Too Much Information, Information Overload and Satisficing Behaviour.

The main attribute of modern information spaces is abundance - never before seen amounts of documents, data, multimedia, and dynamically changing web content, all of which can be accessed at low marginal cost. Plentifulness however, breeds its own ills. Increasing evidence records that users often react to large amounts of information with satisficing behaviors (accepting good enough results) or by using simple heuristics (looking at snippets, recognizing authors, having a positive reputation of a platform) instead of employing deliberate evaluative procedures (Shahrzabi, 2024; Yu, 2024). Research on information overload also presents cognitive and affective effects, such as task rejection, lack of confidence, and shallow knowledge acquisition, making it difficult to address complex, ill formulated

information demands (Shahrzabi, 2024). The digital libraries seek to reduce overload by trying to rank relevance with interfaces, summarisation and facaded navigation. Empirical studies, however, promise only mixed success: on the one hand, search engines-like discovery layers increase access speed, but on the other hand, they also enable the preference of familiar or popular content, leaving resources in niche but necessitating by the academic standards less discoverable (Systematic review, 2025). Therefore, abundance has presented a paradox in which access is coupled with unfulfilled needs of depth particularly to users, who have to do complex scholarly work.

Digital Libraries as Revolutionary Patterns of Use and Engagement.

Digital libraries are no longer digital proxies of paper collections, and are interactive places, which mediate discovery, reuse and scholarly communication. According to the literature, there are several types of transformational services of the contemporary and digital libraries acting as integrators of heterogeneous resources (articles, preprints, datasets, code, OERs), as a mediator of access (federated authentication, single sign-on, open-access interfaces) and as a place of interaction (annotations, collaborative reading, embedded information literacy) (Yunita, 2024; Systematic reviews 2024-2025). It is empirically shown that where digital libraries provide quick searching and the apparent availability of additional material (curated collections, advanced search), the user satisfaction and research productivity may be increased but ineffective metadata and tedious authentication remain to frustrate the situation. Digital libraries, then, are to be considered as socio-technical

systems, which formulate their effectiveness on the propensity of technical and policy choices and the user aids.

The Transformation of The Digital Libraries: Digitization Versus Intelligent Services.

Digital library development can be traversed in three phases which relate to one another. The initial stage (digitization and repository formation) was focused on the process of transformation of physical collections into available digital surrogates and developing institutional repositories. The second step (integration and discovery) focused on discovery layers, federated search and metadata crosswalks in order to render distributed content discoverable. The third stage today anticipates the intelligent services: personalization, AI-enhanced discovery, automatic enrichment of metadata, as well as embedded pedagogy (digital transformation studies 2024 - 2025). Intelligent layers in reducing the search costs, surface serendipity and supporting reproducible scholarship are now the subject of research and practice as well as questions of governance due to transparency, fairness and privacy concerns when algorithmic systems are deployed in scholarly infrastructures (digital transformation literature; AI in libraries studies).

The Need-Shaping, Personalization and Recommender Systems.

One of the most current topics of research in the field of digital library scholarship is personalization and recommender technologies (Alfaifi, 2024; IJRIS systematic review, 2025). Recommender systems are expected to lower search expenses and expose pertinent materials through the use of user account, actions history and content similarity. The

prototypes and practical research in the recent past such as the hybrid recommender models and deep-learning based recommenders with university collections demonstrate the increased click-through rates and perceived relevance (Jomsri, 2024; ACM study, 2024). Nonetheless, the literature also highlights relevant tensions: (a) personalization may entail the instantiations of filter bubbles and exclusion of serendipity; (b) opaque algorithms may challenge the scholarly principles of transparency and provenance; and (c) privacy-related issues and consent procedures are typically not well-developed in library deployments (Alfaifi, 2024; IJRIS systematic review, 2025). Of great importance, personalization does not merely react to the existing needs, it can create them. As recommender algorithms repeat some topics, format or authors, user preferences and perceptions of relevance might become aligned with algorithm biases, making it hard to interpret observed behaviour as being user-driven. The normative consequences to academic libraries are enormous: research should question how the recommenders logics coincide (or contradict) with the principles of openness, diversity of opinion, and scholarly rigor (Jomsri, 2024; Alfaifi, 2024).

Diversity Of Multimodality And Format: Broadening The Concept Of Sufficient Fulfilment.

The modern digital libraries collections include a great variety of formats: peer-reviewed articles, preprints, datasets, code repositories, video lectures, and open educational resources (OER). This diversity is also manifested in the expectations of the users: they are now expecting multi-modes of delivery (summaries, visualisations, video walkthroughs), quick format transformation

(e.g., dataset -> visualization) to facilitate immediate understanding and reuse (Yu, 2024). There are two related challenges as pointed out in the literature. To begin with, there is metadata heterogeneity and a lack of uniform descriptive practice that prevents cross-format discovery (institutional studies, 2023 - 2025). Second, heuristics of evaluation vary by format: users evaluate videos with various credibility cues differently than peer-reviewed articles and libraries need to use quality cues appropriate to the format (Trixa, 2024; Nyqvist, 2024). New developments in terms of merging datasets and software into discovery systems are optimistic (2024 - 2025 prototypes), whereas little empirical assessment of user anticipations across formats has been done systematically.

Featuring User Behaviour, Complexity, And Patterns Of Engagement.

The empirical evidence of the last five years supports the importance of the task complexity in task search depth and search strategy. Iterative search paths with multiple sources, primary source consultation, and more time spent on provenance are mostly used by users who have ill-structured research problems (e.g., graduate students, faculty doing literature synthesis); they use short queries and abandon the search early when an adequate result is found (Das, 2022; IJRIS systematic review, 2025). Single sign-on access and integrated discovery are also documented to be increasing expectations in terms of speed, log analysis and survey studies also document this (UNL study, 2025). Poor metadata, problematic authentication (two or more logins, proxy errors, etc.), and ambiguous scope statements are mentioned as obstacles to engagement again and again,

although the content can be accessed technically (Ijarets, 2024; UNL, 2025).

These behavioural patterns imply that libraries should plan to meet both the transactional and in-depth research processes. Mixed strategies, such as fast, relevance-ranked discovery with good access to advanced search and curated collections, seem to work, still, it needs to be explicitly noted that they need to take consideration of usability, training, and metadata enhancement (Jomsri, 2024).

The recent empirical research (log analysis, surveys, qualitative studies) expounds our knowledge on how the type of task, disciplinary norms, and digital competencies influence behaviour. Key patterns:

- Strategy is a result of task complexity. Users of poorly structured academic tasks undertake iterative and multi-source search and primary source search; users with factual queries use short queries and early termination.
- Metadata cues and heuristics. Under time pressure, users are subject to snippet, author name, and platform reputational fast relevance heuristics, where metadata quality has a direct impact on user capability to rate the suitability of a resource.
- Set of expectations concerning integrated workflows. The users have become demanding, a single sign-on, inbuilt analytics (citation, altmetrics), and in-line literacy supports; lack of these functions diminishes user engagement even when such collections exist.
- Perceived needs are formed through personalization. Recommendation systems do not only ease the effort of search, but also form taste and discovery; the literature advises against

confounding algorithm-driven clicks with user-based needs that are also stable.

The results indicate that it is necessary to meet the requirements of information needs by focusing on the current search interface and the background infrastructure (metadata, identity management, recommender transparency).

African Scenario: Digital Library Renewal, Limitations and Innovation.

Research on African higher education and national library ecosystems indicates that there are clearly defined infrastructural and policy contours defining needs and behaviour. The usual topics are bandwidth and device limitations, lapses in institutional repository adoption, language diversity, and increasing interest in AI and lightweight recommender systems that meet the needs of low-resource contexts (Olaniyi, 2024; SCECSAL proceedings, 2024; recent Nigerian design studies, 2025). These contextual factors, it has also been shown, result in some unique satisficing behavior (e.g. liking text to streaming video) and increase the significance of bandwidth-sensitive discovery interfaces and localized metadata practices. Meanwhile, African practitioners are also innovation-based: the lightweight AI assistants, the national repository partnerships, and the conference publications about the re-defined LIS education and AI literacy show that they are actively adapting to and leading the regionally suitable solutions (SCECSAL 2024; Olajide, 2025). Literature, therefore, suggests contextually designed design, comparative research across the contexts of the Global South, and investments in infrastructures to minimize digital inequalities.

Re-Thinking the Demands and The Place of Digital Libraries.

Based on the socio-technical relationships examined in the previous section, a reframing of the information requirements and a broader scope of the digital libraries are suggested in this section. Information needs are to be regarded as being relational, emergent, and mediated. Need is something that is acted out in search actions, platform affordances and institutional constraints rather than being merely an internal lack of cognition. The key implications of it are: (1) mixed sources (self-report, log data, qualitative accounts) are needed to measure need; (2) fulfilment should be multi-dimensional (speed, depth, format match, ethical acceptability); and (3) the role of algorithmic shaping should be considered as part of needs analysis (i.e. observed preferences can be due to system nudges).

A Stronger Role Of The Digital Libraries.

The re-invention of digital libraries as a discoverability agent, as a trust broker and as an agent of literacies needs to occur. Practically, this entails:

Open control over personalization. Introduce interpretable recommendation strata and the ability to opt out/give consent to such a system in order that personalization assists and does not hide scholarly values.

Metadata and resiliency of access. Focus on metadata enrichment, persistent identifiers (DOI, ORCID on software/datasets), and powerful authentication flows (SSO, guest modes) to minimize friction.

Whole language/integrated literacy and pedagogy. Embed information literacy information literacy is facilitated in finding (inline guidance, micro-tutorials) and collaborate with teaching faculties during curricular integration.

Contextualized, low resource design. Provide interfaces with bandwidth sensitivity and multilingual metadata to overcome the limitations of Global South and test the lightweight AI tools based on the specifics of the local infrastructure.

The roles place libraries as practitioners of information ecologies- being technologically innovative and ethically responsible and just at the same time.

Literacy Information Literacy, Critical Evaluation and Pedagogy.

The focus on the information literacy (IL) is the key to the authentic fulfilment of the information needs. The recent quantitative and qualitative studies demonstrate that IL instruction allows users to enhance their evaluation strategies, selective exposure tendencies, or confidence in teaching or using critical appraisal skills (Trixa, 2024; Frontiers reviews, 2024 - 2025). Still, IL is not evenly integrated into the curricular framework, and pre-service students and teachers tend to claim that they lack confidence in assessing online sources (Trixa, 2024). The placement of IL supports in discovery processes (inline guidance, structured tutorials) in libraries is becoming more common, though careful evaluation of how integrated IL interventions are applied in real-life digital library settings is almost entirely in its infancy. Librarian collaboration with teaching faculty is therefore a critical and under-investigated component in the fulfilment of complicated scholarly demands.

Equity, the Global South and infrastructural constraints.

There is a significant and accumulating amount of opportunity that information needs and their satisfaction are contextually

framed by infrastructure, language, and institutional policy. The effects of digital divide regarding limited bandwidth, device limitations, and language barriers over both query formulation and willingness to stream multimedia and satisficing behaviours have been documented in studies of the low- and middle-income setting (Nigeria and other settings in Africa) (ResearchGate study on Nigeria, 2024; Olaniyi, 2024). In addition, open access behaviors and institutional repository policy are different, and they impact discoverability of scholarship produced locally. The equity aspect therefore asks researchers not to generalize blindly to the usage pattern of the Global North and to develop adaptive solutions which takes the bandwidth sensitive interface, localized metadata as well as multilingual discoverability (Ijarets, 2024; UNL, 2025).

The Metadata, Authentication, And Technical Impediments To Fulfilment.

Technical and infrastructural hindrances continue to crop up as convenient barriers that prevent information needs to meet. The incompleteness of metadata (unfilled fields, mismatched subject entries), absence of crosswalks between the schemas of two repositories, and unfriendly authentication (proxy errors, federated authentication failures) add to the ineffectiveness of otherwise useful resources (Nyqvist, 2025; institutional reports 2023/2025). The literature recommends investing in metadata quality, dataset and software persistent identifiers, and robust authentication processes (single sign-on, no guest access) as most critical interventions to enhance contentment and engagement (Alfaifi, 2024; Jomsri, 2024).

Algorithmic Responsibility, Trust, And Ethics.

Privacy, transparency, and algorithmic fairness Ethical concerns have taken a leading role in digital library studies. Users need to have a clear indication of why a resource is suggested, what data are referred to as the reason, and what are the opt-out options (Alfaifi, 2024; IJRIS systematic review, 2025). HCI and STS views are progressively used in library scholarship to challenge the concept of algorithmic decision-making in recommender systems, whether the systems uphold disciplinary homogeneity or marginalise the minority point of view. Some of the initial suggestions are transparency dashboards, explicable recommendation layers, and governance systems that bring the aims of recommender systems in line with academic values (Jomsri, 2024; Alfaifi, 2024). Nevertheless empirical studies of this form of governance in actual library settings are sparse and should be investigated.

According to the literature written between 2019 and 2025, the classical concept of the need of information though still applicable needs a significant modification to reflect the socio-technical realities of the digital world. Needs are not merely states of mind, but this manifestation of the state is through platforms, which act on the algorithms and are limited by infrastructure and policy. The modern information requirements hence require an interdisciplinary agenda that incorporates information theory of science, HCI, ethics, and context sensitive practice. The above-identified gaps in empirical research provide a certain outline of the agenda of an exploratory, mixed-method research, and the design experiments that might assist digital libraries in addressing better the services services to the complex

and ever-changing expectations of their users.

Recommendations

1. Redefine Information Needs in a Socio-Technical Lens. It is suggested that the libraries and information professionals use a socio-technical approach towards the realization and response of the information needs of users. The information seeking cannot be regarded as an individual cognitive process because it is a process affected by technology, social networks, and institutional systems. Recent research notes that today algorithms and digital infrastructures have a strong mediating role in articulating need, the way of search, relevance evaluation (Shahrzadi, 2024; Trixa, 2024). Therefore, to provide more adaptive services, libraries are encouraged to implement systems, which identify contextualized needs, taking into consideration the user intent, digital literacy level and platform behavior.

2. Embrace Artificial Intelligence (AI) and Personalization in Digital Libraries in an Ethical manner.

Digital libraries are supposed to employ AI-based personalization applications that assist users to narrow down the search, find related materials and enhance relevancy in retrieval. Nevertheless, such integration has to be ethically transparent and user autonomic. Open AI systems (also known as those that have an explanation on how recommendations are formulated) are more likely to increase trust and decrease cognitive overload (Yunita, 2024; Systematic Literature Review, 2025). The ethical personalization processes also provide that the user privacy is considered and that the bias is prevented by the

algorithmic systems that may predispose to access different information.

3. Enhance Information Literacy and User Training to go online.

Information literacy (IL) is also an important factor of effective interaction with online materials. Digital and information literacy training should also be incorporated into the user interface by providing guided search options, pop-up assistance, and micro-tutorials to the libraries (Trixa, 2024; Shahrzadi, 2024). Moreover, it should be institutionalized to keep on with user education programs, particularly among students and researchers in their early career to enhance the capacity of users to interpret metadata, evaluate credibility, and make good use of advanced search features.

4. Improve the Quality and Interoperability of metadata.

Quality, detailed and interoperable metadata are all the pillars of a successful digital library operation. Bad metadata results in search fatigue, wrong information, and low interaction (Yunita, 2024). They suggest that institutions should use international metadata standards (such as Dublin core, MARC 21, MODS) and combine machine learning-enhanced metadata creation with them to enhance discoverability. Conventional audits and inter-institutional metadata matching can be used to guarantee homogeneity and interoperability between repositories and enhance international visibility of institutional collections (Olaniyi, 2024).

5. Promote Centristic and Evidence-Based Design.

The libraries need to shift towards user-based design as opposed to system-based design with ongoing usability tests and data analysis. Decision-making that is based on evidence-based data log data, focus groups, and surveys are used to determine the changing user behaviors and expectations (Systematic Literature Review, 2025). Design methods that involve students, faculty, and researchers in the participatory design can result in interfaces and tools that are in line with the real-world scholarly workflow (Yunita, 2024). This will promote increased satisfaction, continued use, and improved view about the relevance of digital libraries.

6. Enhance Accessibility and Contextual Design in Africa.

Recommendations in the African context should be based on equity and local accommodation. Poor bandwidth, infrastructural differences, and digital literacy gaps still influence the access to libraries (Olaniyi, 2024; SCECSAL, 2024). Libraries are urged to implement low-bandwidth interfaces, mobile-friendly interfaces, and multilingual metadata that will help users of the libraries to operate within resource constrained environments. Sustainability and cost-efficiency can be promoted with the help of collaborative regional arrangements including shared repositories and open educational resources (OER) networks. The institutions should be scaled with local innovation, which could be lightweight AI assistants tailored to African networks (Olajide, 2025).

7. Enhance Institutional Cooperation and Policies.

Policy alignment between universities, governmental agencies and professional

associations is essential to maintain the digital transformation. Digital libraries and institutional repositories need to have strong policies that cover open access, copyright, data control and long-term preservation (SCECSAL, 2024). The collaborative structures will have the ability to improve the sharing of resources and uniform practices throughout the region. Digital preservation and metadata governance can be achieved by developing a coordinated approach to national or continental digital policy, which guarantees the accessibility and interoperability of educational resources (Olajide, 2025).

8. Neverending Evaluation and Changing Governance.

Lastly, digital libraries will have to entrench an ongoing evaluation of user experience and service performance. Analytics and user feedback loops will enable libraries to adapt to new needs and make sure that digital systems keep up with those changes, thereby keeping them relevant (Systematic Literature Review, 2025). The models of governance must encompass a regular AI systems, user privacy policies, and accessibility compliances review to ensure sustainability of trust in digital infrastructures. The recommendations bring out the key issue of a user-centered, ethically controlled, technologically flexible, approach to reconsidering information demands in the digital era. Digital libraries can more effectively discharge their mandate as transformational gateways to knowledge access, engagement, and equity by incorporating AI, increasing their literacy, ensuring the quality of their metadata, and contextualizing their designs to the realities in Africa.

Conclusion

The digital era has transformed the nature of how people search, find, analyze and utilize information. As this paper has revealed, information needs have moved beyond the form of fixed manifestations of cognitive disjunctions into the dynamic, social mediated, and technologically mediated entities. The combination of artificial intelligence, cloud-based systems, and high-connectivity has radically changed the way a user thinks of relevance, credibility, and immediacy in interactions with information (Shahrzabi, 2024; Trixa, 2024). This has also led to the transformation of digital libraries becoming not a simple repository of digitized content but an interactive ecosystem that supports engagement, discovery and co-creation of knowledge (Yunita, 2024).

The literature review and user behaviour analysis show that the digital age requires a paradigm shift with users expecting seamless, intuitive and personalized experiences that would be not only convenient as in commercial search engines, but also respecting the academic principles of transparency, inclusivity, and intellectual integrity. Such increased demands force digital libraries to shift away the conventional cataloguing and curation to intelligent, participatory and useroriented systems (Systematic Literature Review, 2025). Simultaneously, the nature of digital interaction is determined by the algorithmic mediation all of personalization engines, recommender engines, interfaces design affect how users perceive the information that is relevant to them. Consequently, digital libraries have to strike a balance between innovation and both ethical governance and user privacy, diversity and equitable access (Yunita, 2024).

Within the African setting, the paper highlights how the infrastructural constraints, disproportionate bandwidth, and other linguistic settings are still affecting the effectiveness of digital library systems (Olaniyi, 2024; SCECSAL, 2024). Nevertheless, these problems have led to innovation using collaborative networks, mobile access patterns, and low-bandwidth technology to improve inclusiveness. African scholarly and research libraries are also trying out context-sensitive digital solutions that are oriented to the local realities but without losing the connection to the international standards (Olajide, 2025). This is an indication of a gradual redefinition of digital librarianship on the continent- one that has its base on flexibility, sustainability and innovation.

Re-imagination of information requirement also demonstrates that participation in digital libraries must be interactive and participatory where users are placed not only as consumers but also as co-producers of knowledge systems. This necessitates a broader interpretation of the library mission one which makes pedagogy, design, and policy to be considered as a continuum. In order to be relevant, the digital libraries should encourage information literacy, ethical applications of AI, and open knowledge systems that democratize access and empower different groups of users (Trixa, 2024; Shahrzabi, 2024).

Essentially, technology is not the answer to rethinking information requirements in the digital era; philosophical and institutional change, in terms of the way libraries conceive their ties with users, is what is needed. The future of digital libraries is in the fact that they will be able to combine technological intelligence with human

values, which is to make sure that the information is not just available but also meaningful, equitable, and trustworthy. With the constant changes in the digital environment, libraries should change as well becoming context curators, meaning middlemen, and engineered engagement. Through ethical foresight and inclusiveness in taking risks with innovation, digital libraries are able to remain pertinent as core components of scholarly and social forms of knowledge exchange in the 21 st century.

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