

# PERSONALISED AND IMMERSIVE USER EXPERIENCE IN ACADEMIC DIGITAL LIBRARIES IN NIGERIA

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## Abstract

In an era where digital transformation is reshaping how knowledge is created, disseminated and consumed, academic libraries in Nigeria face the challenge of not only delivering digital collections but also providing meaningful and engaging user experiences. This article examines personalised and immersive user experience in academic digital library in Nigeria. The discussion delves into personalised user experience in digital libraries and immersive users experience in digital libraries. Drawing on existing literature from books and scholarly journals, personalisation focuses on adapting library services to individual users' needs, preferences and behaviours while immersion leverages emerging technologies such as virtual reality (VR) and augmented reality (AR) to enhance user engagement and learning experiences. The paper discusses Integrating personalisation & immersion: A synergistic approach, challenges in integrating personalisation & immersion, strategies for enhance challenges in integrating personalisation & immersion. The paper argues that combining personalised services with immersive technologies can significantly improve user satisfaction, research efficiency and learning outcomes in Nigerian higher education institutions. Recommendations are provided for policy development, infrastructure investment, capacity building and ethical data governance to support sustainable development.

Keywords: Digital Library, Personalised User Experience, Immersive User Experience, Academic Libraries, Nigeria

## Introduction

For the purpose of clarification and complete comprehension, a digital library is a collection of documents in organised electronic forms, available on the internet or on CD-ROM (compact-disk read-only memory) disks. On the internet, the use of digital library is enhanced by a broadband connection such as cable modem. In this information age, Khan (2021) opined that digital libraries have emerged as indispensable reservoirs of knowledge, seamlessly intertwining with the fabric of contemporary education and learning. Halder (2021) asserts that as traditional libraries gracefully transition into the digital realm, Tewksbury & Rittenberg (2012) assume a pivotal role in democratising access to a vast ocean of information. Iliescu (2022) agrees that these digital sanctuaries, far more than mere repositories, serve as custodians of the world's collective wisdom, ushering in a new era of inclusivity and accessibility.

In line with this, a digital library according to Igbo (2023) is commonly defined as “a collection of digital objects (texts, images, videos and data) along with methods for access, retrieval, management and preservation”. Some academic libraries have embraced digital reference services, e-resources (e-books, e-journals and databases) and digital portals. For instance, Achugbue et al. (2023) found that electronic resources are extensively used for digital reference services in university libraries in Southern Nigeria. Moreover, digital

libraries have moved beyond simple digitisation and cataloguing, because modern users expect systems that adapt to their interests, preferences and contexts while delivering engaging and immersive experiences. This brought about personalisation that refers to the adaptation of digital library content and services to individual users based on their preferences, profiles and behaviours. Khavidaki, Farajpahlou & Shiri (2023) categorized personalisation in academic digital libraries into content personalisation, interface personalisation, collaborative filtering and personalised information retrieval. It aims to reduce information overload and enhance relevance by delivering targeted information and recommendations.

In consonance with this, immersive user experience involves creating interactive and engaging digital environments that simulate or enhance real-world experiences. Technologies such as augmented reality (AR), virtual reality (VR) and multimedia interfaces are commonly associated with immersion. Similarly, Khrushch (2022) analyzes virtual, augmented and mixed reality technologies and their possible applications in modern digital libraries. It discusses benefits like enriched engagement, new forms of interaction and richer metadata / paradata. In digital libraries, immersive experiences may include virtual library spaces, 3D visualisation of collections and interactive learning environments. In the words of Marzuki et al. (2025) international studies suggest that immersive technologies can foster exploratory learning and deepen user engagement by providing spatial and contextual representations of information. While immersive systems

are still emerging in academic libraries, their potential to transform scholarly interaction is increasingly recognised.

In a nutshell, the objectives of this study delves into personalised and immersive user experience in academic digital libraries, integrating personalisation and immersion in digital libraries, the benefits of such systems, identify barriers and strategies in the Nigerian academic libraries context and provide recommendations for researchers, library administrators and policymaker.

### **Personalised User Experience in Digital Libraries**

Personalised user experience in digital libraries is more than a technical enhancement, it is strategic, pedagogical and user-centric. For Nigerian academic libraries, personalization improves satisfaction and continued usage, supports effective resource discovery and research workflows, meets diverse academic needs, aligns with modern digital expectations, enhances engagement through novel AI interfaces and encourages broader adoption and innovation.

### **Why Personalisation Matters**

In the context of digital libraries, personalisation refers to adapting the system's content, interface and interactions to the individual user's needs, preferences, history, roles and context of use. Personalisation may include recommended resources, customised interfaces, adaptive search, notifications and targeted user training. Other reasons why personalization matters include:

- 1. Supports Diverse Academic Needs and Contexts:** Nigeria's academic library users come from varied disciplines, levels and information needs—from undergraduates to postgraduate researchers that are requiring specialised studies and seeking for basic information need. Personalised experiences according to Marzuki et al. (2025) help tailor responses and recommendations accordingly, making digital libraries more inclusive and effective for diverse user requirements.
- 2. Improves Resource Discovery and Efficiency of Research:** Digital libraries contain vast collections of information, such as journals, e-books, theses, datasets and more. Without personalisation, users often experience information overload, slowing discovery and affecting research productivity. A systematic literature review of digital library by Marzuki et al. (2025) opined that personalisation highlights how personalised systems can increase engagement and improve discovery of relevant content by matching resources to users' interests and behaviours.
- 3. Improves User Engagement and Support Services:** Studies from Nigerian academic libraries show emerging use of AI-based tools that users find helpful. Such tools, according to Wagwu et al. (2024) when further developed with robust, personalization features can greatly improve how users interact with digital collections, saving time and increasing satisfaction.
- 4. Support for Learning and Research:** In higher education contexts, personalisation supports differentiated learning pathways. The study by Mohammed &

Abiodun-Asanre (2023) found that digital libraries in Lagos State public universities helped final year students personalise their learning experiences.

In a nutshell, it is about delivering “the right information, to the right user, at the right time and in the right way”.

### **Immersive User Experience in Digital Libraries**

An immersive user experience in digital libraries refers to interactions where users feel deeply engaged, often through rich media, virtual reality (VR), augmented reality (AR), 3D visualisations and gamification or live interactive simulations. The goal is to transform static browsing into an engaging, exploratory and sometimes playful experience—thus deeper cognitive engagement, curiosity and retention.

### **Why Immersive Experiences Matter**

There are many reasons why immersive experiences matter but some of them include-

- 1. Immersive Technologies and User Engagement-** Several studies have established a strong relationship between immersive technologies and improved user engagement in digital libraries. Immersive environments encourage active participation rather than passive consumption of information, leading to deeper learning and higher satisfaction levels. Research by Okwu (2025) on Nigerian digital libraries demonstrates that AR and VR applications significantly improve user engagement, making academic resources more attractive and easier to understand.

2. **Immersive Experiences and Experiential Learning-** Experiential learning theory supports the use of immersive technologies in academic environments. For Nigerian academic institutions, where access to physical laboratories, archives and fieldwork opportunities may be limited, immersive digital libraries provide alternative platforms for experiential learning. Guidi & Tammaro (2024) suggest that VR and AR applications can simulate laboratories, cultural heritage sites and historical events, thereby expanding access to learning resources beyond physical constraints.
3. **Collaboration and Social Interaction in Immersive Digital Libraries-** Immersive digital libraries can function as shared virtual spaces where users interact, discuss and collaborate in real time. Nigerian studies reported by Onwubiko (2023) indicates that immersive platforms encourage peer learning and academic collaboration by enabling users to jointly explore digital resources and engage in scholarly discussions.
4. **Digital Literacy and Capacity Building-** The successful adoption of immersive experiences in academic digital libraries depends heavily on digital literacy among librarians and users. Onwubiko (2023) emphasizes the need for meta-literacy and advanced digital competencies for librarians in the era of metaverse and immersive technologies. Without adequate skills, the potential benefits of immersive digital libraries may not be fully realized.
5. **Aligning with Global Library and Education Trends-** Global research on digital libraries underscores a shift from repositories of information to experiential

learning environments. Immersive technologies are increasingly explored in international LIS literature as a way to enhance user-centric experiences in libraries—blending digital design, interaction and pedagogy.

Conclusively, immersive experiences matter in academic digital libraries in Nigeria because they elevate engagement and learning outcomes, provide interactive, experiential access to complex scholarly content, foster collaboration and community learning, enhance digital and information literacy skills. align local libraries with global educational and technological trends.

### **Integrating Personalisation & Immersion: A Synergistic Approach**

While personalisation and immersion are often studied separately, their integration offers powerful synergy. The integration of personalisation and immersion offers a holistic approach to enhancing digital library services. Personalisation ensures that users receive relevant and timely information, while immersion deepens engagement through interactive and experiential learning environments. When combined, they can transform digital libraries into dynamic learning ecosystems. These are some of the key design considerations for integrating personalization and immersion.

- 1. User-Centred Design-** Understanding the needs, expectations and behaviours of users is foundational to both personalisation and immersive design. For example, according to Khavidaki, Farajpahlou & Shiri (2023) personalised digital library system could recommend immersive VR-based learning modules aligned with a

student's academic discipline or research interests. Such integration aligns with global trends in user-centred digital library design.

2. **Flexible and Adaptive Interface Architecture-** A responsive and adaptable interface is crucial to support personalised and immersive experiences across devices. The system should provide adaptive layouts that respond to different screen sizes and devices, dashboard customisation where users can pin favourite collections and tag resources.
3. **Data Privacy Ethics and Security-** Personalised systems require the collection and processing of user data, which raises ethical and privacy concerns. Marzuki et al. (2025) assert that Nigerian academic institutions must develop ethical frameworks to govern data usage in digital libraries.
4. **Digital Literacy and Capacity Building-** Users and librarians must possess the requisite digital literacy to effectively engage with personalised and immersive features. According to Mohammed & Abiodun-Asanre (2023) evidence from Nigeria shows that awareness of digital library resources is limited, which constrains the effectiveness of personalisation unless complemented by literacy initiatives.

### **Challenges that are hindering integration of personalization and immersion**

Despite numerous benefits the integration of personalisation and immersion can offer towards enhancing digital library services, it is saddled with challenges, such as

- 1. Infrastructure and Technological Limitations-** One of the most pervasive challenges facing digital transformation in Nigerian academic libraries is insufficient ICT infrastructure, power reliability and internet connectivity. Many libraries as witness by Owate (2024) struggle with outdated equipment, limited bandwidth and inconsistent electricity, all of which impede access to rich digital library services, including immersive systems (e.g., VR/AR) and personalized platforms.
- 2. Human Capital and Technical Skills Gap-** There is a critical skills deficit among librarians and support staff regarding advanced digital systems, AI integration and immersive technology operations. According to Odigie (2024) training in next-generation ICT and immersive design remains limited, reducing the libraries' capacity to support personalized workflows and virtual environments effectively.
- 3. Financial Constraints-** Implementing cutting-edge immersive technologies and advanced personalization systems demands substantial investment. Many Nigerian academic libraries operate under tight budgets that prioritize basic services over advanced digital innovation. This financial limitation according to Igbo et al. (2025) restricts procurement, maintenance and updates of key digital systems.
- 4. Digital Literacy-** Effective personalisation and immersion depend on both user competence and librarian expertise. Okorigbo & Kanu (2022) assert that skill gaps among librarians and low digital literacy among users can undermine adoption.
- 5. Policy, Strategic Frameworks and Governance-** Many academic libraries in Nigeria lack clear institutional policies and strategic frameworks to guide digital

library development and maintenance of immersive environments. Owate (2024) opined that absence of governance frameworks can slow deployment and reduce stakeholders' confidence in new systems.

### **Strategies for Enhancing Integration of Personalization and Immersion**

The following strategies can enhance aforementioned challenges that were hindering integration of personalization and immersion.

- 1. Incremental Infrastructure Development-** Immersive technologies in particular, require reliable power supply, high-speed internet and specialised hardware. In line with this, Owate (2024) assert that academic libraries should adopt phased upgrades to ICT infrastructure, focusing first on internet connectivity, reliable power solutions and scalable server systems to support immersive platforms and personalized services.
- 2. Capacity Building and Professional Development-** Organized and ongoing training programs should be established, focusing on AI, immersive technology tools (e.g. VR/AR), digital literacy and digital library management systems. Odigie (2024) suggests that partnerships with local tech hubs, international universities and professional bodies can facilitate knowledge transfer.
- 3. Strategic Funding and Partnerships-** Libraries should explore diversified funding sources, including government grants, international organizations and public-private partnerships. Collaboration with technology firms and library consortia can reduce costs and enhance access to shared digital platforms. Similarly, Yakubu,

Noorhidawati & Kaur (2022) suggest that these factors not only facilitate preservation and access but also reduce long-term costs, promote resource sharing and enhance institutional reputation.

4. **User-Centred Design and Digital Literacy Training-** Adopting user-centred design principles ensures that digital library systems meet actual user needs. According to Khavidaki, Farajpahlou & Shiri (2023) agreed that regular digital literacy programmes for students and faculty will improve acceptance and effective use of personalised and immersive features.
5. **Policy & Strategy Analysis-** Review institutional policies, budget reports and strategic plans to analyze alignment with personalized and immersive library services. Owate (2024) opined that academic institutions should integrate digital library development into strategic plans and policies, ensuring sustainability, interoperability and alignment with national ICT agendas.

### **Recommendations**

Based on the analysis, the following recommendations are proposed for academic libraries in Nigeria:

1. Library leadership should develop digital strategies that explicitly include personalization and immersive technologies, aligned with institutional goals.
2. Universities and library schools should invest in training for librarians in AI, UX design, gamification, AR/VR, and meta-literacy.

3. Regularly engage users (students, faculty) in design processes (surveys, focus groups) to understand their preferences, pain points and expectations.
4. Collaborate with computer science departments, NGOs and tech companies to secure funding, expertise and shared infrastructure.
5. Formulate policies for data privacy, personalization settings, content curation and usage of immersive environments.
6. Ensure long-term maintenance of systems, regular updates and continuing support for immersive and personalized platforms.

## Conclusion

Academic digital libraries in Nigeria are pivotal to modern scholarship and can be significantly enhanced through targeted personalisation and immersive technologies. Integrating adaptive interfaces with immersive experiences offers the potential to create engaging, user-centric knowledge platforms that meet diverse academic needs. To realise these benefits, stakeholders must address infrastructural, educational and strategic challenges while drawing upon both international research and local empirical evidence.

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