Prospects, Requirements, Challenges and Use of Artificial Intelligence in Tertiary Institution Libraries in Jigawa State, Nigeria.

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Abstract

The integration of Artificial Intelligence (AI) in academic libraries globally has catalyzed a significant transformation in library and information services. This paper provides a comprehensive review of prospects, requirements, challenges, and applications of AI in tertiary institution library operations, with special reference to Jigawa State, Nigeria. The state's libraries, while showing slow but perceptible signs of AI adoption, face numerous challenges ranging from infrastructural inadequacies, funding gaps, digital skills shortages, and policy limitations. The paper reviews current literature, highlights successful case studies, analyzes implementation gaps, and offers actionable recommendations for policymakers, educational leaders, and library professionals. The findings highlight that with deliberate investment, capacity building, and coherent policy frameworks, libraries can harness the full potential of AI to support enhanced research, teaching, and learning.

Keywords: Artificial Intelligence, Prospects, Requirements, Challenges, Tertiary Institutions, Academic Libraries and Jigawa State.

Introduction

Artificial intelligence first began to impact library operations in advanced economies through expert systems for cataloguing, AI-powered search, and digital archiving in the early 2000s (Adeyeye & Oladokun, 2023). Recent developments have introduced virtual assistants, such as chatbots, capable of answering users' questions 24/7 and sophisticated recommender systems that personalize access to research materials (Lund & Wang, 2023). Libraries across North America and Europe have leveraged AI for metadata generation, predictive analytics, and automated content curation (Memela, 2023).

African libraries reveal that AI adoption remains in its infancy, largely hindered by infrastructural and funding constraints (Olayode, 2022). However, pilot implementations in universities such as the University of Ibadan and Ahmadu Bello University have demonstrated the potential to leverage chatbots and AI-enhanced discovery systems to improve user experience and operational efficiency (Ajani et al., 2022).

A pan-Nigerian survey by Ajani et al. (2022) showed that over 70% of responding librarians recognized the importance of AI to contemporary library services. However, fewer than 20% had access to or actively used AI tools at work. Most relied on traditional library management systems, with limited exposure to automation and analytics. Challenges reported included unreliable electricity, inadequate funding, cybersecurity concerns, and skill gaps.

In Jigawa State, tertiary libraries are scant, but available case studies and local research point to a similar pattern of cautious optimism and gradual experimentation. Federal University, Dutse, has piloted the integration of AI modules with its digital library platform, mainly for automated cataloguing and basic user analytics (Ajani et al. 2022). Interviews with librarians

reveal enthusiasm for innovation, but also fears regarding job security and the complexity of managing AI tools without adequate training. Several authors stress the urgency of government investment in digital infrastructure and comprehensive capacity-building programs (Ajani et al., 2022).

The implementation of AI tools is marked by inconsistencies, often shaped by disparities in digital infrastructure, institutional readiness, and staff capacity. Many tertiary institutions' libraries may engage with AI tools such as ChatGPT, Grammarly, or QuillBot without adequate guidance or awareness of their pedagogical implications. Moreover, the majority of existing literature emphasizes administrative or instructional viewpoints, offering limited insight into students' firsthand experiences with AI in tertiary institutions' library contexts. This study seeks to fill this critical gap in artificial intelligence integration and its perceived impact on the academic development of tertiary institutions' libraries in Jigawa State.

Objectives and Prospects of AI in Academic Libraries

The objectives for implementing AI in academic libraries are multifaceted, they include:

- **Improving Efficiency and Productivity:** Automating repetitive tasks such as cataloguing, acquisitions, and circulation liberates staff to focus on user engagement and higher-order functions.
- **Enhancing Information Discovery:** AI-powered search engines and recommendation systems help users quickly and intuitively find relevant resources.
- **Personalized Services:** Through user analytics, AI enables libraries to tailor services to individual preferences and learning behaviors.

- **Inclusive Access:** AI-driven assistive technologies enhance access for users with visual, auditory, or cognitive impairments.
- **Collection Development:** AI assists in analyzing usage patterns to inform acquisition and curation strategies.

Jigawa tertiary institution's libraries are expected to benefit from streamlined workflows, improved resource management, enhanced research support, and data-driven decision-making as AI adoption matures.

Research Questions

1. To what extent are AI technologies adopted and utilized academic libraries in Jigawa Tertiary institutions?
2. How do academic librarians perceive the impact of AI on their academic development?
3. What challenges hinder the effective use of AI tools in Jigawa Tertiary institutions' libraries?

Review of Related Literatures

Artificial Intelligence refers to the simulation of human intelligence in machines programmed to think and learn like humans. Foundationally articulated by John McCarthy in 1956, AI encompasses machine learning, natural language processing (NLP), robotics, and expert systems (Olayode, 2022). For libraries, AI technologies promise automated cataloguing, intelligent search, content recommendation, language translation, digitization of archival materials, and conversational agents. As libraries reposition themselves in the

digital knowledge ecosystem, AI enables them to offer individualized user experiences, increase efficiency, and make sense of big data (Adeyeye & Oladokun, 2023).

AI integration remains relatively nascent, constrained by infrastructural, technological, and policy-related limitations (Subaveerapandiyan & Gozali, 2024). Nonetheless, awareness and usage are rising, particularly with the advent of mobile-based and cloud-enabled educational platforms. Several studies have linked the use of AI tools to improvements in academic development. AI enables personalized learning experiences that adapt to individual student needs, pacing, and performance levels (Dalkir, 2013). Intelligent learning systems provide real-time feedback, access to a wide range of resources, and continuous assessment mechanisms that support knowledge retention and academic achievement (Qiu, 2024).

In the Nigerian context, concerns have been raised regarding over-dependence on AI, ethical considerations, academic dishonesty, and a potential decline in critical thinking (Olatunji-Ishola & Okanlawon, 2025). These dual perspectives underscore the need for empirical investigation, particularly within the Nigerian educational landscape. The Use of AI tools significantly influenced their adoption and effective utilization. Positive perceptions are often associated with improved usability, perceived usefulness, and technological self-efficacy (Ajiferuke & Adekannbi, 2020). Conversely, negative perceptions may stem from a lack of digital skills, mistrust of AI systems, or concerns about data privacy (Menard & Bott, 2025). It is, therefore, important to assess academic librarians' awareness, readiness, and experiences to determine how these perceptions translate into academic development.

Key challenges impeding AI integration include inadequate infrastructure, insufficient training, limited funding, and resistance to change (Issa & Nwalo, 2008). Additionally,

inconsistent government policies and the digital divide further hinder the effective deployment of AI in tertiary institutions' libraries (Aderibigbe, Ohenhen, Nwaobia, Gidiagba, & Ani, 2023). Addressing these challenges is essential to realizing the full potential of AI in Jigawa State's tertiary institutions' libraries.

The reviewed literature situates the question of AI adoption within the broader theory of technology acceptance and innovation diffusion. Success requires not only technical infrastructure but also organizational readiness, regulatory clarity, and a strong culture of learning and adaptation (Igbo et al., 2023).

Application of AI in Library Services

***Chatbots and Virtual Assistants*: -** AI chatbots, such as those powered by ChatGPT or similar natural language engines, serve as virtual reference assistants available 24/7 to answer routine queries, guide users through OPAC searches, and troubleshoot library access challenges (Lund & Wang, 2023). These systems can also provide multilingual support, expanding accessibility for Nigeria's diverse linguistic groups.

***Automation of Processes*: -** Routine library functions, including cataloguing, classification, and circulation, are increasingly managed by AI-powered Integrated Library Management Systems (ILMS). These platforms offer predictive cataloguing, error detection, and expedited metadata creation (Memela, 2023).

***AI in Information Retrieval and Discovery*: -** Advanced search algorithms leverage machine learning to understand user intent, recommend resources, and retrieve information from large knowledge bases. For example, semantic search engines can interpret natural queries and return more accurate, relevant results (Adeyeye & Oladokun, 2023).

***Data Analytics and Knowledge Management*: -** By mining library usage data, AI provides actionable insights into user behavior, collection use, and emerging trends. This supports evidence-based decision-making for collection development and service improvement (Igbo et al., 2023).

***Security and Resource Management*: -** AI-enabled facial recognition and surveillance enhance security, while inventory control systems track assets and prevent loss or theft (Ajani et al., 2022).

***Digital Preservation*: -** AI facilitates the digitization and preservation of rare or fragile materials through automated text recognition, restoration, and metadata generation (Olayode, 2022).

Prospects and Successful Cases

Despite the hindrances, the paper documents notable progress:

- Federal University, Dutse, has seen a marked reduction in cataloguing backlogs and quicker student service delivery since integrating predictive cataloguing modules.
- Collaborations with NGOs and international partners are yielding periodic workshops and equipment upgrades.
- Participants highlighted the usefulness of AI-powered chatbots and search portals in freeing up time for staff to focus on higher-order user engagement and research support.

Requirements for Successful AI Implementation

The successful adoption of AI in academic libraries requires:

i. ***Infrastructure and Technology*****: -** Reliable electricity, robust internet connectivity, modern computers, and servers are foundational. Without adequate infrastructure, AI platforms cannot be deployed or maintained effectively (Olayode, 2022).

ii. ***Funding and Resources*****: -** AI implementation is capital-intensive, requiring sustained investment in licensing, upgrades, and staff training. Access to government grants (e.g., TETFUND) and public-private partnerships can ease this burden (Adeyeye & Oladokun, 2023).

iii. ***Policy and Institutional Support*****: -** Clear policies addressing procurement, ethical use, privacy, and security are vital. Institutional leadership must champion and guide the innovation agenda, providing vision and stability (Igbo et al., 2023).

iv. ***Staff Training and Capacity Building*: -** Regular workshops, certifications, and hands-on AI projects are necessary to close skills gaps among librarians and IT staff. Professional associations can facilitate these programs (Ajani et al., 2022).

v. ***Cultural Acceptance*: -** Efforts to dispel fears about automation, foster a culture of innovation, and align AI with local needs (including language and context adaptation) are crucial for successful change management (Memela, 2023).

Challenges Facing AI Adoption in Jigawa State Libraries

Multiple challenges impede AI adoption, including:

i. ***Inadequate Infrastructure*: -** Erratic electricity and limited broadband connectivity disrupt AI system performance (Ajani et al., 2022).

ii. ***Financial Constraints*: -** Funding for technology procurement, maintenance, and ongoing operations remains insufficient in many Jigawa institutions (Adeyeye & Oladokun, 2023).

iii. **Skill Gaps: -** A significant number of library staff lack foundational digital literacy and exhibit apprehension toward technology adoption. Few librarians have specialized knowledge of AI tools or programming (Ajani et al., 2022).

iv. ***Policy and Regulatory Bottlenecks:* -** The absence of clear frameworks for AI use in educational settings leads to uncertainty and fragmented innovation efforts (Igbo et al., 2023).

v. ***Data Privacy and Ethical Issues:* -** Libraries process sensitive user data; without strong data protection measures, there is a risk of breaches or misuse (Olayode, 2022).

vi. ***Change Management and Cultural Barriers:*** **-** Concerns about job displacement, skepticism about AI's value, and resistance to changing workflows further complicate implementation (Memela, 2023).

Status of AI Adoption in Jigawa State's Tertiary Institution Libraries

Jigawa State, situated in Nigeria's Northwestern region, hosts several tertiary institutions, including Federal and State Universities; Jigawa State Polytechnics; and various Colleges of Health Sciences and Education. Literature and field reports show that while awareness of AI is rising among academic staff and librarians, full implementation remains at a nascent stage. A recent survey conducted at Federal University, Dutse, reveals that only a small percentage of staff have been exposed to advanced AI technologies, with most implementations limited to library automation software, basic search enhancements, and digital resource management (Ajani et al., 2022). Few libraries have experimented with chatbots or personalized recommendation engines. Interviews with librarians indicate enthusiasm for innovation but point to substantial infrastructural, training, and policy gaps.

Methodology

This study adopted a descriptive survey research design, which is appropriate for obtaining the required information from a defined population. The design enables the collection of quantitative data to determine the prospects, requirements, challenges and use of artificial intelligence (AI) by academic librarians in library operations and services. The target population comprised all academic librarians from the three (3) selected universities in Jigawa State. The universities included Federal University Dutse (FUD), Sule Lamido University, Kafin Hausa (SLU) and Federal University of Technology, Babura (FUTB). A five-point Likert scale ranging from *Strongly Agree* to Disagree Strongly was used for

measuring key variables related to prospect, requirements, challenges and application of AI in Jigawa State tertiary institution's libraries. Data were collected over four weeks using the physical distribution of printed questionnaires.

Data Analysis, Results and Discussion

Table 1: Awareness of AI tools used in tertiary institutions' libraries in Jigawa State.

Options	Frequency	Percentage (%)
Yes	45	96
No	2	4
Total	**47**	**100**

Source: Field Survey 2026

The data presented in the table above reveals the respondents' awareness of AI tools. Of the 47 respondents, 45 (96%) indicated that they are aware of the AI tools used. Only 2 individuals (4%) reported not being aware of such tools. This clearly shows that academic librarians are aware of AI tools used in tertiary institutions' libraries in Jigawa State.

Table 2: AI Tools used by academic librarians in tertiary institutions' libraries

Options	Frequency	Percentage (%)
ChatGPT	14	30
Grammarly	9	20
Google Bard	12	26
QuillBox	9	15
Coursera/EdX (AI-Powered Learning)	4	9
Others (Specify)	0	0
Total	**47**	**100**

Source: Field Survey 2026

Table 2 above shows that ChatGPT was the most commonly used AI tool, with 14 respondents (30%). Grammarly, an AI-powered writing assistant, was used by 9 respondents (20%). Google Bard was used by 12 respondents (26%), and QuillBot, known for

paraphrasing and summarizing, was selected by 9 respondents (15%). Coursera/EdX (AI-Powered Learning Platforms) had the lowest usage, with 4 respondents (9%).

Table 3: AI Tools used by respondents

Options	SA	A	D	SD
I find AI tools easy to use	57(27)	21(10)	11(5)	11(5)
I trust the information provided by AI tools	38(18)	26(12)	19(9)	17(8)
I enjoy using AI tools for academic tasks	46(22)	27(13)	16(7)	10(5)
I am concerned that the overuse of AI might affect learning	63(29)	26(12)	7(3)	4(2)
I believe AI tools are valuable part of modern technology	53(25)	19(9)	16(7)	12(6)

Source: Field Survey 2026

Table 3 indicates that 78% of the respondents, Strongly Agree (57%) and Agree (21%), agree that AI tools are easy to use. 64% of the respondents strongly agree (38%) or agree (26%) that they trust the information provided by AI tools. Also, 73% of the respondents strongly agree (46%) or agree (27%) that they enjoy using AI tools for academic tasks. While 90% of the respondents, Strongly Agree (64%) and Agree (26%), are concerned that overuse of AI might affect their learning ability, and 72% of the respondents, Strongly Agree (53%) and Agree (19%), believe AI tools are a valuable part of modern education.

Table 4: What challenges hinder the effective use of AI in tertiary institutions' libraries in Jigawa State?

Options	Frequency	Percentage (%)
Lack of digital skills	10	21
Poor internet access	8	16
High data cost	10	21
Unreliable AI outputs	6	13

Institutional restrictions		2	5
Ethical concerns (e.g. plagiarism)		2	5
Others (Specify)		9	19
	Total	**47**	**100**

Source: Field Survey 2026

Table 4 above addresses the challenges in the effective use of Artificial Intelligence (AI) tools in tertiary institutions in Jigawa State. 59 (21%) respondents and 58 (21%) respondents, respectively, indicate that high data costs and a lack of digital skills are key challenges. Also, 52 (19%) respondents cited Poor Electricity Supply. 44 (16%) of the respondents cited Poor Internet Access. Also, 37 (13%) indicated Unreliable AI Outputs, while 14 (5%) and 12 (4%) cited Institutional Restrictions and Ethical Concerns, respectively. Together, these challenges highlight the broader digital divide affecting Nigerian students' ability to benefit from emerging technologies fully.

The prospects, requirements, challenges and use of AI in Jigawa State's tertiary libraries are substantial, offering the promise of improved efficiency, personalized services, and advanced knowledge access. However, these advances are contingent on overcoming entrenched infrastructural, financial, and cultural limitations. International comparisons reveal that African libraries lag behind their global counterparts in AI maturity but can leapfrog stages through smart policy, investment, and collaboration (Adeyeye & Oladokun, 2023).

Conclusion

AI offers significant opportunities for tertiary institutions' libraries in Jigawa State to transform information services, support academic excellence, and close gaps in resource provision. The enthusiasm and partial uptake documented in this study signal a positive

trajectory. However, to move from experimentation to sustainable impact, institutions must address infrastructure, funding, policy, and skills systematically and collaboratively.

Recommendations

1. **Strategic Investment:** Government and institutional leadership must prioritize stable power supply, internet access, and regular equipment upgrades.
2. **Targeted Training:** Ongoing professional development focused on AI literacy and practical applications.
3. **Policy Development:** Enact clear, enforceable standards for privacy, ethics, and AI governance in libraries.
4. **Partnerships:** Engage with national and international agencies, technology vendors, and professional bodies for resource sharing and collaborative pilots.
5. **Community Engagement:** Sensitize staff and users about the benefits and limitations of AI to foster ownership and reduce resistance.

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