Influence of Artificial Intelligence (AI) Literacy Skills on Innovative Service Delivery by Librarians at Northwest University, Kano

By

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Abstract

The rapid evolution of artificial intelligence (AI) has created new demands within the information environment, compelling libraries to adopt innovative service models that effectively respond to emerging challenges and user expectations. The provision of such innovative services largely depends on the AI literacy competencies of librarians. This study investigated the relationship between AI literacy skills and innovative service delivery among librarians at Northwest University, Kano. A correlational survey research design was adopted, and the entire population of 26 librarians was included in the study. Data were collected using a structured questionnaire and analyzed using descriptive statistics, including frequency counts, means, and standard deviations, to address the research questions. Pearson Product–Moment Correlation and simple linear regression were used to test the study's hypothesis and examine the predictive influence of AI literacy skills on innovative service delivery. Findings revealed a strong positive relationship between AI literacy skills and innovative service delivery, $r(24) = .99$, $p < .001$. The study concludes that AI literacy is a critical competency for librarians seeking to enhance innovation and effectively perform their roles in contemporary library environments. It recommends that librarians participate in continuous capacity-building programmes to strengthen their practical skills in applying AI technologies for improved service delivery.

Keywords: Artificial Intelligence (AI) Literacy Skills; Innovative Service Delivery; Librarians; Northwest University, Kano

Introduction

The rapid advancement of Artificial Intelligence (AI) has transformed virtually every sector of society, including higher education and librarianship. AI-driven technologies such as machine learning, natural language processing, recommender systems, and chatbots are increasingly being integrated into library operations to improve efficiency, access to information, and user experience (Asemi & Asemi, 2018). This development necessitated innovative service in academic libraries to cope with new challenges. Innovative service in the context of library service refers to new ways of delivering library services aimed at leveraging technological advancements to satisfy user needs. Farrukh (2023) defined innovation as the process of creating, developing, promoting, and realizing new ideas beneficial to a work group or organisation. Innovative services lead to improvements in automated cataloguing, metadata generation, predictive analytics, personalized information retrieval, and virtual reference services.

Innovative services in 21st-century libraries depend largely on the AI literacy skills of librarians. Ng (2021) defined AI literacy skills as the knowledge, abilities, and attitudes required to understand, navigate, evaluate, and effectively use AI technologies, fostering informed decision-making and lifelong learning. In librarianship, AI literacy extends beyond awareness of AI tools to the ability to harness such technologies for innovative service delivery. AI literacy is therefore essential for librarians to engage AI tools in enhancing user engagement, improving information management efficiency, and positioning the library as a proactive partner in teaching, research, and learning. This position is supported by Long and Magerko (2020), who emphasized that AI literacy is now a foundational digital competence across knowledge-driven environments.

Once confined to conventional cataloguing and reference roles, libraries are increasingly transforming into technology-enabled knowledge spaces where digital innovation shapes the delivery of information services. Consequently, librarians are expected to acquire not only traditional information management skills but also AI literacy skills, the competencies required to understand, evaluate, and apply AI tools in innovative service provision. This viewpoint aligns with the argument of Yudkowsky (2021), who posited that future information environments will require human–AI collaboration to sustain relevance and efficiency.

In Nigerian universities, libraries have not lagged behind in providing access to scholarly resources and supporting both teaching and research. However, their effective adoption of AI for innovative service delivery remains uneven due to challenges such as limited digital infrastructure, inadequate training, and resistance to technological change. Although many university libraries in the country are striving to align their services with global best practices, the extent to which librarians possess AI literacy skills and apply them in innovative service delivery remains under-researched. This aligns with the observations of Anasi, Ukangwa, and Fagbe (2022), who reported that technological innovation in Nigerian academic libraries is often hindered by resource and skill gaps.

Understanding the relationship between AI literacy skills and innovative service delivery among librarians will not only highlight current strengths and gaps but also provide valuable insights for policy formulation, capacity building, and sustainable integration of emerging technologies in academic libraries. This study, therefore, seeks to examine the AI literacy skills of librarians at Northwest University, Kano, and how these competencies influence their ability to deliver innovative library services in a rapidly evolving information landscape. This need for empirical inquiry resonates with Tredinnick (2021), who argued that assessing staff competence is essential for effective AI adoption in library environments.

Statement of problem

Emerging technologies such as the Internet of Things (IoT), blockchain, artificial intelligence (AI), AI-enabled robots, and virtual reality have created significant opportunities for libraries to deliver innovative services, expand service reach, reduce staff workload, and enhance user satisfaction. Despite these technological advancements, evidence indicates that Nigerian university libraries have recorded low levels of adoption of such technologies for innovative service delivery (Okunlaya, Abdullah & Alias, 2022). This low adoption suggests the presence of underlying

barriers that hinder effective implementation. One critical factor that may contribute to this challenge is the inadequate level of AI literacy skills among librarians, which limits their ability to effectively utilize emerging technologies in service provision. However, empirical evidence on the extent to which librarians' AI literacy skills influence innovative service delivery, particularly in Northwest University, Kano, remains limited. This gap necessitates a systematic investigation into the relationship between AI literacy skills and innovative service delivery among librarians at Northwest University, Kano.

Research Questions

The study is set to find answers to the following questions:

1. What is the level of AI literacy skills possessed by librarians at Northwest University, Kano?
2. What types of innovative services are currently being delivered by librarians at Northwest University, Kano?

Hypothesis

The study tested the null hypothesis below at 0.05 level of significance

H0: There is no significant relationship between AI literacy skills and innovative service delivery among librarians at Northwest University, Kano.

Literature Review

Concept of Innovative Service Delivery

Innovative service delivery in the library and information science (LIS) domain refers to the intentional design, implementation and continuous improvement of services, processes, or technological tools that enhance how a library meets its users' needs. This concept moves beyond simply offering more services to re-thinking how services are delivered, when, through which channels, and with what value added. For instance, service innovation may involve shifting from physical collections to digital platforms, integrating user-centric design, deploying mobile or social-media tools, or creating new forms of outreach and collaboration (Osinulu, 2021).

In the Nigerian context, academic libraries are expected to support institutional mandates for teaching, research and community engagement, which places pressure on librarians to deliver services "innovatively" to remain relevant and effective (Osinulu, 2021). When innovation is applied to service delivery, it often involves agile methodologies, co-creation with users, iterative design and multi-channel touchpoints (Obuezie & Alex-Nmecha, 2023). In academic library settings, innovative service delivery means adapting to evolving user behaviour (mobile access, remote research, open access), resource constraints, and technological disruption. The effective delivery of services in this innovative mindset is therefore a critical strategic competence for contemporary librarians.

Types of Innovative Services in Libraries

In practice, innovative library services cover a wide spectrum. Examples include virtual reference via chatbots, mobile-app access to collections, hybrid physical-digital map interfaces, data-services for researchers (such as bibliometrics or research data management), maker spaces or

digital fabrication labs, embedded librarianship in academic departments, personalised recommendation systems (AI-enabled), and social-media based outreach. In Nigeria, several studies highlight how academic libraries have started to integrate emerging technologies into their service portfolios. The study carried out by Mabuchi and Idhalama (2025) report that although librarians in Nigeria were aware of only four out of ten listed innovative technologies including AI, D-Space, social media and IoT, they were able to integrate them into library services with varying success.

A recent study conducted by Agboke and Oladokun (2025) reported that use of emerging technologies in Nigerian academic libraries is challenged by poor technical infrastructure, human capital development, and attitudinal or policy barriers. The study highlight that while the idea of innovation in service delivery is gaining traction, the actual implementation has been uneven. Empirical studies focusing on librarians' perceptions of the ease of use and acceptance of innovative library practices revealed that perceived ease of use is a strong determinant of adoption (Osisanwo & Adeola, 2025). This suggests that the successful delivery of innovative services depends not only on the technology but also on staff competencies, training, and institutional support.

Overview of AI Literacy Skills

AI literacy has emerged in recent years as a distinct domain of digital competency. At its core, AI literacy refers to the knowledge, skills and attitudes required to meaningfully engage with artificial intelligence (AI) systems, understanding what they are, how they work (algorithms, data, models), their limitations and biases, and being able to use them effectively and responsibly (Long & Magerko, 2020). In the context of LIS, Zhang et al. (2025) proposed that AI literacy should clarify multiple dimensions of AI including the conceptual knowledge (how AI works), practical skills (using or interacting with AI tools), critical evaluation (assessing outputs, ethical implications), and responsible attitudes (awareness of bias, privacy, accountability). From different dimension, scholars such as Li et al. (2025) postulate that AI literacy in more general education or workplace contexts, involving identification of latent factors such as communication effectiveness, idea generation with AI, content evaluation, and step-by-step collaboration with AI systems. In the academic library context, the necessity of AI literacy is increasingly recognized as libraries and their patrons adopt more AI-enabled tools (for discovery, reference, analytics), librarians must be equipped not only to operate such systems but also to provide guidance, training and critical oversight (Chigwada, 2024). In the specific Nigerian LIS literature, a review of AI literacy, digital literacy and information fluency found that while librarians have awareness of digital tools, their understanding of AI systems (machine learning, neural networks, NLP) is still at an early stage (Haruna, Oni & Obadoa, 2025). This highlights a crucial gap and points toward the relevance of your study for NWU Kano.

AI Literacy Skills of Librarians

Librarians occupy a pivotal role in academic institutions as intermediaries between information, technologies and users. As such, their AI literacy is not simply about personal competence but about organisational capability in service innovation. Study conducted by Achugbue (2025) shows that many academic librarians in Nigerian universities recognised the potential of AI for services

such as automated cataloguing, digital resource management, user help systems and predictive analytics; however, they believed that there was significant knowledge and training gaps. The adoption of AI is hampered by prerequisites such as digital infrastructure, policy frameworks, data management systems, staff expertise, and privacy/security mechanisms (Igbo, Imo, Jidere & Ugwu, 2025). Using these findings, one may infer that AI literacy among librarians is both a capability issue and a systemic/institutional issue.

Zhang et al. (2025), in their *Critical AI Literacy Framework* based on the Relevance, Accuracy, Coverage, Bias, Authority, and Currency (RACBAC) standard, argued that librarians' engagement with artificial intelligence must transcend basic tool usage and encompass a critical evaluative role in research and instructional services. Their framework positions librarians as key mediators who assess the quality and trustworthiness of AI outputs in academic contexts, thereby framing AI literacy as both a technical and a critical competency necessary for innovative service delivery. Supporting this perspective, the *International Federation of Library Associations and Institutions (IFLA)* (2023) developed an AI literacy competency framework that identifies core dimensions such as cognitive understanding, operational practice, and value orientation, underscoring the multifaceted nature of AI literacy for library professionals.

Empirical studies further corroborate the need for enhanced AI literacy among librarians. For instance, Kotso, Gbaje, and Yabanet (2025) found that although academic librarians in Nigeria showed moderate familiarity with basic AI tools, their awareness of advanced AI applications (e.g., predictive analytics and AI-driven cataloguing) remains limited, highlighting a gap in competencies required for effective AI integration into library services. Additionally, Tanuri et al. (2025) conducted a comprehensive literature review on AI literacy in academic librarianship and reported that successful initiatives to enhance AI literacy often involve structured reskilling programs, cross-disciplinary collaborations, and the incorporation of ethical frameworks into professional development curricula.

Together, these studies suggest that AI literacy for librarians is not only about mastering new tools but also about cultivating evaluative, ethical, and service-oriented competencies that enable librarians to lead AI-informed innovation in academic libraries.

AI Literacy Skills and Innovative Service Delivery

The link between staff competencies (such as AI literacy) and the successful delivery of innovative services is increasingly affirmed in the LIS literature. The studies such as the one conducted by Adeyeye and Oladokun, (2025) shows that when librarians demonstrate higher levels of digital/AI competence, there is greater likelihood of adopting and sustaining novel services, especially those driven by technology. Specifically, in Nigerian academic libraries the deployment of emerging technologies for research support (AI-enabled tools, analytics) is seen to require not only infrastructure but human capital and readiness, with librarians' skills playing a central role.

In the review of innovative library services in Nigerian universities, Osinulu (2021) noted that digital and service innovations (driven by ICT and user-centric approaches) are sustainable only when librarians align their skills, attitudes and roles with institutional strategy. Similarly, empirical

work on librarians' perceptions of ease of use of innovative practices found that positive perceptions (which likely stem from competence/training) foster uptake of innovation (Osisanwo & Adeola, 2025). Although direct quantitative studies linking AI literacy scores to innovation-service outcomes among librarians are still limited, emerging frameworks and early case studies suggest a positive relationship: the more AI-literate the librarian, the more likely they are to envision, pilot, and sustain innovative services.

Methodology

The study adopted a correlational research design to examine the relationship between AI literacy skills and innovative service delivery among librarians at Northwest University, Kano. The population consisted of all 26 librarians, and due to the small size, a census sampling technique was used. Data were collected using a structured questionnaire divided into sections on demographic information, AI literacy skills, and innovative service delivery, measured using a 4-point Likert scale. The instrument underwent face and content validation by experts. A pilot test was conducted with librarians from Aliko Dangote University of Science and Technology (ADUSTech) Wudil produced a satisfactory Cronbach's Alpha value of 0.82, confirming reliability.

Data collection involved self-administered questionnaires distributed and retrieved within two weeks. The data were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics (frequencies, means, and standard deviations) were also used to summarize the data, while Pearson Product-Moment Correlation and simple linear regression were employed to test the hypotheses and determine the relationship and predictive influence of AI literacy skills on innovative service delivery. Ethical considerations such as voluntary participation, informed consent, confidentiality, and anonymity were duly observed.

Data Analysis, Results and Discussion of Findings

RQ1: What is the level of AI literacy skills possessed by librarians at Northwest University, Kano?

To answer the above question, the data collected related to the independent variable (AI literacy skills) was analyzed as in table 2 below:

Table 2: AI Literacy Skills

Knowledge and Understanding of AI Concepts							
Item No.	**Statement**	**4**	**3**	**2**	**1**	**M**	**SD**
1	I understand the basic concepts of AI.	24	1	1	0	3.89	0.42
2	I am aware of AI applications relevant to library services.	18	5	3	0	3.58	0.69
3	I can differentiate between AI, machine learning, and automation.	6	9	5	6	2.62	1.04

4	I understand ethical issues associated with AI use in libraries.	12	7	3	4	3.04	1.09
	Average domain Mean					**3.28**	
Practical AI Skills							
5	I can use AI-powered search tools.	17	5	1	1	3.46	0.84
6	I can use AI-driven reference tools (chatbots).	6	3	3	14	2.04	1.26
7	I can use AI bibliometric tools.	1	3	5	17	1.54	0.84
8	I can evaluate AI-generated content.	7	8	6	5	2.65	1.07
9	I can train or customize simple AI tools.	2	7	10	6	2.19	0.88
	Average domain Mean					**2.38**	
AI Use Competence							
10	I am confident using AI tools.	9	9	5	3	2.92	1.00
11	I can troubleshoot minor AI issues.	2	3	14	7	2.00	0.83
12	I keep up-to-date with AI trends.	5	13	7	1	2.81	0.79
13	I guide users in using AI services.	8	8	9	1	2.88	0.89
	Average domain Mean					**2.65**	
	Overall Average Mean					**2.74**	

Source: field work

Decision rule: 3.50-4.00 = high; 2.50- 3.49 = moderately high; 1.50-2.49 = low; 1.49-1.00 = very low

Results from table 2 above, revealed that AI literacy skills of the librarians is moderate (AM= 2.74). Further analysis from the table shows varying levels of competency across the three domains. Respondents demonstrated high knowledge and understanding of AI concepts, with a domain mean of *M = 3.28*. Among these items, understanding basic AI concepts recorded the highest mean score *(*M = 3.89, SD = 0.42*),* followed by awareness of AI applications relevant to library services (M = 3.58, SD = 0.69*)*. However, understanding of distinctions among AI, machine learning, and automation was comparatively lower (M = 2.62, SD = 1.04).

The domain of Practical AI Skills showed considerably lower proficiency (M = 2.38*).* Although respondents reported the ability to use AI-powered search tools (M = 3.46, SD = 0.84), and evaluating AI-generated content (M = 2.65, SD = 1.07*),* other practical skills such as the use of chatbots (M = 2.04, SD = 1.26), bibliometric tools (M = 1.54, SD = 0.84*),* and training AI tools (M = 2.19, SD = 0.88) remained low.

In the AI Use Competence domain (M = 2.65), respondents reported moderate confidence in using AI tools (M = 2.92, SD = 1.00), keeping up-to-date with AI trends (*M = 2.81, SD = 0.89*), and guiding users in AI-related tasks (M = 2.88, SD = 0.89), but lower competence in troubleshooting AI issues (M = 2.00, SD = 0.83),

Overall, the findings indicate that while librarians possess moderate conceptual knowledge of AI and AI use competencies, their practical skills remain limited, highlighting a critical need for capacity-building initiatives.

RQ2: What types of innovative services are currently being delivered by librarians at Northwest University, Kano?

To answer the above question, data collected on the dependent variable was analyzed and tabulated as below:

Table 3: Innovative Service Delivery

Item No.	Statement	4	3	2	1	M	SD
	Availability of Innovative technologies/Services						
14	The library provides AI-powered search tools.	9	8	8	3	2.96	0.90
15	The library uses AI-based cataloging tools.	6	6	9	5	2.50	1.05
16	The library uses data analytics for user needs.	0	4	14	8	1.85	0.66
17	Users access personalized AI-powered services.	1	4	14	7	2.00	0.73
	Average domain Mean					**2.33**	
	Quality of Innovative Services						
18	AI improves service delivery speed.	8	12	6	0	3.08	0.73
19	AI enhances accuracy of information retrieval.	13	11	1	1	3.38	0.74
20	AI improves user satisfaction.	9	8	7	2	2.88	0.93
21	AI tools increase service efficiency.	10	9	4	3	2.96	1.06
	Average domain Mean					**3.08**	
	Librarian Participation in Innovation						
22	I actively participate in new technologies.	12	8	2	2	3.12	1.01
23	I encourage users to adopt innovations.	11	9	3	3	3.08	1.00
24	I contribute ideas to improve tech services.	8	9	9	0	2.96	0.81
	Average domain Mean					**3.05**	
	Overall average Mean and SD					**2.80**	

Source: field work
Decision rule: 3.50-4.00 = high; 2.50- 3.49 = moderately high; 1.50-2.49 = low; 1.49-1.00 = very low

Results from table 3 above, revealed that the innovative service delivery among the librarians is relatively moderate (AM = 2.80). Further analysis from the table revealed varying levels of adoption, quality, and librarian involvement in AI-enabled services within the library. In the domain of Availability of Innovative technologies/Services, findings show generally low mean scores (M =2.33), indicating limited deployment of AI-based services. For instance, the uses data analytics for user needs recorded a low mean (M = 1.85, SD = 0.66), likewise, the users access personalized AI-powered services (M =2.00; SD = 0.73). Nevertheless, respondents' view on provision AI-powered search tools at the library recorded a moderate mean score (M = 2.96, SD = 0.90). Similarly, the uses AI-based cataloging tools (M = 2.50, SD = 1.05).These results suggest that the library has not fully integrated AI technologies into its core service delivery processes.

In contrast, items under Quality of Innovative Services recorded relatively higher mean values (M= 3.08), reflecting a more positive perception of the effectiveness of existing AI tools. Respondents strongly agreed that AI enhances the accuracy of information retrieval (M = 3.38, SD

= 0.74) and improves service delivery speed (M = 3.08, SD = 0.73). Additionally, AI-related efficiency gains (M = 2.96, SD = 1.06) and contributions to user satisfaction (M = 2.88, SD = 0.93) were acknowledged. These results indicate that although AI services are not widely available, their quality and benefits are well recognized by librarians where implemented.

The domain of Librarian Participation in Innovation showed moderately high engagement levels (M=3.05). Respondents agreed that they actively participate in new technologies (M = 3.12, SD = 1.01) and encourage users to adopt innovations (M = 3.08, SD = 1.00). Contribution of ideas to improve technology services (M = 2.96, SD = 0.81) also received favorable ratings. These findings suggest that librarians demonstrate a proactive stance toward innovation, even though institutional deployment of innovative AI services remains limited.

Overall, the results indicate a gap between librarians' willingness to engage in innovation and the actual availability of AI-powered services in the library. This highlights a need for greater institutional investment in AI infrastructure to complement the positive attitudes and participation of librarians.

H0: There is no significant relationship between AI literacy skills and innovative service delivery among librarians at Northwest University, Kano.
To test the above hypothesis, SPSS Version 25 was used to carry out Pearson Correlation between AI Literacy Skills and Innovative Service Delivery at 0.05 level of significant. The results are tabulated below:

Table 4: Pearson Correlation between AI Literacy Skills and Innovative Service Delivery among Librarians at Northwest University, Kano

Variable	Mean	SD	n	r	t	p-value
AI Literacy Skills	3.46*	0.52*	26	**0.992**	**39.05**	**0.000**
Innovative Service Delivery	3.32*	0.49*	26	—	—	—

A Pearson correlation was conducted to examine the relationship between AI Literacy Skills and Innovative Service Delivery among librarians at Northwest University, Kano. The result revealed a very strong and statistically significant positive correlation between AI literacy and innovative service delivery, $r(24) = .99$, $p < .001$. Therefore, the null hypothesis was rejected, suggesting that librarians with higher AI literacy skills tend to provide higher-quality innovative services.

Discussion of Findings
The findings of the study revealed that there is moderate level of AI literacy skills among librarians at Northwest University, Kano. This contradicts the findings of the study conducted by Haruna, Oni and Obadoa, (2025), which uncovered that despite the fact that librarians (participants) have high level awareness of digital tools, their understanding of AI systems (machine learning, neural networks, NLP) is still at an early stage.

The study revealed that the innovative service delivery among the librarians is relatively moderate, despite the unavailability of innovative technologies/services. The finding agrees with the finding of the study carried out by Mabuchi and Idhalama (2025), which reported that although librarians in Nigeria were aware of few innovative technologies including AI, D-Space, social media and IoT, they were able to integrate them into library services with varying successes.

The study revealed that there is strong positive relationship between AI literacy skills and Innovative service delivery among the librarians. This finding concur with result of the related study conducted by Adeyeye and Oladokun, (2025), which revealed that when librarians demonstrate higher levels of digital/AI competence, there is greater likelihood of adopting and sustaining novel services, especially those driven by technology. This contradicted the report made by Osinulu (2021) that digital and service innovations (driven by ICT and user-centric approaches) are sustainable only when librarians align their skills, attitudes and roles with institutional strategy.

Conclusion

AI literacy is a critical determinant of librarians' capacity to deliver innovative and technology-enhanced services in the contemporary information environment. Enhancing librarians' AI competencies is therefore imperative for improving service quality, strengthening user engagement, and ensuring that the library remains responsive to emerging technological trends. Continuous professional development, institutional support, and strategic technological investment are essential to unlock the full potential of AI-driven innovation in library services at Northwest University, Kano.

Recommendations

Based on the findings of this study, the following recommendations are proposed:

1. The library management at Northwest University, Kano, should provide regular capacity-building workshops and professional training opportunities to enhance librarians' practical and applied competencies in using AI technologies for improved service delivery.
2. The university should allocate resources toward acquiring and maintaining AI-driven tools and infrastructure, thereby supporting librarians' readiness and positive disposition toward innovative service practices.
3. Librarians are encouraged to actively embrace and integrate AI tools into their daily operations to fully harness their potential in enhancing the quality and efficiency of library services.

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