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IMPACT OF ARTIFICIAL INTELLIGENCE (AI) IN ENHANCING LIBRARY SERVICES IN FEDERAL UNIVERSITY OF EDUCATION, ZARIA

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ABSTRACT

This study examined the impact of Artificial Intelligence (AI) in enhancing library services at the Federal University of Education, Zaria. The study was guided by four objectives, which were to examine the extent of AI adoption in library services, assess the perceived impact of AI on service delivery, identify the challenges hindering AI adoption and suggest strategies for improving AI integration. A quantitative survey research design was adopted. The population comprised 150 professional librarians and ICT staff of the University Library, from which a sample of 108 respondents was determined using the Krejcie and Morgan sample size determination table. Stratified random sampling was employed to ensure representation of professional librarians and ICT staff. Data were collected using a structured questionnaire developed in line with the study objectives. The instrument adopted a five-point Likert scale ranging from Strongly Agree to Strongly Disagree. A pilot study involving 20 librarians and ICT staff was proposed at the Federal University of Education, Adeyemi, to assess the clarity and reliability of the instrument. The data were intended to be analysed using descriptive statistics, including frequency counts, percentages, mean scores and standard deviations, with SPSS Version 26. The study focused on AI applications such as plagiarism detection, automated cataloguing and classification, chatbots, information retrieval and digital preservation. It also examined potential barriers, including inadequate ICT infrastructure, insufficient funding, limited staff competencies and the absence of clear institutional policies. The study proposed that improved infrastructure, adequate funding, continuous staff training, ethical guidelines and collaboration with technology providers could support effective AI integration. The study is expected to provide insights that can

guide the university library in adopting AI technologies to improve service efficiency, accessibility and responsiveness to users' information needs.

KEYWORDS: Artificial Intelligence, AI adoption, library services, service delivery, academic libraries, Federal University of Education, Zaria.

INTRODUCTION

Artificial Intelligence (AI) has become one of the most transformative technologies in higher education and library systems globally. It is defined as the simulation of human intelligence by machines programmed to think, learn, and solve problems (Kumar & Singh, 2023). Libraries, being at the heart of knowledge dissemination, have not been left out of this transformation. Across the world, AI is used for cataloging, information retrieval, reference services, plagiarism detection, and digital preservation, thereby revolutionizing library services (Adewojo, Amzat, & Abiola, 2024). In the Nigerian context, the demand for information resources is rapidly increasing due to the growth of tertiary education and research activities. However, libraries often struggle with limited manpower, outdated systems, and insufficient budgets to meet users' expectations (Musa & Adegboye, 2023). AI tools such as machine learning and natural language processing present opportunities to overcome these challenges by automating tasks and offering intelligent services that enhance user satisfaction.

The Federal University of Education, Zaria (FUE Zaria), as an emerging center of teacher education, research, and innovation, requires a functional library system that supports effective teaching, research, and community engagement. The integration of AI in its library services will potentially redefine how lecturers, students, and researchers access and use information. This aligns with global educational trends where libraries are adopting digital assistants, recommender systems, and smart cataloging for efficiency (Nair, 2025). AI applications also play a critical role in bridging the gap between physical and digital libraries. Tools such as chatbots provide round-the-clock support to users, while recommender systems suggest resources based on user preferences. By enhancing personalization, AI contributes to more effective learning and research outcomes (Okeke, 2024). For institutions like FUE Zaria, adopting AI in the library is not merely a technological trend but a strategic necessity.

Moreover, the Federal Government of Nigeria's push toward digital education and ICT adoption in universities makes AI adoption more urgent. The World Bank (2023) emphasizes that higher education institutions in Sub-Saharan Africa must embrace digital technologies to

remain globally competitive. Therefore, a university library such as that of FUE Zaria must adopt AI tools to align with these national and international digital transformation agendas. Despite its potential, AI adoption in Nigerian libraries is still slow. The few attempts at integrating AI tools remain underutilized due to infrastructural constraints, skill gaps among librarians, and insufficient funding (Shinde, Okoro, & Albright, 2024). Understanding how AI has been deployed and its actual contributions to library services in FUE Zaria is therefore essential.

This study is important because it investigates not only the presence of AI tools in FUE Zaria library but also their practical impact on enhancing service delivery. By focusing on cataloging, circulation, reference services, and digital preservation, the study provides insights into how AI is shaping the library's contribution to teaching, learning, and research. Ultimately, the introduction of AI in FUE Zaria library could position the institution as a leader in smart library innovation in Nigeria. This research therefore seeks to examine the impact of AI on library services, identifying its benefits, challenges, and strategies for improved adoption.

Statement of Problem

Library services in Nigerian universities continue to face persistent challenges that limit their effectiveness in supporting research and learning. Manual cataloging, inadequate staff, and outdated information retrieval systems often result in inefficiencies and user dissatisfaction (Musa & Adegboye, 2023). At FUE Zaria, these challenges hinder the ability of the library to meet the diverse needs of lecturers, students, and researchers. Globally, AI technologies have been successfully deployed in libraries to enhance service delivery. For example, AI-powered chatbots provide virtual reference services, recommender systems suggest relevant resources, and machine learning algorithms automate cataloging (Kumar & Singh, 2023). However, in Nigerian libraries, the adoption of these tools has been slow and inconsistent, leaving a gap in effective service delivery. The FUE Zaria library, in particular, is yet to fully integrate AI in its operations. While there are efforts toward ICT adoption, the use of intelligent systems for cataloging, circulation, and information retrieval remains minimal. This creates a disconnect between global best practices and the local reality of library services in the institution (Okeke, 2024).

Compounding this issue is the lack of adequate infrastructure and trained personnel to manage AI systems. Many librarians in Nigeria lack the digital literacy skills required to effectively use AI tools (Abubakar & Nwosu, 2024). Without proper training and investment,

AI adoption may remain superficial, failing to achieve its full potential in enhancing service delivery. Furthermore, ethical concerns such as data privacy, security, and algorithmic bias pose significant challenges. Shinde et al. (2024) argue that the absence of clear policies on AI use in libraries increases the risk of misuse and reduces trust among users. At FUE Zaria, these concerns may further discourage both librarians and users from embracing AI-based services. Another critical issue is the lack of empirical studies assessing AI adoption in Nigerian libraries. While global research has documented AI's contributions to library services, there is little evidence on its impact in Nigerian contexts, especially within newly established universities like FUE Zaria (Nair, 2025). This knowledge gap limits policymakers and administrators from making informed decisions. If left unaddressed, the slow pace of AI adoption could negatively impact the relevance of university libraries in Nigeria. Students and researchers may increasingly bypass libraries in favor of alternative digital platforms, thereby undermining the role of libraries in academic success (Adewojo et al., 2024).

Therefore, this study addresses a pressing need to evaluate the impact of AI in enhancing library services at FUE Zaria. By doing so, it will provide valuable insights into the opportunities, challenges, and strategies for optimizing AI adoption to improve service delivery.

Objective of the Study

The study seeks to identify the following:

1. To examine the extent of AI adoption in library services in Federal University of Education, Zaria.
2. To assess the perceived impact of AI in enhancing library services in Federal University of Education, Zaria.
3. To identify challenges in adopting AI in library services in Federal University of Education, Zaria.
4. To suggest strategies for improving AI integration in Federal University of Education, Zaria.

Research Questions

1. To what extent is artificial intelligence (AI) adopted in library services at the Federal University of Education, Zaria?

2. What is the perceived impact of artificial intelligence (AI) on the enhancement of library services at the Federal University of Education, Zaria?

3. What challenges hinder the adoption of artificial intelligence (AI) in library services at the Federal University of Education, Zaria?

4. What strategies can be adopted to improve the integration of artificial intelligence (AI) into library services at the Federal University of Education, Zaria?

Literature Review

The literature review examines the concept of AI in libraries, its application in service delivery, awareness and utilisation, the extent of adoption and the challenges associated with implementation.

Concept of Artificial Intelligence in Libraries

Artificial Intelligence (AI) is broadly defined as the simulation of human cognitive functions such as learning, reasoning, and problem-solving through computer systems (Kumar & Singh, 2023). In the context of libraries, AI has been conceptualized as the integration of intelligent systems capable of supporting library operations, from cataloging to information retrieval. Adewojo, Amzat, and Abiola (2024) observed that AI tools are not only capable of automating routine tasks but also of personalizing services to meet the unique needs of users. The concept of AI in libraries is rooted in the wider digital transformation agenda within higher education. Libraries have historically been central to research and teaching, but the increasing complexity of information needs requires smarter systems. AI applications such as natural language processing, machine learning, and data mining offer solutions to these emerging challenges (Okeke, 2024).

Globally, the adoption of AI in libraries is linked to the shift toward user-centered services. For example, chatbots provide interactive support, while recommender systems suggest resources tailored to individual user profiles. This ensures that libraries move beyond being static repositories of information to becoming dynamic platforms of knowledge interaction (Nair, 2025). In Nigeria, the conceptualization of AI in libraries is still evolving. Most university libraries remain focused on automation rather than true AI-based transformation (Abubakar & Nwosu, 2024). However, growing awareness of AI's potential is encouraging institutions like FUE Zaria to consider adopting AI tools to align with global best practices. The Federal Government's emphasis on ICT integration in higher education further supports this shift. According to World Bank (2023), universities in Sub-Saharan Africa must embrace digital technologies like AI to remain competitive in global academic spaces. Thus, AI in

libraries is not just an innovation but also a strategic necessity for institutions such as FUE Zaria.

From this perspective, AI is best understood not as a replacement for librarians but as an enabler of enhanced service delivery. It allows librarians to dedicate more time to specialized tasks such as research support and information literacy training while delegating repetitive tasks to intelligent systems (Shinde, Okoro, & Albright, 2024). Therefore, the concept of AI in libraries extends beyond technology; it represents a paradigm shift in how knowledge is managed, accessed, and used in academic environments.

AI and Library Service Delivery

AI is transforming the delivery of library services across the world. For instance, AI-powered chatbots allow users to access information round the clock without depending on staff availability (Okeke, 2024). These virtual assistants respond to frequently asked questions, guide users in locating resources, and even provide links to electronic databases. Cataloging and classification, which traditionally consume significant librarian time, have also benefited from AI. Machine learning algorithms now automate metadata creation and subject classification, improving accuracy and efficiency (Kumar & Singh, 2023). This ensures quicker access to resources and reduces the workload of library staff. Another area of impact is in reference services. AI tools provide personalized recommendations by analyzing user search patterns. For example, recommender systems embedded in online public access catalogs (OPACs) suggest additional books or articles that match a user's research interests (Nair, 2025). This improves the research experience and saves time for both users and librarians.

AI also supports digital preservation, a critical function for academic libraries. Intelligent systems detect and repair corrupted digital files, ensuring the longevity of institutional repositories (Adewojo et al., 2024). For a university like FUE Zaria, this is essential to safeguard theses, dissertations, and academic publications. In circulation services, AI systems track borrowing patterns and predict resource demand, enabling better collection development and acquisition decisions (Shinde et al., 2024). Such predictive analytics help libraries align their collections with user needs. Despite these advancements, Nigerian libraries are yet to fully integrate AI into service delivery. While automation systems exist, true AI capabilities such as predictive analytics and intelligent cataloging remain underdeveloped (Abubakar & Nwosu, 2024). This gap highlights the urgent need for empirical research on AI adoption in Nigerian libraries. In summary, AI holds enormous

potential to improve library service delivery, but its success depends on infrastructural readiness, librarian training, and policy support.

Awareness and Utilization of AI in Libraries

Awareness is a prerequisite for adoption. Studies indicate that awareness of AI tools among Nigerian librarians is still limited (Musa & Adegboye, 2023). Many librarians associate AI only with futuristic technologies without recognizing its practical applications in cataloging, reference services, or plagiarism detection. In contrast, universities in advanced countries are already using AI-driven platforms extensively. For instance, AI-based plagiarism detection tools such as Turnitin and Grammarly are now standard in academic institutions (Yang, 2025). Such tools demonstrate that AI is not an abstract concept but an everyday resource in research and learning. At FUE Zaria, awareness of AI's role in enhancing library services remains low. While some librarians are exposed to ICTs, fewer have in-depth knowledge of AI systems. This lack of awareness limits utilization even where basic AI tools are available (Okeke, 2024). Utilization is also influenced by professional training. Librarians who have undergone ICT or AI-related training tend to embrace AI tools more readily. Abubakar and Nwosu (2024) argued that professional development workshops are essential for bridging the awareness gap in Nigerian libraries.

The level of awareness among users, particularly students and lecturers, also determines the extent of utilization. When users are unaware that AI-driven recommender systems or chatbots exist, they may continue to depend on traditional methods of information retrieval (Shinde et al., 2024). Globally, awareness campaigns and training programs have proven effective in boosting adoption. Nair (2025) reported that universities in Asia that conducted librarian training on AI technologies recorded higher utilization rates. This suggests that similar initiatives could work in Nigerian contexts. Thus, creating awareness and promoting utilization is not only about providing infrastructure but also about developing human capacity and changing attitudes toward technology.

Challenges of AI Adoption in Nigerian Libraries

Despite its potential, AI adoption in Nigerian libraries faces several barriers. The foremost challenge is poor ICT infrastructure. Inadequate internet connectivity, unreliable electricity, and insufficient computing resources make it difficult to implement AI-based systems (World Bank, 2023). Financial constraints also pose a serious limitation. Many libraries operate under restricted budgets, which prioritize book acquisition over digital transformation.

Without sustained funding, AI adoption remains difficult (Musa & Adegboye, 2023). Another challenge is the lack of digital literacy among librarians. Abubakar and Nwosu (2024) noted that many librarians in Nigeria lack the technical skills needed to manage AI tools, which often require advanced training in data analysis, programming, or information systems. Resistance to change is another barrier. Some librarians perceive AI as a threat to their jobs, fearing that automation could make their roles redundant (Okeke, 2024). Such perceptions discourage proactive adoption of AI technologies.

Ethical concerns, including data privacy, algorithmic bias, and intellectual property rights, also complicate adoption. Shinde et al. (2024) emphasized that without clear policies, AI systems could expose libraries and users to legal and ethical risks. Furthermore, lack of government policy support contributes to the problem. While the Nigerian government has promoted ICT adoption broadly, specific policies on AI integration in libraries are yet to be developed (Adewojo et al., 2024). These challenges collectively explain why AI adoption in Nigerian libraries is still limited compared to global counterparts. Addressing them requires a holistic approach involving infrastructure development, training, funding, and policy support.

Extent of Use of AI in Libraries

The extent of AI use in libraries globally has grown significantly, but disparities exist between advanced and developing nations. In developed contexts, AI is widely deployed across cataloging, information retrieval, digital preservation, and user interaction. Systems like Ex Libris Primo and EBSCO Discovery Service use AI-driven algorithms to deliver personalized search results, thereby demonstrating a high level of adoption (Yang, 2025). By contrast, in Nigerian libraries, including Federal University of Education (FUE) Zaria, AI adoption remains at an early stage, with most services still rooted in traditional automation rather than advanced intelligent systems (Abubakar & Nwosu, 2024). One area of visible AI use in Nigerian universities is plagiarism detection. Tools such as Turnitin and Grammarly have become part of standard academic practice, indicating that at least one dimension of AI is in active use (Okeke, 2024). However, beyond plagiarism detection, applications such as chatbots for reference services or predictive analytics for circulation remain rare. This shows that the extent of AI utilization is narrow and focused on isolated tools rather than holistic integration across library operations. AI has also been used in digital preservation internationally, where machine learning algorithms detect file corruption, automate metadata tagging, and ensure long-term access to institutional repositories (Nair, 2025). In FUE Zaria, digital preservation is still largely manual, with librarians responsible for uploading,

categorizing, and safeguarding electronic theses and dissertations. This reflects limited use of AI to manage the lifecycle of digital content.

Reference services globally have benefitted from AI-powered chatbots that provide round-the-clock assistance (Kumar & Singh, 2023). In many Asian and European universities, chatbots serve as digital reference librarians capable of answering queries in real time. Nigerian libraries, however, rarely employ such systems, which means that reference support is constrained by librarian availability and working hours. Cataloging is another area where the extent of AI use is uneven. While international libraries deploy machine learning to automate subject classification and metadata generation, Nigerian libraries continue to rely on librarians' manual input (Shinde, Okoro, & Albright, 2024). This increases processing time and limits efficiency in catalog management. Nevertheless, the potential for AI utilization in FUE Zaria is promising. Musa and Adegboye (2023) argued that Nigerian academic libraries show readiness for AI adoption in areas such as recommendation systems and circulation analysis, provided adequate infrastructure is in place. The growing awareness of AI in the Nigerian academic community also suggests that the extent of use will expand in the coming years. In conclusion, the current extent of AI use in libraries, particularly in Nigeria, is still limited to specific tools like plagiarism detection, with minimal adoption in cataloging, reference, or digital preservation. For FUE Zaria, the challenge is not the absence of AI potential but the lack of systematic integration across multiple library functions.

Challenges of AI Adoption in Libraries

AI adoption in libraries faces multiple challenges that hinder its integration, especially in developing contexts such as Nigeria. One of the foremost issues is inadequate ICT infrastructure. According to World Bank (2023), many Sub-Saharan African universities struggle with unreliable internet connectivity, limited bandwidth, and frequent power outages, all of which make AI-based systems difficult to sustain. FUE Zaria, like many Nigerian universities, experiences these infrastructural limitations, slowing the pace of digital transformation. Financial constraints are another major barrier. Libraries often operate under constrained budgets, and investments are usually directed toward acquiring print resources rather than emerging technologies (Musa & Adegboye, 2023). Since AI tools often require costly software, specialized hardware, and regular upgrades, most university libraries cannot prioritize them within existing financial frameworks. A lack of skilled personnel compounds the problem. AI implementation requires librarians with advanced knowledge in areas such as data science, machine learning, and information systems. However, Abubakar and Nwosu

(2024) observed that most Nigerian librarians lack such technical expertise, with their ICT training limited to automation and database use. This skills gap means that even when AI tools are available, they may not be fully utilized.

Resistance to change also poses a barrier. Some librarians perceive AI as a threat to job security, fearing that automation could replace their roles (Okeke, 2024). This perception reduces enthusiasm for adopting AI tools and creates institutional reluctance to invest in them. Ethical and legal concerns further complicate adoption. AI systems often raise questions about data privacy, intellectual property rights, and algorithmic bias (Shinde et al., 2024). Without clear institutional policies, libraries may avoid adopting AI due to the risks associated with storing and processing sensitive user data. Another challenge is the absence of government and institutional policy support. While Nigeria's National ICT Policy encourages digitalization, there are no specific frameworks guiding AI integration in libraries (Adewojo, Amzat, & Abiola, 2024). This policy vacuum leaves universities without clear standards or guidelines to follow in implementing AI-based systems. Finally, cultural attitudes and user readiness also play a role. Users who are unfamiliar with AI tools may distrust their accuracy or prefer traditional librarian-mediated services. Yang (2025) noted that user acceptance is as important as institutional readiness in determining AI adoption outcomes.

Research Design Adopted for the Study

The study adopted a quantitative research design in the form of a survey. The design was considered appropriate because the study aimed to collect measurable data from respondents to establish patterns and relationships between variables. A structured questionnaire served as the principal instrument for data collection. It captured respondents' perceptions of the extent, challenges and effectiveness of Artificial Intelligence (AI) adoption in enhancing library services. The survey design also facilitated statistical analysis, which provided a basis for drawing conclusions and making recommendations.

Population of the Study

The population of the study comprised 150 professional librarians and ICT staff employed in the University Library of the Federal University of Education, Zaria. These categories of staff were included because they were directly involved in information organisation, ICT operations, digital services and decision-making relating to technology adoption in the

library. Their responsibilities made them relevant respondents for assessing the impact of AI on library service delivery.

Sample and Sampling Technique

The sample size was determined using Krejcie and Morgan's (1970) sample size determination table, which recommended approximately 108 respondents for a population of 150. Consequently, 108 participants were selected for the study. A stratified random sampling technique was employed to ensure adequate representation of the different categories of staff. The population was divided into two strata: professional librarians and ICT staff. Respondents were then randomly selected from each stratum in proportion to its representation in the population.

Instrument for Data Collection

The main instrument for data collection was a structured questionnaire developed by the researcher in line with the objectives of the study. The questionnaire consisted of two sections:

Section A: Demographic information, including gender, years of experience and job category.

Section B: Items relating to the four research objectives, namely the extent of AI adoption in library services, its perceived impact on library operations and user satisfaction, challenges associated with AI adoption and strategies for improving AI integration in library services.

The questionnaire items were structured on a five-point Likert scale: Strongly Agree (SA) = 5, Agree (A) = 4, Undecided (U) = 3, Disagree (D) = 2 and Strongly Disagree (SD) = 1.

The sample questionnaire items covered the adoption of AI-based plagiarism detection tools, AI-powered cataloguing and classification systems, chatbots for reference services, improvements in information retrieval and digital preservation, challenges relating to ICT infrastructure, funding and staff skills, as well as strategies involving staff training, institutional policies and collaboration with technology providers.

Pilot Study

A pilot study was conducted at the Federal University of Education, Adeyemi, involving 20 librarians and ICT staff. The pilot study was used to assess the clarity, reliability and validity of the questionnaire items. The reliability of the instrument was determined using Cronbach's Alpha, with a coefficient of 0.70 or above considered acceptable. Feedback obtained from the

pilot study was used to refine and improve the questionnaire before the main data collection exercise.

Procedure for Data Collection

The researcher personally administered the questionnaires with the assistance of trained research assistants. Official permission was obtained from the University Librarian and the ICT Directorate of the Federal University of Education, Zaria. Respondents were informed about the purpose of the study, assured of the confidentiality of their responses and encouraged to participate voluntarily. The questionnaires were distributed and collected within a two-week period to facilitate timely data collection and encourage a high response rate.

Procedure for Data Analysis

The collected data were coded and analysed using the Statistical Package for the Social Sciences (SPSS), Version 26. Descriptive statistics, including frequency counts, percentages, mean scores and standard deviations, were used to answer the research questions. A criterion mean of 2.50 was adopted for interpreting the questionnaire responses. Mean scores of 2.50 and above indicated agreement, while scores below 2.50 indicated disagreement. The results were presented in tables and charts and interpreted in relation to the objectives of the study.
Since the questionnaire contains no completed response frequencies for Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) and Strongly Disagree (SD), the presentation below is a provisional example based on the study objectives and proposed sample of 108 respondents. The figures are illustrative, not actual field-survey findings. They should be replaced with the responses collected from the 108 participants before the report is submitted.

Presentation and Discussion of Findings

This section presents and discusses the findings on the impact of Artificial Intelligence (AI) in enhancing library services at the Federal University of Education, Zaria. The presentation is organised according to the four research questions, focusing on the extent of AI adoption, its perceived impact on library services, the challenges associated with adoption and strategies for improving AI integration.

Presentation of Data

Research Question One: To what extent is artificial intelligence (AI) adopted in library services at the Federal University of Education, Zaria? Table 1: Extent of AI Adoption in Library Services.

Questionnaire item	Mean	SD	Decision
AI-based plagiarism detection tools are adopted	3.49	1.34	Agree
AI-powered cataloguing and classification tools are used	2.62	1.32	Agree
Chatbots or virtual assistants are available for reference services	2.50	1.29	Agree
Grand mean	**2.87**	**—**	**Agree**

Source: Field Survey, 2026.

The grand mean of 2.87 exceeds the criterion mean of 2.50. This suggests a positive assessment of AI adoption overall, with plagiarism detection receiving the highest mean score. The mean for chatbots is exactly at the decision threshold.

Research Question Two: What is the perceived impact of artificial intelligence (AI) on the enhancement of library services at the Federal University of Education, Zaria?

Table 2: Perceived Impact of AI on Library Services.

Questionnaire item	Mean	SD	Decision
AI improves the speed and accuracy of information retrieval	3.75	1.24	Agree
AI enhances digital preservation and access to electronic resources	3.58	1.28	Agree
AI contributes positively to user satisfaction	3.66	1.26	Agree
Grand mean	**3.66**	**—**	**Agree**

Source: Field Survey, 2026.

The grand mean of 3.66 exceeds the criterion mean of 2.50, suggesting that respondents generally agree with the potential benefits of AI for library service delivery. Improving the speed and accuracy of information retrieval has the highest mean score among the three items.

Research Question Three: What challenges hinder the adoption of AI in library services at the Federal University of Education, Zaria?

Table 3: Challenges of AI Adoption in Library Services.

Questionnaire item	Mean	SD	Decision
Lack of ICT infrastructure limits AI adoption	3.90	1.22	Agree
Insufficient funding affects AI integration	3.93	1.23	Agree
Librarians and ICT staff lack the necessary AI skills	3.78	1.20	Agree
Grand mean	**3.87**	**—**	**Agree**

Source: Field Survey, 2026.

The grand mean of 3.87 suggests that respondents would generally agree that the identified factors pose challenges to AI adoption. Insufficient funding has the highest mean score, followed by inadequate ICT infrastructure. These results are examples based on the supplied figures, not confirmed findings from the university.

Research Question Four: What strategies can be adopted to improve the integration of AI into library services at the Federal University of Education, Zaria?

Table 4: Strategies for Improving AI Integration in Library Services.

Questionnaire item	Mean	SD	Decision
Training librarians and ICT staff improves AI integration in library services.	4.14	1.03	Agree
Adequate funding and ICT infrastructure promote effective AI adoption.	4.07	1.10	Agree
Developing institutional AI policies improves the integration of AI into library services.	4.03	1.02	Agree
Grand mean	**4.08**	**—**	**Agree**

Source: Field Survey, 2026.

The grand mean of 4.08 exceeds the criterion mean of 2.50, suggesting that respondents would generally agree that training librarians and ICT staff, providing adequate funding and ICT infrastructure and developing institutional AI policies are important strategies for improving AI integration. Staff training has the highest mean score (4.14), followed by adequate funding and ICT infrastructure (4.07) and institutional AI policies (4.03). These figures are illustrative and should be replaced with results calculated from the actual questionnaire responses before being reported as research findings.

DISCUSSION OF FINDINGS

The discussion is organised according to the four research questions and relates the issues examined in the study to relevant empirical literature published between 2022 and 2026.

Extent of AI Adoption in Library Services

The extent of AI adoption in academic libraries can be assessed through its application in plagiarism detection, cataloguing and classification, reference services and other library operations. AI adoption should be considered in terms of actual implementation rather than awareness of available technologies alone. A systematic review by Ayinde et al. (2026) found that AI applications in academic libraries covered technical services, reference and information services, circulation, collection development, information literacy and

professional development. The review also identified funding as a major institutional barrier to adoption. These findings suggest that comprehensive AI integration requires libraries to move beyond isolated applications towards broader implementation across service areas. Similarly, Mustapha and Yusuf (2023) examined AI adoption for improving library service delivery in academic libraries in Kwara State, Nigeria, while Achugbue (2025) discussed the AI skills required by librarians to support emerging library technologies. Together, these studies provide a Nigerian context for examining both the practical use of AI tools and the capacity of library personnel to implement them.

For the Federal University of Education, Zaria, the key issue is therefore whether AI tools have been incorporated into routine library operations and the extent to which staff use them. If the actual survey results show greater adoption of plagiarism detection tools than AI-powered cataloguing and virtual reference services, this would suggest that adoption is concentrated in selected applications rather than distributed across the library's full range of services.

Perceived Impact of AI on the Enhancement of Library Services

Artificial intelligence has the potential to enhance library services by improving information retrieval, supporting digital preservation and providing more responsive assistance to library users. These applications can reduce the time required to perform routine tasks and help librarians deliver more efficient services. Obi (2026), in a systematic review of AI in library services, identified cataloguing, recommendation systems, chatbots, digital preservation and predictive analytics as important areas in which AI can support library operations. The review highlights the potential of AI to improve information access and service delivery. Similarly, a systematic review by Ayinde et al. (2026) identified reference and information services as a prominent area of AI application in academic libraries. The authors also emphasised the need for librarians to acquire additional competencies to manage AI-enabled communication tools.

In the context of the Federal University of Education, Zaria, these findings suggest that AI could support faster searching, improved access to electronic resources and more responsive reference services. However, the actual benefits experienced by the university library would depend on whether the relevant technologies are available, appropriately implemented and effectively used by library staff.

Challenges Hindering AI Adoption in Library Services

The adoption of AI in academic libraries may be constrained by inadequate ICT infrastructure, insufficient funding, limited technical expertise and the absence of institutional policies. These challenges can prevent libraries from acquiring appropriate systems, maintaining technological infrastructure and developing the staff competencies required for effective implementation.

John et al. (2026), in a study of academic libraries in the Mubi Zone of Nigeria, reported that awareness of AI was relatively high while actual adoption remained limited and largely experimental. The study identified inadequate ICT infrastructure, limited technical expertise, insufficient funding and the absence of institutional AI policies as major challenges. Ayinde et al. (2026) similarly identified funding as a major institutional barrier in their systematic review of AI adoption in academic libraries. Their findings indicate that successful implementation requires institutional commitment and investment in the resources needed to sustain AI-based services. Achugbue (2025) also highlighted the importance of developing librarians' competencies to support the use of AI technologies in academic library operations. This reinforces the need for continuous professional development alongside investment in technological infrastructure.

For the Federal University of Education, Zaria, these studies provide a basis for investigating whether similar challenges affect AI adoption. If the actual survey results identify infrastructure, funding and skills as major constraints, the findings would suggest that technological investment should be accompanied by staff development and institutional support.

Strategies for Improving AI Integration in Library Services

Improving AI integration requires a coordinated approach involving staff training, sustainable funding, appropriate institutional policies and collaboration with technology providers. These strategies can help libraries identify suitable AI applications, prepare staff for implementation and establish procedures for responsible use.

John et al. (2026) recommended investment in ICT infrastructure, staff capacity development and policy frameworks to support sustainable AI adoption in Nigerian academic libraries. Their findings suggest that awareness alone is insufficient to ensure effective implementation. Ayinde et al. (2026) also emphasised retraining librarians to develop the competencies needed to manage AI-enhanced communication tools. This indicates that training should extend beyond basic awareness to practical skills in using, evaluating and supervising AI

applications. In addition, Obi (2026) discussed AI applications across cataloguing, recommendation systems, virtual assistance and digital preservation, providing a basis for libraries to identify priority areas for implementation.

For the Federal University of Education, Zaria, an effective strategy would involve assessing the library's technological readiness, identifying the services most likely to benefit from AI, training librarians and ICT personnel, allocating adequate funding and developing institutional guidelines on data privacy, accuracy and accountability. Collaboration with technology providers and other academic libraries could further support implementation and knowledge sharing.

CONCLUSION

The study examined the impact of Artificial Intelligence (AI) in enhancing library services at the Federal University of Education, Zaria. The study focused on the extent of AI adoption in library services, its perceived impact on service delivery, the challenges associated with its adoption and strategies for improving AI integration. The study highlights the potential of artificial intelligence to improve library operations through automated cataloguing and classification, faster information retrieval, AI-powered reference services, plagiarism detection and improved access to electronic resources. The integration of AI can also contribute to more efficient service delivery, improved user satisfaction and better access to relevant information. However, the effective use of these technologies depends on adequate ICT infrastructure, sufficient funding, staff competence and appropriate institutional policies. Furthermore, challenges such as inadequate technological infrastructure, limited funding, insufficient AI-related skills and the absence of clear implementation policies may hinder the successful adoption of AI in academic libraries. Addressing these challenges requires a coordinated approach involving library management, the university administration, librarians and ICT personnel. In conclusion, artificial intelligence offers significant opportunities for enhancing library services at the Federal University of Education, Zaria. Its successful integration requires sustained investment in technology, continuous professional development and institutional support. The library should therefore adopt a systematic approach to AI implementation to improve service efficiency, accessibility and responsiveness to users' information needs.

RECOMMENDATIONS

Based on the objectives of the study and the issues identified in the literature, the following recommendations are proposed:

1. Provision of adequate ICT infrastructure: The management of the Federal University of Education, Zaria should provide reliable internet connectivity, modern computers, adequate power supply and appropriate software to support the effective implementation of AI in library services.

2. Adequate funding for AI integration: The university administration should allocate sufficient funds for acquiring, implementing and maintaining AI tools and systems. Budgetary provision should also cover software licences, technical support and regular system upgrades.

3. Continuous training and professional development: The university library should organise regular training programmes, workshops and seminars to equip librarians and ICT personnel with the knowledge and skills required to use AI tools effectively in cataloguing, classification, reference services, information retrieval and other library operations.

4. Gradual adoption of appropriate AI tools: The library should identify its priority service needs and introduce suitable AI applications gradually. Priority areas may include AI-powered reference chatbots, automated cataloguing, plagiarism detection tools and intelligent information retrieval systems.

5. Development of institutional AI policies: The university management should develop clear policies and guidelines governing the use of AI in library services. These policies should address data privacy, information security, copyright, transparency, ethical use and human oversight of AI-generated outputs.

6. Collaboration with ICT experts and technology providers: The university library should collaborate with the institution's ICT unit, relevant technology providers and other academic libraries to obtain technical assistance, share experiences and support the effective implementation of AI-based services.

7. Awareness creation among library users: The library should educate users about available AI-supported services and provide guidance on their appropriate use. This may be achieved through user education programmes, demonstrations, library orientations and online tutorials.

8. Regular monitoring and evaluation: The library management should periodically assess the effectiveness of AI applications using indicators such as service delivery time, accuracy of information retrieval, user satisfaction, system reliability and cost-effectiveness. Findings from these assessments should guide improvements in AI implementation.

9. Maintenance of human-centred library services: AI should complement rather than completely replace professional librarians. Librarians should continue to provide expert guidance, verify AI-generated information and assist users with complex information needs.

10. Strengthening institutional support for innovation: The university administration should encourage innovation and establish an enabling environment for AI adoption through supportive leadership, appropriate policies, staff participation and long-term planning.

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