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Exploring Artificial Intelligence (AI) and Inclusive Library Services for Sustainable Development in Federal Polytechnic, Northwest, Nigeria.

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Abstract
This study examines the role of Artificial Intelligence (AI) in strengthening inclusive library services in Federal Polytechnics in North-West Nigeria. It investigates librarians' level of awareness of AI applications, the extent to which these tools are used, and whether they contribute to inclusive service delivery. A descriptive survey design was adopted, and data were collected through structured questionnaires administered to 217 library personnel across the selected institutions. The findings show that awareness of AI is relatively high among respondents. Many librarians indicated that they understand how AI tools can support library operations, with a mean score of 2.55, and several reported being comfortable using such tools in their daily tasks. However, actual implementation remains limited. The availability of AI technologies in routine library services recorded a lower mean score of 2.43, while the absence of clear institutional policies guiding AI adoption was reflected in a mean of 2.11. Findings on inclusive services, respondents generally agreed that their libraries provide accessible services, including some support for users with special needs and remote access to resources (mean = 2.64). Nevertheless, communication about these services appears insufficient (mean = 2.43). There was strong agreement (mean = 2.82) that improved awareness and responsible use of AI could enhance inclusive service delivery. In conclusion,

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the study suggests that while awareness is growing, practical integration of AI remains moderate and requires stronger institutional support.

Keywords: Artificial Intelligence (AI), Inclusive Library Services, Sustainable Development, Federal Polytechnics, North-West Nigeria.

Introduction

Over the past few decades, digital technology has changed the way information is created, stored, and shared. The shift has been steady but profound, affecting nearly every sector of society. One of the most talked-about developments in recent years is Artificial Intelligence (AI). In simple terms, AI refers to computer systems that can perform tasks that normally require human thinking, such as learning from experience, identifying patterns, and making decisions (Russell & Norvig, 2021). Traditionally, libraries have focused on organizing knowledge and ensuring that people have fair access to information. Today, however, expectations are higher. With the growth of digital collections and online learning, users want quick, personalized, and seamless services. In response, some libraries have introduced chatbots to answer reference questions, automated cataloguing systems to organize materials, intelligent search tools to improve discovery, plagiarism detection software, and recommendation systems that suggest relevant resources (Cox et al., 2019; Panda & Kaur, 2021).

Inclusive library services are built on the idea that every user regardless of physical ability, economic background, language, or prior educational exposure should have equal access to information (Jaeger et al., 2015). In modern libraries, inclusion goes far beyond providing a physical building. It involves ensuring digital access, offering assistive technologies, designing user-friendly systems, and making electronic resources accessible to all (Mehra & Gray, 2020). AI-driven tools such as speech-to-text applications, screen readers, automated translation software, and personalized learning platforms can help remove barriers that many users face (Salisu, 2026).

At the international level, conversations about AI in libraries are often linked to broader development goals. Sustainable development in education emphasizes equal access to quality learning, innovation, and the reduction of inequalities (Aithal & Aithal, 2020). In many developed countries, academic and technical institution libraries have already experimented with AI-based discovery systems and virtual assistants capable of responding instantly to users' questions (Huang & Rust, 2021). These tools proved particularly useful during the COVID-19 pandemic, when physical access to campuses was restricted. The disruption highlighted the importance of digital preparedness, prompting many institutions to invest more seriously in intelligent systems to maintain academic continuity. While progress has been noticeable in some parts of the world, other regions are still taking early steps toward full integration.

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Across Africa, the adoption of AI in library services is gradually emerging but remains uneven. Scholars such as Chisita and Raju (2020) note that many African libraries struggle with limited infrastructure and funding. Challenges like unstable electricity, weak internet connectivity, and restricted budgets often slow technological advancement. Despite these realities, awareness is increasing. Nigeria reflects a similar pattern. Over the past two decades, academic libraries have made steady progress in automation. The introduction of integrated library management systems, institutional repositories, and access to electronic databases marked significant milestones (Omeluzor et al., 2017). However, moving from basic automation to more advanced intelligent systems has been slower. While some university libraries are experimenting with innovative digital services, polytechnic libraries frequently face tighter financial constraints and limited technical expertise (Salaam & Okezie, 2018).

In North-West Nigeria, inclusive library services carry particular importance. The region is socially and economically diverse, and students enter tertiary institutions with varying levels of digital exposure. Some come from communities where access to advanced technologies is minimal. Others may face physical or learning challenges that require additional support. Libraries that incorporate assistive technologies can help bridge these gaps. For example, AI-supported screen readers can assist visually impaired students, while translation tools may support those who struggle with language differences. Despite these possibilities, there is still limited empirical research focusing specifically on AI adoption in Federal Polytechnic libraries within the region. Much of the existing Nigerian literature concentrates on general ICT use and library automation (Nwalo, 2013; Okiy, 2014), with less attention given to AI as a means of promoting inclusion and sustainable growth in polytechnic settings. For this reason, examining the awareness, availability, and practical application of AI technologies in Federal Polytechnic libraries is both timely and necessary.

Statement of Problem

Libraries in tertiary institutions are expected to do far more than store books on shelves. They are meant to function as active learning spaces that adjust to the changing needs of students and lecturers. In a time when digital technology shapes how information is accessed and shared, this role increasingly includes engaging with emerging tools such as Artificial Intelligence (AI). Across many parts of the world, academic libraries are beginning to experiment with chatbots, smart search systems, automated cataloguing support, and assistive technologies designed to make services quicker and more accessible (Cox et al., 2019; Huang & Rust, 2021). In principle, Federal Polytechnic libraries in North-West Nigeria should be moving along the same path using such tools not only to update their operations but also to widen access and strengthen inclusive services within their institutions.

The situation on the ground, however, suggests that this transition is not yet fully in place. While a number of polytechnic libraries have adopted basic automation systems and digital catalogues, the move toward more advanced systems that can respond intelligently to users'

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needs remains unclear. Persistent challenges such as limited funding, irregular power supply, weak internet connectivity, and shortages of technical expertise continue to slow progress (Omeluzor et al., 2017; Salaam & Okezie, 2018). In many cases, efforts have focused on maintaining basic ICT services rather than exploring more advanced tools that could significantly improve user experience.

This gap carries real consequences. Polytechnic students often come from varied social and educational backgrounds, and many rely heavily on library services to support both academic learning and practical training. If these libraries are unable to provide responsive and technology-supported services, students may struggle to access the quality information needed to compete in today's job market. The concern is even greater for students with disabilities or those who have limited digital skills. Inclusive library services are intended to ensure that access to knowledge is not restricted by physical limitations or technological barriers (Jaeger et al., 2015). Yet in many institutions, assistive tools and adaptive technologies are either unavailable or rarely used, which can unintentionally exclude certain groups of users.

Librarians are also part of this challenge. The success of any technological innovation depends largely on the people expected to implement it. Where professional training is insufficient or institutional policies are unclear, librarians may feel unsure about adopting new systems. Some may even view them as complicated additions rather than helpful tools. As a result, there is little concrete data on how aware librarians are of AI tools, how extensively such tools are being used, what ethical considerations guide their adoption, and how all these factors affect inclusive service delivery. This therefore, creates the need for this study.

Objectives

The main objective of the study Exploring Artificial Intelligence (AI) and Inclusive Library Services for Sustainable Development in Federal Polytechnic North-West Nigeria. Specifically, the study sought to:

1. examine AI use among librarians of federal polytechnics in Northwest, Nigeria; and
2. identify the availability of inclusive library services in federal polytechnics in Northwest, Nigeria

Literature Review

A number of recent studies have looked closely at how librarians are responding to emerging technologies in their workplaces. Findings from Eiriemiokhale and Sulyman (2023), Ajav and Tor-Akwer (2024), and Isiaka et al. (2024) suggest that awareness is gradually improving. Many librarians have at least heard of tools such as chatbots, Dynamed platforms, and even facial recognition systems. However, knowing about these tools is not the same as using them. Across these studies, actual implementation remains quite limited. The reasons are not surprising: unstable internet connections, weak ICT infrastructure, erratic power supply, and

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gaps in technical know-how continue to make adoption difficult. Even so, librarians tend to view these technologies positively. They recognize that such tools could reduce routine workload, speed up information searches, and make it easier to connect users with relevant materials.

Other researchers have gone further to examine how confident librarians feel about working with these technologies. Achugbue (2024), for instance, found that many librarians in South-South Nigeria appreciate the relevance of these tools but admit they need more structured training to use them effectively. Similar observations were made by Oniovoghai et al. (2023) and Lo (2024), who noted that practical exposure is often lacking. In addition to technical skills, there are also concerns about understanding the ethical side of these technologies. Lo (2024) proposed a structured approach to training that combines skill development with ethical awareness, arguing that both are necessary if libraries are to move forward responsibly. Taken together, these studies highlight a clear need for continuous professional development.

When it comes to actual deployment, progress appears modest. Moustapha and Yusuf (2023), studying university libraries in Kwara State, found that technology use is often confined to basic functions such as security checks or simple reference assistance. More advanced applications, including smart cataloguing systems or RFID tracking, are still rare. Resistance to change, limited technical capacity, and infrastructure challenges continue to slow down progress. Yet, despite these constraints, librarians generally agree that these tools could significantly enhance service delivery if adequate support were provided.

Ethical concerns have also received attention in the literature. Wusu (2023) stressed that introducing new technologies into libraries must be accompanied by clear safeguards. Issues such as user privacy, fairness, transparency, and protection of intellectual freedom cannot be overlooked. The study recommended that libraries develop clear policies to guide responsible use and prevent unintended harm. Finally, it is worth noting that technology alone does not guarantee effective service. Studies by Hamid and Younus (2021), Hussain and Richardson (2024), and Aulawi and Mustajib (2022) remind us that communication skills remain central to library work. Strong communication fosters teamwork among staff, builds trust with users, and eases the transition when new systems are introduced. Even as libraries adopt new tools, these human skills continue to shape the quality of service delivered.

Methodology

The study adopts a descriptive survey design. The population of the study comprised professional librarians, para-professionals, and library officers working in Federal Polytechnics located within the North-West geopolitical zone of Nigeria. The states in this zone include Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto, and Zamfara. However, it is important to clarify that Sokoto State does not have a Federal Polytechnic; therefore, it was excluded from the population. The total number of eligible library personnel across the

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remaining states was 697. These individuals were considered suitable respondents because they are directly involved in delivering library services and are therefore well positioned to provide informed views on AI practices and inclusive service delivery within their institutions. To determine the sample size, the Research Advisors (2006) Sample Size Table was consulted using a 95% confidence level and a 5% margin of error. Based on a population of 697, the table recommends a sample size of 234 respondents. Data were collected through a structured questionnaire. After collection, the responses were coded and analyzed using descriptive statistical tools. Specifically, simple percentages and frequency counts were used to summarize patterns in responses, while mean scores and standard deviation helped to interpret the level of agreement on key items. The findings were presented in tables to make them clear and easy to follow. Descriptive statistics were also used to present and interpret the results.

Results

Out of the 234 questionnaires distributed, 221 were correctly completed and returned, representing a high response rate. The result was presented based on the research objectives in the Tables below:

Table 1: Biodata of the respondents

Institution	**Freq**	**Percentage**
Federal	118	54.38
State	99	45.62
Total	**217**	**100.00**
Gender	**Freq**	**Percentage**
Male	127	58.53
Female	90	41.47
Total	**217**	**100.00**
Designation	**Freq**	**Percentage**
Asst. Librarian	39	17.97
Librarian II	47	21.66
Librarian I	51	23.50
Senior Librarian	43	19.82
Principal Librarian	21	9.68
Chief Librarian	16	7.37
Total	217	100.00
Work Experience	**Freq**	**Percentage**
1-5	59	27.19
6-10	61	28.11
11-15	49	22.58
16 above	48	22.12
Total	**217**	**100.00**

Source: *Field Survey, 2026*

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The above table revealed that 118 respondents (54.38%) were from Federal Polytechnics, while 99 respondents (45.62%) were from State Polytechnics. This indicates slightly higher representation from Federal institutions, providing a balanced view of library services across both sectors. Regarding gender, 127 respondents (58.53%) were male and 90 respondents (41.47%) were female, suggesting a male-dominated workforce in the sampled libraries.

In terms of professional designation, the largest group of respondents were Librarian I (23.50%), followed by Librarian II (21.66%) and Senior Librarians (19.82%). Assistant Librarians accounted for 17.97%, while Principal Librarians (9.68%) and Chief Librarians (7.37%) made up the remainder. This spread indicates that responses were collected from both junior and senior staff, ensuring a comprehensive perspective on library operations. Work experience was fairly evenly distributed, with 27.19% having 1–5 years, 28.11% having 6–10 years, 22.58% having 11–15 years, and 22.12% having 16 years and above, demonstrating that respondents included both relatively new and experienced staff members.

Table 2: AI use to promote inclusive library services in Federal Polytechnics in Northwest, Nigeria.

SN	Opinion	SA	A	D	SD	$\bar{x}$	Std	Dec.
1	I have a good understanding of how Artificial Intelligence can be used in library services	61	73	47	36	2.67	.29	Agree
2	Some library services in my institution make use of AI-based technologies	55	69	51	42	2.43	.35	Disagree
3	Library staff in my institution are comfortable using AI tools in their daily work	49	67	57	44	2.71	.56	Agree
4	Issues such as user privacy and data protection are taken seriously when AI tools are used in the library	63	71	45	38	2.81	.21	Agree
5	My institution has clear rules or guidelines guiding the responsible use of AI in library services	53	65	55	44	2.11	.34	Disagree
	Weighted $\bar{x}$					**2.55**		

Source: *Field Survey, 2026*

The analysis revealed that respondents agreed (weighted $\bar{x}$ = 2.55) that they have a good understanding of AI in library services, are comfortable using AI tools, and recognize the importance of privacy and data protection. However, they disagreed that AI-based technologies are widely used in their institutions and that clear institutional guidelines exist for responsible AI use. This suggests that awareness is moderate, but practical adoption and regulatory frameworks are limited.

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Table 3: Availability of inclusive library services provided in Federal Polytechnics in North-West Nigeria

SN	Opinion	SA	A	D	SD	x̄	Std	Dec.
1	The library provides services that are accessible to different categories of users	59	71	49	38	2.84	.56	Agree
2	There are library facilities or services designed to support users with special needs	47	63	59	48	2.56	.41	Agree
3	Users who cannot visit the library in person can still access library services remotely	61	69	45	42	2.51	.34	Agree
4	The library offers a range of services that reflect the diverse needs of its users	55	73	47	42	2.87	.51	Agree
5	Information about inclusive library services is clearly communicated to users	49	67	53	48	2.43	.34	Disagree
	Weighted **x̄**					**2.64**		

Source: *Field Survey, 2026*

From the table above, respondents generally agreed (weighted x̄ = 2.64) that libraries provide accessible services, support users with special needs, allow remote access, and offer services reflecting diverse needs. However, they disagreed that information about these inclusive services is clearly communicated, highlighting a gap in service visibility despite the availability of inclusive facilities.

Table 4: Influence of Artificial Intelligence awareness, use and ethical practices on the availability and types of inclusive Library services in Federal Polytechnics in North-West Nigeria

SN	Opinion	SA	A	D	SD	x̄	Std	Dec.
1	Better awareness of AI among library staff has helped to improve inclusive service delivery	63	69	47	38	2.92	.45	Agree
2	The use of AI has made it easier for the library to offer a wider range of inclusive services	59	71	45	42	2.71	.61	Agree
3	When AI is used responsibly, users are more willing to accept and use inclusive library services	61	67	49	40	2.89	.19	Agree

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4	Libraries that adopt AI are better positioned to serve users from different backgrounds and abilities	57	73	45	42	2.91	.51	Agree
5	The use of AI in library services supports inclusiveness and long-term development in my institution	65	69	43	40	2.69	.63	Agree
	Weighted $\bar{x}$				**2.82**			

Source: *Field Survey, 2026*

Respondents strongly agreed (weighted $\bar{x}$ = 2.82) that AI awareness and responsible use positively influence inclusive service delivery. They indicated that AI facilitates a wider range of services, increases user acceptance, and enhances the ability of libraries to serve users from diverse backgrounds. The findings suggest that AI has significant potential to strengthen inclusiveness and support sustainable library development in Federal Polytechnics in North-West Nigeria.

Major Findings of the Study

The study revealed that more men (58.53%) participated than women (41.47%). In terms of rank, most respondents were Librarian I and Librarian II, placing them within the middle professional cadre, though a reasonable number held senior positions such as Senior Librarian, Principal Librarian, and Chief Librarian. Many had between six and ten years of work experience. This mix suggests that the responses largely reflect the views of active professionals who are directly involved in day-to-day service delivery.

Findings on the first objective revealed a moderate awareness but limited practical adoption. Respondents generally agreed that they understand how AI can support library services and that staff members are reasonably comfortable using such tools. They also indicated that issues of privacy and data protection are taken seriously. In other words, while librarians appear open to AI and recognize its relevance, actual deployment and policy direction remain weak. This pattern supports earlier observations by Asemi and Asemi (2018), who noted that many institutions in developing countries struggle with implementation despite growing awareness.

Findings second objective assessing the availability of inclusive library services respondents largely agreed that their libraries provide accessible services, including facilities for users with special needs and options for remote access. They also felt that efforts are made to consider the needs of diverse user groups. However, they disagreed that information about these services is clearly communicated.

Finally, on the third objective, respondents strongly agreed that AI has the potential to improve inclusiveness. They believed that better awareness and responsible use of AI can expand service options, improve accessibility, and enhance user satisfaction. Libraries that

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embrace such tools, in their view, are better equipped to serve users from different backgrounds and abilities. This perception aligns with Cox, Pinfield, and Rutter (2019), who argue that emerging technologies can strengthen personalization and access in academic libraries.

Conclusion

This study examines the role of Artificial Intelligence (AI) in strengthening inclusive library services in Federal Polytechnics in North-West Nigeria. The findings revealed that librarians generally understand what AI is and recognize its potential to improve service delivery. Many expressed positive attitudes toward its use and showed a willingness to engage with emerging technologies. However, awareness has not fully translated into practice. The actual use of AI tools in routine library activities remains limited, and formal guidelines to direct responsible and ethical use are not clearly defined in many cases. The study further shows that inclusive library services are present across the institutions surveyed. Libraries provide certain forms of support for users with special needs and offer remote access to resources. Yet, information about these services is not always clearly communicated, which may prevent some users from benefiting fully. The basic foundation for integrating AI into inclusive library services already exists, but more deliberate action is required. Stronger institutional policies, improved technological infrastructure, and clearer communication about available services will be necessary if these libraries are to fully realize the benefits of AI in supporting equitable access to information.

Recommendations

Base on the findings from the study, the following recommendations are provided:

i. Federal Polytechnics in North-West Nigeria should develop and implement clear institutional policies and guidelines on the responsible use of Artificial Intelligence in library services. These guidelines should address issues such as data protection, user privacy, accountability, and ethical standards.
ii. Library management should invest in AI-based technologies that directly support inclusive service delivery. Practical tools such as automated cataloguing systems, intelligent search platforms, and assistive technologies should be prioritized.
iii. Regular training and capacity-building programmes should be organized for library staff on the effective use of AI tools. Continuous professional development will strengthen staff competence and confidence in deploying emerging technologies.
iv. Libraries should improve communication strategies to ensure that users are aware of available inclusive services. Information about assistive facilities, remote access options, and special support services should be clearly displayed through websites, notice boards, and orientation programmes.
v. Federal and institutional authorities should provide adequate funding for technological infrastructure in polytechnic libraries. Reliable internet connectivity, modern hardware, and updated software are essential for effective AI integration.

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