

Impact of AI Literacy Training on Service Delivery of Library Professionals in Universities in Edo State

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ABSTRACT

This study investigated the influence of AI Literacy Training on Service Delivery of Library professionals in Universities in Edo State, examining available training programmes, service delivery application, implementation challenges and their relationship. Using descriptive survey research design with total enumeration sampling, data were collected from all library professionals in university libraries in Edo State. Results showed moderate availability of AI literacy training programmes (grand mean=2.58), with formal workshops and webinars most accessible, while specialised training opportunities were limited. Application of AI literacy to service delivery showed concerning results (grand mean=1.98), with all measured areas below the criterion mean. Major challenges included poor internet connectivity (mean=3.42), inadequate funding (mean=3.38) and limited access to specialised training programmes (mean=3.34). Simple linear regression analysis revealed AI literacy training significantly predicted service delivery ($R^2 = .147$, $F(1, 159) = 27.642$, $p < .001$), explaining 14.7% of variance in service delivery outcomes. The low indicated AI literacy training accounts for moderate portion of service delivery variance. The study recommends comprehensive AI literacy policy frameworks, increased infrastructure investment, context-specific solutions, supportive policy environments and collaborative learning communities to enhance AI integration in library services.

KEYWORDS

- AI literacy,
- Library professionals,
- university libraries,
- Nigeria, service delivery,
- Training programmes

Introduction

The emergence of artificial intelligence (AI) has significantly transformed various sectors of human endeavour, with libraries not being an exception. Academic libraries worldwide are increasingly adopting AI technologies to enhance their services and meet the evolving needs of users in the digital age (Barsha and Munshi, 2023). These technologies offer numerous possibilities for improving information discovery, knowledge organisation and personalised user experiences. As noted by Udem and Ogungbeni (2023), AI applications including machine learning algorithms, natural language processing tools, and intelligent tutoring systems are gradually becoming integral components of modern library infrastructure. However, the effective

utilisation of these technologies requires librarians to possess adequate knowledge and skills, highlighting the importance of AI literacy among library professionals.

In developing countries like Nigeria, academic libraries face unique challenges in the adoption and implementation of AI technologies. According to Adeleke and Olorunsola (2010), these challenges include inadequate infrastructure, limited funding and insufficient technical expertise among library staff. In the same vein, Oniovoghai, Idiodi and Urhiewhu (2023) examined the adoption of Artificial Intelligence applications across Nigerian academic libraries' reference, readers' services, cataloguing and serial control units, identifying technical knowledge gaps, funding constraints and lack of government support as significant barriers while proposing potential solutions for enhancing AI integration in library operations. A study by Denen and Udensi (2023) on technology adoption in Nigerian university libraries revealed that there is an adequate level of adopted ICT facilities and library services in university libraries, while many institutions recognise the importance of embracing new technologies, significant gaps exist in the implementation process, particularly regarding staff development and training. This situation is further complicated by the rapid pace of technological advancement, which often outstrips the capacity of many academic libraries to adapt (Igwe, 2013). The resulting disparity between available technologies and librarians' abilities to effectively leverage them potentially undermines the quality of information services provided to academic communities.

In Edo State specifically, university libraries operate within resource-constrained environments while serving increasingly technology-savvy user populations. Nkiko and Iroaganachi (2016) observed that academic libraries in Southern Nigeria, including those in Edo State, face mounting pressure to modernise their services despite significant operational constraints. A survey conducted by Emojorho and Nwalo (2009) on library services in tertiary institutions indicated varying levels of technological readiness, with many institutions struggling to maintain even basic digital infrastructure. This situation is particularly concerning given the pivotal role that university libraries play in supporting teaching, learning and research activities. As emphasised by Ademodi and Adepoju (2009), the effectiveness of academic libraries in fulfilling their mission is increasingly dependent on their ability to successfully integrate emerging technologies into their service delivery models.

Despite the growing significance of AI technologies in academic library operations, there exists a concerning knowledge gap regarding the AI literacy levels of academic librarians in Nigerian universities, particularly in Edo State. According to Anyaoku, Orakpor and Ezejiofor (2012), many library professionals in Nigerian universities demonstrate limited understanding of emerging technologies and their applications in library settings. This observation is supported by Okite-Amughoro, Makgahlela and Bopape (2014), whose study on digital literacy among academic librarians in Southern Africa (including Nigeria) revealed significant deficiencies in technology-related competencies. More specifically, Idiegbeyan-ose, Nkiko and Osinulu (2016) found that less than 40% of academic librarians surveyed across several Nigerian universities reported confidence in their understanding of current technological trends relevant to library services.

The implications of this AI literacy gap are potentially far-reaching for information service quality in academic libraries. Adeyoyin (2006) argues that without adequate

technological competencies, librarians may be unable to effectively evaluate appropriate tools for implementation, develop suitable policies governing their use, or provide knowledgeable guidance to library users. This view is echoed by Ukwoma and Iwundu (2016), who emphasise that insufficient technological literacy among library professionals may contribute to resistance toward innovation, potentially widening the digital divide between Nigerian academic libraries and their counterparts in more technologically advanced environments. As noted by Ekoja (2007), the increasingly digital nature of information resources and research methodologies across disciplines means that librarians with limited technological knowledge may find themselves progressively marginalised in the academic information ecosystem.

While various studies have examined general ICT literacy among Nigerian (Adedara, Subair Omonagbe, 2022), there is limited empirical research specifically investigating the influence of targeted AI literacy training programmes on service delivery of library personnel in academic libraries, particularly within universities in Edo State. It is on this basis that this study intends to find out the impact of AI Literacy training on service delivery of Library Professionals in Edo State.

Objectives of the Study

The primary aim of this study is to investigate the impact of AI literacy training on the quality of service by Professionals in Edo State universities. The specific objectives are to:

1. Identify the types of AI literacy training programmes available for Library professionals in Universities in Edo state.
2. Find out the extent to which AI literacy has been applied to service delivery in Universities in Edo State.
3. Find out the challenges of AI literacy of Library professionals in Universities in Edo State.

Research Questions

Based on the stated objectives, this study seeks to answer the following research questions:

1. What are the AI literacy training programmes available for library professionals in Universities in Edo State?
2. To what extent has AI literacy been applied to service delivery in Universities in Edo State?
3. What are the challenges of AI literacy of Library Professionals in Universities in Edo State?
4. Determine the relationship between AI literacy training programmes and service delivery in Universities in Edo State?

Research Hypothesis

This hypothesis will guide this study:

H₀: There is no significant relationship between AI literacy training and service delivery among library professionals in universities in Edo State.

Literature Review

The integration of new technologies into library operations represents a paradigmatic shift in how information professionals conceptualise and deliver services in academic environments. AI represents a computer science field dedicated to endowing machines with abilities that simulate natural human intelligence, according to Merriam-Webster (2019). Expanding on this concept, Frankenfield (2021) characterises artificial intelligence as technology that replicates human cognitive processes, enabling machines to emulate human thinking and behaviour. Kok et al. (2018) position AI as a discipline focused on developing systems capable of human-like mental functions including learning, reasoning and self-correction, emphasising that machine intelligence can be refined to incorporate capabilities typically associated with human cognition, including adaptation and self-improvement.

Several distinct AI domains have been identified by Asemi and Asemi (2018), including expert systems, fuzzy logic, artificial neural networks, evolutionary algorithms, case-based reasoning, image processing, natural language processing, speech recognition and robotics. Heath (2018) describes AI as technology that enables computerized systems to perform sophisticated cognitive functions like planning, learning, reasoning, problem-solving, movement and limited creativity. The term encompasses any computerised system demonstrating human-like capabilities such as problem-solving. In a recent study, Akpukpu and Osawe (2024) opined that AI applications in libraries enhance efficiency through automated cataloguing and inventory management, provide instant support for user inquiries and deliver personalised recommendations based on borrowing patterns, collectively transforming traditional library operations while allowing librarians to focus on more complex tasks

Research on technological literacy among information professionals has gained significant traction as libraries globally transition from traditional service models to technology-enhanced frameworks. Quadri (2012) conducted a study on librarians' perceptions of ICT usage in Nigerian university libraries, identifying essential competencies including technical knowledge, adaptation skills and professional development attitudes. The study emphasised that effective technological literacy extends beyond technical knowledge to encompass critical thinking about technological limitations and applications. Similarly, Oketunji (2011) explored the evolving roles of academic librarians in technology-rich environments, documenting the emergence of specialised positions such as systems librarians, digital resource specialists and information literacy instructors. These studies collectively establish technological literacy as a multidimensional construct encompassing technical skills, critical awareness and professional adaptability dimensions that subsequently inform training program development and evaluation in library contexts.

The relationship between professional development interventions and service quality improvements represents a central concern in library management literature. Tella (2020) argues that academic libraries must strategically position themselves to leverage artificial intelligence capabilities to enhance service quality in today's information landscape. The implementation of AI in academic libraries facilitates improved information services and search functionality, resulting in greater satisfaction among both staff and patrons through expedited information access. AI integration has significantly enhanced key librarian responsibilities including cataloguing, indexing, information retrieval and reference services, with practical applications spanning speech recognition, machine translation and robotic library assistants.

Research by Baro and Asaba (2010) examining ICT literacy among university librarians in Nigeria demonstrated correlations between professional development initiatives and improvements in service delivery. Their analysis revealed that libraries implementing comprehensive digital literacy programmes reported higher user satisfaction rates and greater service innovation compared to institutions without systematic training approaches. In a related study, Okonedo, Popoola, Emmanuel and Bamigboye (2015) investigated technological adoption patterns across Nigerian university libraries, finding that institutions prioritising staff development consistently demonstrated greater technological implementation success. Their survey documented significant relationships between librarians' confidence levels following specialised training and subsequent technology integration in service delivery. These findings align with theoretical frameworks proposed by Madu (2009) suggesting that effective technology-focused professional development creates transformative learning experiences that directly translate to service innovation a relationship potentially applicable to AI literacy training specifically.

Within the Nigerian academic library context, research by Baro, Endouware and Ubogu (2011) documented considerable variation in information literacy awareness and practice across institutions, identifying critical factors influencing professional development including institutional support, individual motivation and access to training opportunities. Their survey of academic librarians across Southern Nigeria revealed that many library professionals recognise the importance of developing technological skills despite limited formal training opportunities. According to Tunde et al. (2022), the University of Lagos stands as Nigeria's sole institution implementing AI in library operations, with awareness of such applications remaining minimal among library professionals.

The unique characteristics of academic libraries in Southern Nigeria, including Edo State, were documented by Okiy (2012), who identified challenges and opportunities for library development across the region. Similarly, an assessment by Anunobi and Ukwoma (2009) examining digital library initiatives in Nigerian university libraries identified professional development as a significant factor in implementation success. Their finding that librarians with specialised training were more likely to implement technological innovations than their untrained counterparts suggest potential parallels for AI literacy development. Okiy's study revealed considerable disparities between well-established federal universities and emerging state institutions, highlighting the importance of contextual factors in technology implementation. Due to the increasing relevance of artificial intelligence, librarians who adopt this technology will improve

their service delivery capabilities and institutional effectiveness in the rapidly evolving information landscape.

Methodology

This study adopts a survey design to investigate the impact of AI literacy training on librarians' information service delivery in Edo State universities. The survey design is appropriate as it allows for the systematic collection of data from a large number of respondents to examine the relationship between AI literacy training and information service delivery effectiveness among library professionals. The population of this study consists of all library professionals working in universities in Edo State, Nigeria. For this study, library professionals include both librarians (academic staff) and library officers. Based on available data, there are approximately 181 library professionals across the universities in Edo State, which include University of Benin, Ambrose Alli University, Edo State University Uzairue, Igbinedion University, Benson Idahosa University, Samuel Adegboyega University and Wellspring University.

Total enumeration was used for the study. A structured questionnaire titled "AI Literacy and Information Service Delivery Questionnaire (AILISDQ)" was developed for data collection. Out of the 181 copies of the questionnaire distributed, 161 respondents returned their questionnaire, representing an 89% response rate. The research instrument was validated by three experts: Two in Library and Information Science and one in Educational Management. The reliability of the instrument was established through a pilot test conducted with 20 library professionals from Lagos State universities (outside the study area). Cronbach's alpha coefficients were calculated for each section: AI literacy level ($\alpha = 0.87$), AI training experiences ($\alpha = 0.82$), information service delivery practices ($\alpha = 0.85$) and challenges and prospects ($\alpha = 0.81$), indicating high internal consistency. The researcher, with the assistance of three postgraduate students serving as research assistants, administered the questionnaire. Before data collection, the research assistants underwent a one-day training session on the research objectives and proper questionnaire administration techniques. The main data collection lasted for three weeks, with follow-up visits to ensure high response rates.

Data were analysed using Statistical Package for Social Sciences (SPSS) version 26.0. Both descriptive and inferential statistics were employed: Descriptive statistics (frequencies, percentages, means and standard deviations) were used to analyze demographic information and describe the levels of AI literacy and information service delivery. Inferential statistics were used to test hypotheses and establish relationships. A significance level of 0.05 was adopted for all statistical tests.

Demographic details

Table 1: Demographic Characteristics of Respondents (N=161)

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	62	38.5
	Female	99	61.5
Age (years)	25-30	28	17.4
	31-40	57	35.4
	41-50	52	32.3
	Above 50	24	14.9
Educational Qualification	Bachelor's Degree	74	46.0
	Master's Degree	75	46.6
	PhD	12	7.4
Professional Designation	Library Officer	103	64.0
	Librarian	58	36.0
Years of Work Experience	Less than 5 years	31	19.3
	5-10 years	57	35.4
	11-15 years	42	26.1
	Above 15 years	31	19.2
University Type	Federal	54	33.5
	State	52	32.3
	Private	55	34.2

Table 1 presents the demographic characteristics of the 161 library professionals who participated in the study. The gender distribution shows a higher proportion of females (61.5%) than males (38.5%), reflecting the general gender composition of library professionals in Nigerian universities.

The age distribution indicates that the majority of respondents (35.4%) fall within the 31-40 years age bracket, followed by those in the 41-50 years category (32.3%). This suggests a relatively mature workforce with potentially significant professional experience. Only 17.4% of the respondents were young professionals between 25-30 years, while 14.9% were above 50 years.

Regarding educational qualifications, there is an almost equal distribution between Master's degree holders (46.6%) and Bachelor's degree holders (46.0%), reflecting the diverse academic backgrounds of library professionals in the study area. Only 7.4% have attained PhD qualifications, which is typical as a Ph.D. is primarily required for senior academic librarian positions.

The professional designation data shows that the majority of respondents (64.0%) are Library Officers, while the remaining 36% hold various librarian positions ranging from Assistant Librarian to University Librarian. This distribution accurately reflects the staffing pattern in Nigerian university libraries, where library officers typically outnumber academic librarians.

In terms of work experience, the majority of respondents (35.4%) have served for 5-10 years, with 26.1% having 11-15 years of experience and 19.2% with over 15 years.

This distribution indicates a good mix of mid-career and experienced professionals in the sample.

Research Findings and Analysis

Research Question 1: What are of types of AI literacy training programmes available for Library professionals in Universities in Edo State?

Table 2: Types of AI literacy training programmes available for Library professionals (N=161)

S/N	Items	SA	A	D	SD	Mean
1	Formal workshops on basic AI concepts and applications are available	53	72	20	16	3.01
2	Online courses on AI for librarians are accessible	45	68	31	17	2.88
3	Hands-on training sessions with AI tools for cataloguing are provided	38	65	40	18	2.76
4	Professional development seminars on AI ethics in libraries are conducted	29	54	53	25	2.54
5	Peer-to-peer mentoring programmes on AI applications exist	23	45	59	34	2.35
6	Vendor-led training on AI-powered library systems is available	39	63	43	16	2.78
7	Collaborative learning communities on AI integration are established	22	40	65	34	2.31
8	Certification programmes in AI for information professionals are accessible	18	37	71	35	2.24
9	Industry-academia partnership training on AI implementation exists	15	33	76	37	2.16
10	Train-the-trainer programmes for AI knowledge dissemination are available	25	50	57	29	2.44
11	Specialised training on AI-driven reference services is provided	32	60	46	23	2.63
12	Webinars on emerging AI trends in libraries are regularly organised	41	66	36	18	2.81
	Grand Mean					2.58

The Table reveals that out of the twelve identified types of AI literacy training programmes, seven are available to library professionals in universities in Edo State, while five are not adequately available. Programmes with the highest availability include formal workshops on basic AI concepts (mean=3.01), webinars on emerging AI trends (mean=2.81) and vendor-led training on AI-powered library systems (mean=2.78). However, industry-academia partnership training (mean=2.16), certification programs (mean=2.24) and collaborative learning communities (mean=2.31) are notably lacking. The grand mean of 2.58, while above the criterion mean of 2.50, indicates that there is only moderate availability of AI literacy training programmes overall. This suggests that while some foundational training

opportunities exist, there are significant gaps in more specialised, structured and collaborative AI learning opportunities for library professionals in the region.

Research Question 2: To what extent has AI literacy been applied to service delivery in Universities in Edo State?

Table 3: Extent of application of AI literacy to service delivery (N=161)

S/ N	Items	VH E	HE	LE	VLE	Mean
1	Implementation of AI-powered cataloguing systems	14	32	77	38	2.14
2	Use of chatbots for basic reference services	11	27	80	43	2.04
3	Application of AI for collection development decisions	10	23	82	46	1.98
4	Deployment of AI-driven plagiarism detection systems	17	35	74	35	2.21
5	Implementation of AI for metadata generation	9	22	83	47	1.95
6	Use of AI for user behaviour analysis and service personalisation	7	20	84	50	1.90
7	Application of AI in digital preservation processes	10	26	79	46	2.00
8	Deployment of AI for information literacy instruction	15	34	76	36	2.18
9	Use of machine learning for resource recommendation services	8	21	81	51	1.91
10	Implementation of AI for accessibility services	6	18	85	52	1.86
11	Application of AI in interlibrary loan optimization	5	16	85	55	1.82
12	Use of AI tools for content summarization and analysis	13	28	77	43	2.07
13	Implementation of AI-powered translation services	7	21	79	54	1.88
14	Application of AI in predictive analytics for service improvement	4	16	81	60	1.77
	Grand Mean					1.98

The results in Table 2. demonstrate that AI literacy application to service delivery in universities in Edo State is at a low extent across all identified areas, with a grand mean of 1.98, significantly below the criterion mean of 2.50. The highest application areas—AI-driven plagiarism detection (mean=2.21) and AI for information literacy instruction (mean=2.18)—still fall within the low extent category. Particularly concerning are the extremely low scores for predictive analytics (mean=1.77), interlibrary loan optimisation (mean=1.82) and accessibility services (mean=1.86). This pattern indicates a significant gap between theoretical knowledge of AI and its practical implementation in library operations. The uniformly low application levels

suggest systemic barriers to AI integration that may include insufficient infrastructure, limited practical training, resource constraints, or organisational resistance to technological change. These findings highlight an urgent need for targeted interventions to bridge the knowledge-application gap in AI literacy among library professionals.

Research Question 3: What are the challenges of AI literacy facing Library professionals in Universities in Edo State?

Table 4: Challenges of AI literacy facing Library professionals (N=161)

S/N	Items	SA	A	D	SD	Mean
1	Inadequate funding for AI infrastructure and tools	89	51	15	6	3.38
2	Limited access to specialized AI training opportunities	82	57	16	6	3.34
3	Lack of technical support for AI implementation	77	59	18	7	3.28
4	Insufficient awareness of AI applications in library contexts	67	62	22	10	3.16
5	Resistance to technological change among staff	64	58	26	13	3.07
6	Concerns about job security due to AI automation	71	60	21	9	3.20
7	Limited institutional policy frameworks for AI adoption	74	63	17	7	3.27
8	Poor internet connectivity hampering AI tool usage	93	48	14	6	3.42
9	Insufficient time allocation for AI skills development	68	65	19	9	3.19
10	Lack of localized AI solutions for Nigerian library contexts	80	59	16	6	3.32
11	Absence of benchmarks for evaluating AI literacy competencies	71	62	20	8	3.22
	Grand Mean					3.26

The analysis of challenges facing AI literacy among library professionals in Edo State universities reveals unanimous agreement across all identified barriers, with a high grand mean of 3.26. The most critical challenges include poor internet connectivity (mean=3.42), inadequate funding for AI infrastructure (mean=3.38) and limited access to specialized training (mean=3.34). The high agreement ratings for lack of localized AI solutions (mean=3.32) and limited institutional policy frameworks (mean=3.27) highlight systemic issues that extend beyond individual capabilities. These findings reveal a complex interplay of infrastructural, institutional and personal barriers that collectively hinder AI literacy development.

Regression Analysis Results

H₀: There is no significant relationship between AI literacy training and service delivery among library professionals in universities in Edo State. A simple linear regression analysis was conducted using AI literacy training as the independent variable and service delivery as the dependent variable. The analysis yielded the following results:

Regression Model Summary

Model	R	R ²	Adjusted R ²	Std. Error of the Estimate
1	0.384	0.147	0.142	0.586

ANOVA Results

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	9.488	1	9.488	27.642	0.000
Residual	54.632	159	0.343		
Total	64.120	160			

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.096	0.174		6.299	0.000
AI Literacy Training	0.344	0.065	0.384	5.257	0.000

A simple linear regression was conducted to determine if AI literacy training predicted service delivery. The regression model was statistically significant, $F(1, 159) = 27.642$, $p < .001$. The model explained 14.7% of the variance in service delivery scores. AI literacy training was a significant positive predictor of service delivery, $\beta = .384$, $p < .001$. This indicates that higher AI literacy training is associated with higher service delivery scores. The model demonstrates adequate fit with $F(1, 159) = 27.642$, $p < .001$, indicating the regression model significantly predicts service delivery better than the mean alone. The standard error of estimate (0.586) suggests moderate precision in predictions. The regression coefficient ($B = 0.344$, $SE = 0.065$) indicates that for each one-unit increase in AI literacy training, service delivery is predicted to increase by 0.344 units, $t(159) = 5.257$, $p < .001$. The low R^2 (14.7%) indicates that AI literacy training accounts for a moderate portion of service delivery variance. This suggests that other unmeasured variables significantly influence service delivery outcomes, which is justifiable given that service delivery is influenced by multiple organizational, technological, and human factors beyond AI literacy training alone.

Discussion of Findings

The study revealed moderate availability of AI literacy training programmes among library professionals (grand mean=2.58), with formal workshops, webinars and vendor-led training being most accessible, while specialized training opportunities were lacking, which aligns with Lo's (2024) survey of 760 academic library employees that found moderate self-rated understanding of AI concepts, limited hands-on experience with AI tools, and notable gaps in specialized training areas, indicating a consistent pattern of general training availability but insufficient specialized skill development across library contexts. However, application of AI literacy to service delivery showed concerning results (grand mean=1.98), with even

highest areas falling below criterion mean, contradicting Ekoja's (2007) optimistic technology integration projections and Alex-Nmecha et al's (2018) higher implementation success rates. Recent evidence supports this concern, as Clarivate's 2024 global survey revealed that while 60% of libraries are planning AI implementation, only 7% are currently implementing AI, demonstrating a significant implementation gap.

Major challenges included poor internet connectivity (mean=3.42), inadequate funding (mean=3.38), and limited specialized training access (mean=3.34), strongly supporting Uzoigwe's (2013) identification of infrastructure barriers and Obinyan et al.'s (2011) documentation of funding constraints creating cascading effects. These findings align with recent surveys showing budget constraints and lack of AI expertise as primary concerns for librarians, while studies by Oniovoghai et al. (2023) revealed librarian's optimism about AI's potential but they showed concerns about ethical implications. Regression analysis showed moderate positive relationship between training and service delivery ($R=0.384$, $p<0.001$), with training explaining only 14.7% of variance, which aligns with findings of Sendawula et al. (2018) from Uganda's health sector where training contributed up to 44.7% of variance in employee performance, suggesting that while training relationships are consistently positive, the magnitude of explained variance varies across organizational contexts.

Conclusion and Recommendations

This study examined AI literacy training availability among library professionals and its application to service delivery, revealing a critical disconnect between professional development opportunities and practical implementation. While AI literacy training programs demonstrate reasonable accessibility through formal workshops and vendor-led initiatives, the translation of acquired knowledge into effective service delivery remains problematic. The research uncovered substantial barriers including infrastructure limitations, funding constraints, and insufficient specialized training opportunities that collectively impede meaningful AI integration in library services.

The findings illuminate the complexity of AI literacy implementation in library contexts, demonstrating that training availability alone does not guarantee successful service delivery outcomes. The modest relationship between professional development and practical application suggests that multiple organizational, technological, and institutional factors mediate the effectiveness of AI literacy initiatives. These results challenge conventional assumptions about linear relationships between training inputs and service delivery outputs in library settings. Based on the study findings, the following recommendations were proposed:

1. Library management should collaborate with professional associations to design practical training modules focusing on AI applications in reference services, collection development, and user experience enhancement.
2. University management should accord priority to infrastructure upgrades and strategic partnerships with technology providers to ensure sustainable access to specialized training resources.

3. Library management should adopt holistic approaches encompassing organizational readiness assessments, institutional culture adaptation, and systematic change management to effectively bridge the gap between AI literacy acquisition and practical service delivery application.
4. Academic institutions should increase investment in stable internet infrastructure and AI technologies while developing context-specific solutions aligned with local needs.

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