International Journal of Educational Qualitative Quantitative Research (IJE-QQR)
ISSN: 2962-9918 (Online)
Vol. 5, No. 1, pp. 105-118

Academic Librarians' Student Engagement for Promoting Information Literacy and Artificial Intelligence Instruction in Nigerian Tertiary Institutions

Kayode Sunday John Dada
University Library, Federal University of Education, Zaria, Kaduna State, Nigeria

Article Info

Article history:
Received: Apr 27, 2026
Revised: Jun 30, 2026
Accepted: Jul 2, 2026

DOI: 10.58418/ijeqqr.v5i1.224

How to cite this article:
Dada, K. S. J. (2026). Academic Librarians' Student Engagement for Promoting Information Literacy and Artificial Intelligence Instruction in Nigerian Tertiary Institutions. *International Journal of Educational Qualitative Quantitative Research*, *5*(1), 105–118. https://doi.org/10.58418/ijeqqr.v5i1.224

Read online:

Scan this QR code with your smart phone or mobile device to read online.

ABSTRACT

As artificial intelligence (AI) platforms transform higher education, reshaping the instructional role of academic libraries has become critical. This study empirically examined the nature and effectiveness of academic librarians' student engagement strategies for promoting information literacy (IL) and AI instruction in Nigerian tertiary institutions. Anchored on the ACRL Framework for Information Literacy for Higher Education and the Technology Acceptance Model (TAM), the study adopted a cross-sectional survey design. A total of 412 academic librarians drawn from 38 federal and state universities, polytechnics, and colleges of education in Nigeria participated through a structured questionnaire. Data were analysed using descriptive and inferential statistics. Findings revealed that in-person reference consultations and formal library instruction sessions were the dominant modes of student engagement. Academic librarians reported moderate-to-high competence in IL instruction but comparatively lower confidence in delivering AI literacy content. Regression analysis showed that engagement frequency ($\beta = 0.41$, $p < 0.001$), perceived administrative support ($\beta = 0.29$, $p < 0.01$), and prior AI training ($\beta = 0.33$, $p < 0.001$) significantly predicted the effectiveness of AI instruction. Significant barriers included inadequate digital infrastructure, absence of formal AI curricula, and limited professional development. The study recommends institutionalising AI literacy within higher education library frameworks, implementing structured professional development, and driving policy reforms that embed IL and AI instruction into national library standards for Nigerian tertiary education.

Keywords: Academic Librarians, Information Literacy, Artificial Intelligence Instruction, AI Literacy, Student Engagement, Nigeria, Higher Education

Corresponding Author:
Kayode Sunday John Dada
University Library, Federal University of Education, Zaria, Kaduna State, Nigeria
Email: kayodescholar@gmail.com

1. INTRODUCTION

The rapid diffusion of artificial intelligence (AI) tools, including generative AI platforms, intelligent search systems, and automated research assistants, has fundamentally altered the information landscape confronting students in higher education globally (Nazaretsky et al., 2022; Ruano-Borbalan, 2025; Wong, 2024). Higher education institutions in developing regions, including Nigerian universities, polytechnics, and colleges of education, are not insulated from these technological shifts (Egielewa et al., 2022; Eli-Chukwu et al., 2023). While contemporary students routinely encounter AI-mediated environments, long-standing deficits in basic digital fluencies suggest they frequently lack the critical competencies required to evaluate, use, and ethically deploy complex AI-generated content (Almatrafi et al., 2024; Celik, 2023; Černý, 2024). Academic librarians occupy a strategically vital position in bridging this pedagogical gap because of their dual role as information professionals and instructional partners who facilitate students'

information literacy and AI literacy through curriculum-integrated teaching and collaboration with faculty (Greer, 2023; Lo, 2023; Mushi et al., 2023).

Information literacy (IL), broadly defined as the integrated ability to engage in reflective information discovery, understand how information is created and valued, and use information ethically to generate new knowledge, remains a foundational domain of academic library instruction (Bernard, 2024; Caffrey et al., 2024; Mbandje et al., 2023). The emergence of AI, however, compels a rapid expansion of traditional information literacy frameworks to incorporate AI literacy, which encompasses the capacity to understand AI systems, critically evaluate AI-generated outputs, and apply AI technologies responsibly and ethically in academic and professional contexts (Almatrafi et al., 2024; Cox, 2024; Pinski & Benlian, 2024). The intersection of information literacy instruction and AI literacy education presents both a transformative opportunity and a significant pedagogical challenge for academic librarians, particularly in resource-constrained higher education environments where institutional readiness, staff competencies, and technological infrastructure remain uneven (Carroll & Borycz, 2024; Chatikobo & Pasipamire, 2024; LaFlamme, 2025).

Although scholarly attention to information literacy instruction in sub-Saharan Africa has grown considerably in recent years, empirical studies specifically examining how academic librarians in Nigeria leverage student engagement to promote AI literacy remain scarce (Adarkwah et al., 2024; Akakpo, 2024). Existing literature tends to focus either on isolated IL outcomes among students (Carroll & Borycz, 2024) or on the general technology competencies of librarians (Deshen & Noa, 2024), rarely integrating both dimensions within a unified empirical framework. Furthermore, quantitative evidence regarding the predictors of effective AI instruction delivered by academic librarians is largely absent from the West African higher education context (Chatikobo & Pasipamire, 2024). Nigerian tertiary institutions are witnessing a rapid expansion of AI-powered tools across teaching, learning, assessment, and research activities. However, institutional mechanisms for equipping students with the competencies required to critically, ethically, and responsibly engage with these technologies remain underdeveloped (Bali et al., 2024). Academic libraries are increasingly expected to extend their educational remit to encompass AI literacy. However, empirical evidence indicates that many academic librarians remain insufficiently prepared for this expanded pedagogical role because of limited professional development opportunities, inadequate technological infrastructure, and the lack of well-defined AI literacy policies and curricula (Miltenoff, 2024). Globally, this readiness deficit reflects a persistent systemic gap between the rapid advancement of artificial intelligence technologies and the pace of institutional adaptation in library education, workforce development, and professional training (Oladokun & Umar, 2025). Without systematic empirical data quantifying current student engagement practices, librarian competency levels, and organisational barriers, it remains difficult for library administrators and academic policymakers to design targeted capacity-building interventions.

To address these critical empirical and structural deficiencies, this study investigated the overarching effectiveness of library-led AI instruction in Nigerian higher education. Specifically, this inquiry sought to answer four interconnected research questions. First, it identified the specific modes of student engagement that academic librarians currently employ to promote information literacy and AI instruction. Second, it assessed the self-reported competency levels of academic librarians in delivering AI instruction. Third, it mapped the specific barriers that academic librarians perceive as impeding effective student engagement for AI instruction. Finally, it determined the extent to which engagement frequency, administrative support, and prior AI training predict the effectiveness of AI instruction by academic librarians.

2. LITERATURE REVIEW

2.1. Theoretical Framework

This study is anchored on two complementary theoretical frameworks that bridges pedagogical design with technology adoption behavior. The first framework is the Association of College and Research Libraries or ACRL (Hsieh et al., 2021; Ko & Chiu, 2024; Pienaar & Bartlett, 2024) framework for information literacy for higher education, which conceptualises information literacy as a metaliteracy requiring critical engagement with information across a wide range of formats and contexts, including digital and AI-mediated environments. The threshold concepts within this framework, which include authority as constructed and contextual, information creation as a process, research as inquiry, scholarship as conversation, searching as strategic exploration, and information use as ethical practice, provide a robust scaffold for understanding how academic librarians structure their instructional engagement with students. Recent higher education scholarship positions this framework as an adaptable lens for emerging technologies, demonstrating that traditional information evaluation mechanisms must expand to address the complexities of algorithmic architectures (Almatrafi et al., 2024).

The second foundational framework is the Technology Acceptance Model (TAM), which posits that perceived usefulness and perceived ease of use are the primary determinants of individuals' intentions to adopt and use new technologies, thereby shaping subsequent implementation behavior (Al-Adwan et al., 2023; Or, 2024). TAM has been extensively applied in educational settings to explain how instructors and other education professionals adopt emerging digital technologies, learning management systems, and AI-

enabled instructional tools (Galimova et al., 2024; Susiani et al., 2025). Within the architecture of this inquiry, TAM informs the analysis of academic librarians' readiness, pedagogical confidence, and self-efficacy to integrate advanced computing tools into their instructional repertoire.

By synthesizing the ACRL Framework and TAM, this study establishes a holistic theoretical synthesis. The ACRL Framework maps the cognitive and pedagogical dimensions of what constitutes meaningful AI literacy, while TAM illuminates the attitudinal and behavioral factors that govern whether academic librarians successfully deliver that instruction. This integrated framework conceptualizes that a librarian's technological acceptance directly influences the frequency, mode, and ultimate effectiveness of their instructional engagement.

2.2. Academic Librarians and Information Literacy Instruction

Academic librarians have increasingly assumed a central and transformative role in fostering students' information literacy competencies through instruction, curriculum integration, and collaborative partnerships within higher education ecosystems (Andres & Usova, 2024). Through curriculum-integrated library instruction, embedded librarianship, individualized research consultations, and digital outreach initiatives, academic librarians provide structured learning experiences that strengthen students' abilities to locate, critically evaluate, and ethically use information in higher education (Franzen et al., 2024; Keenan & Meredith, 2024). Within the sub-Saharan African higher education landscape, empirical evidence indicates that systematic information literacy instruction provided through academic libraries enhances students' research capabilities, critical evaluation of information, and broader academic learning outcomes (Adarkwa, 2024; Ramgadwala, 2024). However, contemporary evidence suggests that variation in the quality of learning outcomes is strongly influenced by librarians' professional development, institutional support and resource allocation, and leadership commitment to fostering effective teaching and learning practices within academic libraries (Adekoya & Guobiazor, 2023; Faulkner & Reiter, 2025).

In the specific context of West Africa, academic librarians encounter distinctive structural and institutional challenges that complicate the delivery of consistent information literacy education. These challenges include inadequate digital infrastructure, limited institutional investment, insufficient continuing professional development opportunities, weak digital policies, and constrained technological capacity, all of which hinder the effective integration of information literacy and AI-related educational initiatives (Adarkwah et al., 2024; Nakaziba & Ngulube, 2025). These historical constraints help explain the documented gap between the instructional aspirations of librarians and actual learning outcomes, providing essential context for the challenges that are likely to be intensified as the demand for advanced AI instruction escalates across university campuses.

2.3. AI Literacy and the Expanding Role of Academic Libraries

Artificial intelligence literacy has emerged as a critical competency within the contemporary information landscape, extending traditional information literacy to encompass the ability to understand fundamental AI concepts, critically evaluate AI systems and algorithmic outputs, and apply AI technologies ethically and responsibly in academic, professional, and everyday contexts (Almatrafi et al., 2024; Cox, 2024). Recent scholarship situates AI literacy within a comprehensive educational competency framework that emphasizes human agency, ethical reasoning, responsible data practices, and the capacity to critically navigate increasingly complex AI-mediated information environments (Mikeladze et al., 2024; Nguyen et al., 2023). These expectations closely align with the metaliteracy perspective underpinning the ACRL Framework, which conceptualizes information literacy as a dynamic, reflective practice rather than a static set of technical skills. Consequently, academic libraries are increasingly being repositioned as the institutional hubs for AI literacy education, leveraging librarians' expertise in information evaluation, digital scholarship, and ethical technology use (Ko & Chiu, 2024; Miltenoff, 2024).

Global empirical literature documents a growing wave of library-led AI literacy initiatives across universities, particularly in North America, Europe, and Asia. These initiatives commonly include workshops on generative AI, guidance on evaluating and citing AI-generated content, AI-focused LibGuides, and the integration of AI concepts into information literacy instruction grounded in the ACRL Framework (Ko & Chiu, 2024; Miltenoff, 2024). Conversely, within the African higher education ecosystem, empirical evidence on AI literacy and library-led AI education remains limited. Existing studies are relatively few and predominantly comprise exploratory, qualitative, or systematic review research, highlighting the need for more robust quantitative investigations across diverse institutional contexts (Adarkwah et al., 2024; Chatikobo & Pasipamire, 2024; Falebita & Kok, 2024). This study addresses this substantial gap by providing concrete, large-scale quantitative evidence regarding how these dynamics manifest within a developing country context.

2.4. Student Engagement and Librarian Instructional Strategies

The nature and extent of student engagement with library services and information literacy programs are shaped by a complex interplay of relational, environmental, individual, and organizational factors that

collectively influence students' participation and learning experiences (Scoulas et al., 2024; Zhu et al., 2025). Methodological evidence indicates that the frequency and pedagogical quality of information literacy instruction are positively associated with improvements in students' information competencies, while sustained engagement with librarians enhances students' willingness to seek professional academic support and research assistance (Delmond et al., 2024; LeMire et al., 2024). Embedded librarianship, a model in which librarians are integrated into academic courses, departments, or disciplinary learning environments, is widely recognized as an effective strategy for strengthening student engagement, fostering faculty–librarian collaboration, and ensuring that information and technology instruction remains authentic, contextualized, and responsive to students' learning needs (Franzen et al., 2024; Keenan & Meredith, 2024). However, within the Nigerian higher education landscape, embedded instructional models remain at an emerging stage of development. Although several universities have begun adopting embedded librarianship practices, implementation remains uneven and requires stronger institutional support and broader integration into teaching and learning activities (Ajani et al., 2022; Inuwa & Abrizah, 2018).

To complement the limitations of face-to-face services, digital engagement strategies including institutional library portals, synchronous virtual reference services, asynchronous online tutorials, embedded online instruction, and social media outreach have become essential channels for expanding the reach, accessibility, and effectiveness of library instructional programs (Keenan & Meredith, 2024; Reed et al., 2025). Although the COVID-19 pandemic accelerated the adoption of virtual library services and online instructional delivery across many African academic libraries, concerns regarding the long-term sustainability of these innovations persist because of recurring infrastructure constraints, limited technological capacity, and resource shortages (Adarkwah et al., 2024; Chigwada, 2024). Therefore, mapping the efficacy of the current landscape of engagement strategies is a prerequisite for engineering inclusive, resilient, and effective AI instruction frameworks.

2.5. Barriers to Effective AI Literacy Instruction

A multidimensional matrix of structural and individual barriers currently constrains the capacity of academic librarians to deliver high-quality AI instruction. Technological barriers including inadequate broadband connectivity, limited digital infrastructure, insufficient computing resources, and restricted access to advanced AI platforms remain particularly pronounced in developing economies. These challenges are compounded by funding constraints, organizational readiness, and gaps in librarians' AI-related competencies (Adarkwah et al., 2024; Ngulube & Vincent Mosha, 2025). These structural deficiencies are further compounded by significant competency-related barriers, including librarians' limited technical proficiency, uncertainty regarding advanced AI and machine-learning concepts, insufficient preparation for AI-focused pedagogy, and concerns about the effective and ethical integration of AI into teaching and library services (Deshen & Noa, 2024; Miltenoff, 2024; Oladokun & Umar, 2025).

Finally, organizational and systemic barriers including limited leadership commitment, the absence of clear institutional AI governance and AI literacy policies, and insufficient investment in continuing professional development and organizational capacity building continue to constrain academic librarians' ability to implement effective AI literacy instruction and related educational initiatives (M. Y. Ali & Richardson, 2025; Ayinde et al., 2026; Oladokun & Umar, 2025). Prior empirical research in academic library settings indicates that technological, competency-related, and organizational barriers are closely interconnected and collectively shape librarians' capacity to implement AI technologies and AI literacy initiatives effectively (Ngulube & Vincent Mosha, 2025; Shahzad et al., 2025). Consequently, successfully optimizing the educational role of academic libraries in the digital era requires coordinated institutional interventions that simultaneously address physical infrastructure, policy support, and the human capital readiness of the educators themselves.

3. METHOD

3.1. Research Design and Participant Sampling

This study adopted a quantitative, cross-sectional survey design to capture data on professional attitudes, behaviors, and pedagogical perceptions at a single point in time. The target population encompassed academic librarians employed across accredited Nigerian tertiary institutions, which specifically included federal universities, state universities, polytechnics, and colleges of education monitored by the National Universities Commission and the National Board for Technical Education as of 2023.

To achieve a representative sample, a stratified random sampling technique was utilized based on three institutional strata: type of higher education institution, geopolitical zone, and professional librarian cadre ranging from junior to senior and principal levels. Out of 450 distributed surveys, 412 instruments were returned with complete and usable data, representing a high response rate of 91.6%. This sample size exceeds conventional minimum recommendations for survey research and provides adequate statistical power for multivariate analyses, consistent with contemporary methodological guidance on sample size determination (Moshagen & Bader, 2023).

Strict administrative and ethical protocols guided the fieldwork phase, which spanned a 10-week period between March and May 2023. Formal ethical clearance was granted by the institutional review board prior to data collection. Crucially, formal informed consent was explicitly obtained from all participating academic librarians via a digital agreement clause before survey access was granted, and absolute anonymity was maintained through rigorous data encryption and anonymization protocols.

3.2. Measures and Instrumentation

Primary data collection was executed via the researcher-designed Academic Librarian AI Literacy Engagement Scale (ALALES). The ALALES instrument was structured into five distinct operational dimensions. Section A gathered demographic characteristics, while Section B measured specific modes of student engagement across 12 items. Section C evaluated self-reported AI instructional competency using 10 items, Section D mapped multi-level perceived barriers using 14 items, and Section E evaluated the overall effectiveness of AI instruction across 8 items, serving as the primary criterion variable. All substantive items in Sections B through E were measured on a uniform five-point Likert scale, anchored from 1 for strongly disagree or never to 5 for strongly agree or always.

To ensure academic rigor, the instrument underwent a multi-stage validation process. Content validity was established through an independent panel review consisting of five professors specializing in library and information science, which resulted in a robust Content Validity Index of 0.89. Construct validity was further verified through preliminary factor analysis to ensure distinct factor loadings across the theoretical dimensions. Internal consistency and reliability were established via a pilot study involving 30 academic librarians who were excluded from the final analysis, demonstrating acceptable Cronbach's alpha coefficients of 0.81 for student engagement modes, 0.84 for instructional competency, 0.79 for perceived barriers, and 0.86 for instructional effectiveness.

3.3. Data Analysis and Hypothesis Testing

Quantitative data preparation and subsequent statistical analyses were performed utilizing IBM SPSS Statistics Version 27. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated to address the first three research questions regarding engagement modes, competency baselines, and structural barriers. Pearson's product-moment correlation analysis was applied to assess the initial linear associations between the variables.

To evaluate the predictive model and test the primary directional hypotheses, a multiple linear regression analysis using the enter method was deployed at a significance threshold of $\alpha = 0.05$. Prior to interpreting the regression output, statistical assumptions for linear modeling were rigorously verified to confirm that the residuals met the criteria for normality and homoscedasticity, and that multicollinearity was absent as indicated by Variance Inflation Factor values well below the standard threshold of 5.0. This analytical architecture evaluated three specific directional hypotheses, positing that engagement frequency significantly predicts the effectiveness of AI instruction by academic librarians as the first hypothesis (H1) , that perceived administrative support significantly predicts the effectiveness of AI instruction by academic librarians as the second hypothesis (H2) , and that prior AI training significantly predicts the effectiveness of AI instruction by academic librarians as the third hypothesis (H3). Within the final regression equation, AI instruction effectiveness operated as the single continuous criterion variable, while engagement frequency, perceived administrative support, and prior AI training were simultaneously evaluated as the continuous predictor variables.

4. RESULTS

4.1. Demographic Profile of Respondents

The demographic parameters of the academic librarians surveyed in this study were analyzed to establish a clear baseline of the sample population. To provide a comprehensive overview of these participant dynamics, the explicit distribution across gender, institutional affiliation, professional cadre, educational qualifications, and years of service is detailed in Table 1.

Table 1. Demographic Characteristics of Respondents (N = 412)

Variable	Category	n	%	Cumulative %
Sex	Male	224	54.4	54.4
	Female	188	45.6	100.0
Institution Type	Federal University	152	36.9	36.9
	State University	118	28.6	65.5
	Polytechnic	86	20.9	86.4
	College of Education	56	13.6	100.0
Cadre	Junior Librarian	146	35.4	35.4
	Senior Librarian	164	39.8	75.2

	Principal Librarian	102	24.8	100.0
Qualification	B.LIS	84	20.4	20.4
	M.LIS/MLS	241	58.5	78.9
	Ph.D.	87	21.1	100.0
Experience	1–5 years	98	23.8	23.8
	6–10 years	136	33.0	56.8
	11–15 years	112	27.2	84.0
	16+ years	66	16.0	100.0

The data presented in Table 1 indicates a relatively balanced representation of gender, with male librarians comprising 54.4% (n = 224) and female librarians representing 45.6% (n = 188) of the total sample. Regarding the distribution across Library and Information Science (LIS) institutions, federal universities contributed the largest share with 36.9%, followed by state universities at 28.6%, polytechnics at 20.9%, and colleges of education at 13.6%. Professionally, senior librarians constituted the largest cadre group at 39.8%, and the sample proved to be highly qualified, with 58.5% holding a master's degree (M.LIS/MLS) and 21.1% possessing a doctoral degree. In terms of service longevity, the modal experience bracket was 6 to 10 years, accounting for 33.0% of the respondents, which indicates that the data reflects perspectives from experienced professionals within the West African higher education ecosystem.

4.2. Descriptive Analysis of Student Engagement Modes

The first research question sought to identify the specific operational channels through which academic librarians actively engage with students to promote core literacies. To address this objective empirically, the researchers mapped the percentage distributions, mean scores, and standard deviations for eight distinct engagement channels, as displayed in Table 2.

Table 2. Modes of Student Engagement (N = 412)

Engagement Mode	Always (%)	Often (%)	Sometimes (%)	Rarely (%)	M (SD)
In-person reference consultation	42.5	33.2	16.0	8.3	4.10 (0.96)
Formal library instruction sessions	38.3	35.7	18.2	7.8	4.05 (0.93)
Embedded librarianship in courses	11.4	19.7	31.6	37.3	3.05 (1.01)
Email/chat virtual reference	28.6	30.1	24.3	17.0	3.71 (1.06)
Social media outreach	24.3	29.6	27.4	18.7	3.59 (1.08)
Online tutorials / LibGuides	18.9	24.5	30.1	26.5	3.36 (1.07)
Workshop / seminar programmes	20.1	27.9	32.3	19.7	3.49 (1.04)
AI tool orientation sessions	7.3	13.6	28.4	50.7	2.77 (1.00)
Aggregate Engagement Index					3.52 (0.87)

Based on the quantitative evaluations shown in Table 2, where the items were scored on a five-point Likert scale ranging from 1 for never to 5 for always, traditional face-to-face service delivery remains the dominant paradigm. In-person reference consultations generated the highest frequency, yielding a mean score of 4.10 with a standard deviation of 0.96, while formal library instruction sessions closely followed with a mean score of 4.05 and a standard deviation of 0.93. Conversely, modern instructional models focusing on emerging technologies showed minimal integration. Embedded librarianship produced a moderate mean score of 3.05, whereas dedicated artificial intelligence tool orientation sessions recorded the lowest frequency, with a mean score of 2.77 and a standard deviation of 1.00. This trend is highlighted by the fact that 50.7% of respondents reported rarely implementing artificial intelligence orientations, resulting in an aggregate engagement index mean score of 3.52 and a standard deviation of 0.87.

4.3. Librarian Competency in Artificial Intelligence Instruction

The second research question examined librarians' self-reported readiness and pedagogical efficacy in delivering artificial intelligence instruction. Participants assessed their competencies across eight technical and instructional tasks related to AI education. The detailed results of these competency assessments are presented in Table 3.

Table 3. Self-Reported AI Instructional Competency of Academic Librarians (N = 412)

Competency Item	High (%)	Moderate (%)	Low (%)	M (SD)
Understanding AI concepts (ML, NLP, generative AI)	23.3	41.5	35.2	2.88 (0.96)
Evaluating credibility of AI-generated content	31.6	43.7	24.7	3.07 (0.94)
Teaching ethical AI use to students	27.9	44.4	27.7	3.00 (0.95)
Integrating AI tools into IL sessions	19.4	38.8	41.8	2.78 (0.96)
Designing AI literacy learning objectives	16.7	36.2	47.1	2.70 (0.95)
Assessing students' AI literacy outcomes	14.1	34.0	51.9	2.62 (0.93)
Traditional IL instruction delivery	58.7	32.0	9.3	4.02 (0.84)
Database search and retrieval instruction	61.2	30.3	8.5	4.07 (0.82)
Composite AI Competency Score				2.86 (0.71)

The metrics presented in Table 3 reveal a stark divergence between traditional library capabilities and emerging technological competencies, with high rankings indicating scores of 4 to 5, moderate indicating 3, and low representing 1 to 2. Librarians demonstrated strong capabilities in database search and retrieval instruction with a mean score of 4.07, and conventional information literacy delivery with a mean score of 4.02. However, when calculating a composite artificial intelligence competency score that excludes these traditional items, the mean dropped to 2.86 with a standard deviation of 0.71, highlighting an instructional readiness gap. The lowest self-reported proficiencies were concentrated in instructional design and evaluation, specifically designing artificial intelligence learning objectives with a mean score of 2.70, and assessing student artificial intelligence literacy outcomes, which generated the lowest mean score of 2.62 with a standard deviation of 0.93.

4.4. Perceived Systemic and Curricular Barriers

The third research question identified the core structural and operational impediments that restrict effective student engagement for technology-focused instruction. To map these constraints clearly, ten distinct institutional and environmental barriers were evaluated and ranked based on their empirical mean scores, as structured in Table 4.

Table 4. Perceived Barriers to Effective AI Literacy Instruction (N = 412)

Barrier	Agree/Strongly Agree (%)	M (SD)	Rank
Inadequate internet connectivity and digital infrastructure	87.4	4.38 (0.74)	1
Absence of formal AI literacy curriculum in LIS training	84.2	4.27 (0.79)	2
Limited professional development/training opportunities	82.5	4.20 (0.81)	3
Insufficient institutional policy support for AI literacy	79.6	4.12 (0.86)	4
Lack of administrative and funding support	77.9	4.07 (0.88)	5
Absence of AI-capable hardware/software in libraries	76.5	4.01 (0.91)	6
Student low awareness/motivation for AI literacy	71.4	3.89 (0.94)	7
Heavy workload limiting instructional time	68.9	3.79 (0.97)	8
Insufficient collaboration with academic faculty	65.3	3.68 (0.99)	9
Ethical/copyright concerns regarding AI tool use	61.2	3.55 (1.02)	10

The institutional rankings outlined in Table 4 demonstrate that physical infrastructure and professional education frameworks are the most critical limiting factors. Inadequate internet connectivity and digital infrastructure ranked as the most severe barrier, supported by an 87.4% level of agreement and a mean score of 4.38. This physical deficit is closely followed by a structural educational challenge, namely the absence of formal artificial intelligence literacy curricula in library and information science professional

training, which ranked second with a mean score of 4.27, and limited professional development opportunities, which ranked third with a mean score of 4.20. In contrast, non-institutional factors such as insufficient collaboration with academic faculty with a mean score of 3.68, and broader ethical or copyright concerns with a mean score of 3.55, were ranked as least restrictive, showing that librarians are motivated to instruct but face severe infrastructural and educational constraints.

4.5. Inferential Analysis and Predictive Modeling

The fourth research question and its corresponding directional hypotheses evaluated the empirical determinants governing the overall effectiveness of artificial intelligence instruction. A multiple linear regression analysis using the enter method was executed, using artificial intelligence instruction effectiveness as the continuous criterion variable against three designated continuous predictors, with the full statistical output detailed in Table 5.

Table 5. Multiple Regression Analysis: Predictors of AI Instruction Effectiveness (N = 412)

Predictor Variable	B	SE B	β	t (p)
Constant	0.74	0.21	N/A	3.52 (0.001)
Engagement Frequency	0.48	0.09	0.41	5.33 (<0.001)
Perceived Administrative Support	0.31	0.10	0.29	3.10 (0.002)
Prior AI Training	0.37	0.09	0.33	4.11 (<0.001)

The multivariate regression model summarized in Table 5 exhibits robust explanatory power, with an R-squared value of 0.52 and an Adjusted R-squared value of 0.51, indicating that the linear combination of the three predictors accounts for 52% of the total variance in instructional effectiveness. The overall model was highly statistically significant, as confirmed by the F-statistic where $F(3, 408) = 148.27$ and $p < 0.001$, confirming the reliability of the predictive framework.

Crucially, the regression output provides strong support for all three directional hypotheses established in the study. Engagement frequency emerged as the strongest independent predictor in the model with a standardized regression coefficient of $\beta = 0.41$, $t = 5.33$, and $p < 0.001$, thereby validating the first hypothesis (H1). Prior artificial intelligence training also operated as a highly significant contributor, returning a coefficient of $\beta = 0.33$, $t = 4.11$, and $p < 0.001$, which supports the third hypothesis (H3). Finally, perceived administrative support exerted a significant positive influence on the criterion variable, yielding a coefficient of $\beta = 0.29$, $t = 3.10$, and $p = 0.002$, validating the second hypothesis (H2).

5. DISCUSSION

5.1. The Persistence of Traditional Paradigms amidst Digital Disruption

The empirical results demonstrating that traditional face-to-face modalities, specifically in-person reference consultations ($M = 4.10$, $SD = 0.96$) and formal library instruction sessions ($M = 4.05$, $SD = 0.93$), remain the dominant engagement modes, while dedicated artificial intelligence orientations ($M = 2.77$, $SD = 1.00$) are severely underutilized, highlights a significant pedagogical anchorage within the Nigerian library ecosystem. This explicit baseline pattern suggests that despite the global rhetoric surrounding the rapid virtualization of higher education, academic libraries in developing regions continue to rely heavily on relational, co-present interactions as their primary instructional vehicle. When contrasted with contemporary international trends, a sharp geographical divergence emerges. While many academic libraries in North America and Western Europe have rapidly expanded their services to include AI literacy initiatives, generative AI workshops, AI policy guidance, and AI-enabled user support, academic libraries across sub-Saharan Africa generally remain at earlier stages of AI integration. Progress in the region is constrained by disparities in digital infrastructure, institutional capacity, and resource availability, resulting in substantial regional differences in AI education and outreach (M. Y. Ali & Richardson, 2025; Buitrago-Ciro et al., 2025).

This institutional inertia should not be interpreted simply as resistance to technological change. Rather, it reflects a pragmatic institutional response to persistent infrastructural constraints, limited organizational readiness, inadequate funding, and insufficient technological capacity that continue to shape service delivery in many resource-constrained universities (Adarkwah et al., 2024; Ayinde et al., 2026; Molaudzi & Marutha, 2025). Furthermore, this phenomenon reflects what macro-sociologists term a cultural lag, wherein exponential technological advancements outpace the linear adaptation of institutional instructional frameworks. By leaving artificial intelligence tool orientations at the periphery of student engagement, libraries inadvertently create an epistemological vacuum. Students are left to navigate complex algorithmic environments without the critical scaffolding required to deconstruct automated outputs, thereby transforming the library from a proactive gateway of knowledge into a reactive repository of conventional media.

5.2. The Competency Paradox and Cognitive Instructional Efficacy

The documented competency paradox, marked by an acute divergence between high self-reported proficiency in conventional database retrieval (M = 4.07) and depressed capabilities in managing artificial intelligence instruction (composite score M = 2.86), particularly in designing learning objectives (M = 2.70) and assessing student outcomes (M = 2.62), uncovers a profound professional challenge that alters the contemporary identity of academic librarianship. This dramatic drop reveals that traditional pedagogical frameworks are fundamentally inadequate for handling automated information architectures. Although academic librarians are generally experienced in teaching students to retrieve and evaluate information from conventional scholarly databases, many report challenges in teaching critical evaluation of generative AI outputs because this requires new AI literacy competencies, an understanding of algorithmic systems, and pedagogical approaches specifically designed for AI-mediated information environments (Deshen & Noa, 2024; Ko & Chiu, 2024; Torres, 2024). This specific finding confirms that the competencies required to manage Large Language Models are fundamentally different from conventional digital literacies (Carroll & Borycz, 2024).

From a theoretical perspective, this baseline deficiency is best explained by integrating Technology Acceptance Model (Al-Adwan et al., 2023; Or, 2024) with theory of instructional self-efficacy (Waddington, 2023). Within the Technology Acceptance Model, perceived ease of use enhances users' perceptions of a technology's usefulness, which in turn serves as a primary determinant of their behavioral intention to adopt and use the technology. In many contexts, perceived ease of use also exerts an indirect influence on behavioral intention through perceived usefulness (I. Ali & Warraich, 2025; Santini et al., 2025). Because many academic librarians have had limited formal preparation in machine learning, natural language processing, prompt engineering, and other AI-related competencies, their perceived ease of use of advanced AI technologies tends to be relatively low. These competency gaps reduce instructional confidence and self-efficacy, leaving many librarians insufficiently prepared to design AI-focused learning outcomes, critically evaluate generative AI outputs, or integrate AI literacy into information literacy instruction. Consequently, limitations in assessing students' AI literacy reflect not only pedagogical challenges but also lower levels of technology acceptance and organizational readiness for AI-enabled teaching (Miltenoff, 2024; Oladokun & Umar, 2025).

5.3. Decoupling Structural Inertia from Professional Motivation

By demonstrating that technological infrastructure deficits (M = 4.38, SD = 0.74) and the absolute absence of a formal artificial intelligence curriculum (M = 4.27, SD = 0.79) rank as the most critical impediments, while placing attitudinal factors such as student motivation (M = 3.89) and ethical anxieties (M = 3.55) at the bottom of the spectrum, the empirical findings decouple professional willingness from institutional capacity. This structural hierarchy challenges the traditional narratives of user-centric instructional failures. The primary challenge confronting higher education institutions in West Africa is not simply individual resistance to technological change. Rather, evidence suggests that AI adoption is constrained by persistent structural barriers including inadequate digital infrastructure, limited institutional capacity, resource shortages, and weak governance frameworks that collectively restrict the ability of librarians and educators to implement AI-enabled teaching and learning effectively (Adarkwah et al., 2024; Mbaya & Ouma-Mugabe, 2024).

This reality highlights a growing mismatch between existing library and information science (LIS) education and the competencies required for AI-enabled academic environments. Although regulatory and higher education institutions are increasingly expected to support digital transformation, many LIS curricula have yet to comprehensively integrate AI-related knowledge and skills. As a result, practicing librarians frequently depend on continuing professional development, workplace learning, and self-directed upskilling to acquire competencies in AI technologies and AI literacy (Montesi et al., 2025; Oladokun & Umar, 2025). Comparative evidence from developing regions, including sub-Saharan Africa, Southern Asia, and Latin America, indicates that persistent deficiencies in digital infrastructure, institutional capacity, and policy readiness continue to slow the integration of AI and digital innovation in academic libraries. These structural constraints contribute to uneven patterns of development and widen the gap between resource-constrained and better-resourced higher education systems (Ayinde et al., 2026; Buitrago-Ciro et al., 2025; Martínez-Camacho et al., 2025). This underscores the reality that any intervention focusing solely on purchasing hardware without a simultaneous overhaul of professional educational standards is fundamentally bound to fail.

5.4. The Operational Triad of Library-Led Instructional Success

The robust explanatory power of the multivariate regression model, which successfully accounts for 52% of the variance in artificial intelligence instruction effectiveness ($R^2 = 0.52$, Adjusted $R^2 = 0.51$, $F(3, 408) = 148.27$, $p < 0.001$), provides a firm empirical justification for the hypothesized paths. Specifically, the validation of all three directional hypotheses (H1, H2, and H3), led by the strong predictive dominance of engagement frequency ($\beta = 0.41$, $t = 5.33$, $p < 0.001$), followed by prior artificial intelligence training (β

= 0.33, t = 4.11, p < 0.001) and perceived administrative support (β = 0.29, t = 3.10, p = 0.002), offers an empirical blueprint for restructuring technological education within academic libraries. This primary position of engagement regularity confirms that the development of critical metaliteracy cannot be achieved through isolated, sporadic interventions such as orientation week lectures or occasional workshops. This finding is consistent with the Association of College and Research Libraries (ACRL) Framework, which conceptualizes information evaluation as a reflective, context-dependent process grounded in threshold concepts. To internalize complex concepts such as Authority Is Constructed and Contextual, particularly in AI-mediated information environments, students benefit from scaffolded and sustained instructional engagement led by academic librarians (Hsieh et al., 2021; Ko & Chiu, 2024; LaFlamme, 2025). Regular engagement transforms the library from an external technical support service into an active partner in the student's academic journey.

The significant predictive effects of prior artificial intelligence training and perceived administrative support provide empirical support for extending the Technology Acceptance Model by incorporating organizational and capability-related variables. Professional training functions as an important external factor that enhances librarians' perceived ease of use, perceived usefulness, and instructional self-efficacy, thereby strengthening their readiness to integrate AI into teaching and learning practices (Odelami et al., 2026; Oladokun & Umar, 2025; Yang et al., 2024). However, individual capability alone is insufficient without strong organizational and administrative support. Leadership commitment plays a pivotal role in allocating resources, fostering an organizational culture that encourages innovation, strengthening institutional readiness for AI adoption, and enabling librarians to implement new pedagogical practices and AI literacy initiatives effectively (Kautonen & Gasparini, 2024; Khalil et al., 2024; Shal et al., 2024). Therefore, the inferential output demonstrates that effective artificial intelligence instruction cannot occur through isolated grassroots efforts by librarians or top-down mandates from management. It requires a deliberate, tripartite alignment where trained librarians are structurally supported by university leadership to maintain continuous, high-frequency educational engagement with the student body.

6. CONCLUSION

This study establishes a comprehensive empirical foundation regarding the current state of academic librarians' student engagement for the promotion of information literacy and artificial intelligence instruction in Nigerian higher education. The synthesized findings demonstrate a profound structural dichotomy, where traditional engagement modes remain highly dominant and information professionals possess robust competencies in conventional literacies, yet severe instructional gaps persist in artificial intelligence readiness, curriculum design, and learning assessment. These deficits are systemic, driven primarily by severe technological infrastructure limitations and an absolute absence of standardized professional training frameworks. However, the inferential evidence provides a clear operational pathway forward, proving that engagement frequency, prior professional training, and proactive administrative support function as highly significant and substantive predictors that account for over half of the total variance in determining the overall success of library-led artificial intelligence instruction.

To mitigate these structural and pedagogical deficiencies, coordinated policy interventions must occur simultaneously at national, institutional, and operational levels. Initially, national regulatory authorities, including the National Universities Commission and the Librarians' Registration Council of Nigeria, should collaborate to engineer and mandate a standardized national artificial intelligence literacy competency framework that is deeply integrated into both pre-service professional education and mandatory continuing development programs. Concurrently, state and federal governments must prioritize targeted capital investments in public library digital infrastructure, specifically addressing the critical deficits in campus broadband connectivity and high-performance computing hardware, which serve as absolute prerequisites for sustainable technological education. At the campus level, institutional library administrators must formalize artificial intelligence instruction within core educational remits, moving beyond sporadic workshops to systematically embed algorithmic literacy modules into orientation frameworks, academic faculty partnerships, and dedicated instructional sessions.

Furthermore, academic libraries should actively transition from passive service points toward innovative, embedded librarianship models, thereby ensuring that technological instruction is contextually integrated directly into disciplinary learning workflows to maximize student engagement frequency. Professional bodies, such as the Nigerian Library Association, should complement these systemic overhauls by establishing dedicated peer-led communities of practice focused on technological literacies, facilitating collaborative resource sharing and localized curriculum benchmarking across institutions. Ultimately, while this cross-sectional inquiry provides a vital diagnostic snapshot of institutional readiness, future research trajectories should employ longitudinal and experimental methodologies to capture the causal impacts of targeted educational interventions on longitudinal student learning outcomes across the shifting higher education landscape.

ACKNOWLEDGMENTS

The author wishes to express sincere gratitude to all the academic librarians across Nigerian tertiary institutions who participated in this study. Their cooperation and willingness to share insights into their engagement strategies, competencies, and challenges were invaluable to the success of this research. Special thanks are extended to the various universities, polytechnics, and colleges of education that facilitated access to their staff and provided the necessary support for data collection.

Additionally, appreciation is due to colleagues and reviewers whose constructive feedback and scholarly guidance contributed significantly to the development and refinement of this work. Finally, I am grateful to my family and friends for their ongoing encouragement and support throughout this research journey.

REFERENCES

Adarkwa, A. B. (2024). Information Literacy Among Students in Higher Learning Institutions in Ghana: The Case of Kwame Nkrumah University of Science and Technology. *The International Information & Library Review*, *56*(2), 167–183. https://doi.org/10.1080/10572317.2024.2335607

Adarkwah, M. A., Okagbue, E. F., Oladipo, O. A., Mekonen, Y. K., Anulika, A. G., Nchekwubemchukwu, I. S., Okafor, M. U., Chineta, O. M., Muhideen, S., & Islam, A. Y. M. A. (2024). Exploring the Transformative Journey of Academic Libraries in Africa before and after COVID-19 and in the Generative AI Era. *The Journal of Academic Librarianship*, *50*(4), 102900. https://doi.org/10.1016/j.acalib.2024.102900

Adekoya, C. O., & Guobiazor, I. R. (2023). Leadership styles, organisational rewards and employees' commitment in academic libraries. *IFLA Journal*, *49*(4), 664–677. https://doi.org/10.1177/03400352231202512

Ajani, Y. A., Tella, A., Salawu, K. Y., & Abdullahi, F. (2022). Perspectives of Librarians on Awareness and Readiness of Academic Libraries to Integrate Artificial Intelligence for Library Operations and Services in Nigeria. *Internet Reference Services Quarterly*, *26*(4), 213–230. https://doi.org/10.1080/10875301.2022.2086196

Akakpo, M. G. (2024). Skilled for the Future: Information Literacy for AI Use by University Students in Africa and the Role of Librarians. *Internet Reference Services Quarterly*, *28*(1), 19–26. https://doi.org/10.1080/10875301.2023.2280566

Al-Adwan, A. S., Li, N., Al-Adwan, A., Abbasi, G. A., Albelbisi, N. A., & Habibi, A. (2023). "Extending the Technology Acceptance Model (TAM) to Predict University Students' Intentions to Use Metaverse-Based Learning Platforms". *Education and Information Technologies*, *28*(11), 15381–15413. https://doi.org/10.1007/s10639-023-11816-3

Ali, I., & Warraich, N. F. (2025). Meta-analysis of technology acceptance for mobile and digital libraries in academic settings using technology acceptance model (TAM). *Global Knowledge, Memory and Communication*, *74*(9–10), 3114–3131. https://doi.org/10.1108/GKMC-09-2023-0360

Ali, M. Y., & Richardson, J. (2025). AI literacy guidelines and policies for academic libraries: A scoping review. *IFLA Journal*, *51*(3), 588–599. https://doi.org/10.1177/03400352251321192

Almatrafi, O., Johri, A., & Lee, H. (2024). A systematic review of AI literacy conceptualization, constructs, and implementation and assessment efforts (2019–2023). *Computers and Education Open*, *6*, 100173. https://doi.org/10.1016/j.caeo.2024.100173

Andres, A., & Usova, T. (2024). A conceptual analysis of collaboration in information literacy librarianship. *The Journal of Academic Librarianship*, *50*(5), 102934. https://doi.org/10.1016/j.acalib.2024.102934

Ayinde, L., Ebiefung, R., & Oladokun, B. D. (2026). Adoption of artificial intelligence in academic libraries: A systematic review of current practices, challenges, and research opportunities. *The Journal of Academic Librarianship*, *52*(1), 103185. https://doi.org/10.1016/j.acalib.2025.103185

Bali, B., Garba, E. J., Ahmadu, A. S., Takwate, K. T., & Malgwi, Y. M. (2024). Analysis of emerging trends in artificial intelligence for education in Nigeria. *Discover Artificial Intelligence*, *4*(1), 110. https://doi.org/10.1007/s44163-024-00163-y

Bernard, S. (2024). Investigating curriculum integrated information literacy. *The Journal of Academic Librarianship*, *50*(1), 102839. https://doi.org/10.1016/j.acalib.2023.102839

Buitrago-Ciro, J., Samokishyn, M., Moylan, R., Hernández Pérez, J., Bakare-Fatungase, O., & Firdawsi, C. (2025). Bridging the AI gap: Comparative analysis of AI integration, education, and outreach in academic libraries. *IFLA Journal*, *51*(3), 682–702. https://doi.org/10.1177/03400352251325274

Caffrey, C., Perry, K., Withorn, T., Lee, H., Philo, T., Clarke, M., Eslami, J., Galoozis, E., Kohn, K. P., Ospina, D., Chesebro, K., Clawson, H., & Dowell, L. (2024). Library instruction and information literacy 2023. *Reference Services Review*, *52*(3), 298–384. https://doi.org/10.1108/RSR-07-2024-0036

Carroll, A. J., & Borycz, J. (2024). Integrating large language models and generative artificial intelligence tools into information literacy instruction. *The Journal of Academic Librarianship*, *50*(4), 102899.

https://doi.org/10.1016/j.acalib.2024.102899
Celik, I. (2023). Exploring the Determinants of Artificial Intelligence (AI) Literacy: Digital Divide, Computational Thinking, Cognitive Absorption. *Telematics and Informatics*, *83*, 102026. https://doi.org/10.1016/j.tele.2023.102026
Černý, M. (2024). University Students' Conceptualisation of AI Literacy: Theory and Empirical Evidence. *Social Sciences*, *13*(3), 129. https://doi.org/10.3390/socsci13030129
Chatikobo, M. V., & Pasipamire, N. (2024). Readiness to embrace artificial intelligence in information literacy instruction at a Zimbabwean University. *Cogent Education*, *11*(1). https://doi.org/10.1080/2331186X.2024.2425209
Chigwada, J. (2024). Adaption and reorganisation of academic libraries following the COVID-19 pandemic. *South African Journal of Libraries and Information Sciences*, *90*(1). https://doi.org/10.7553/90-1-2302
Cox, A. (2024). Algorithmic Literacy, AI Literacy and Responsible Generative AI Literacy. *Journal of Web Librarianship*, *18*(3), 93–110. https://doi.org/10.1080/19322909.2024.2395341
Delmond, A. R., Weber, E. M., & Busch, H. S. (2024). An interdisciplinary assessment of information literacy instruction. *The Journal of Academic Librarianship*, *50*(5), 102944. https://doi.org/10.1016/j.acalib.2024.102944
Deshen, M., & Noa, A. (2024). Librarians' AI Literacy. *Proceedings of the Association for Information Science and Technology*, *61*(1), 883–885. https://doi.org/10.1002/pra2.1128
Egielewa, P., Idogho, P. O., Iyalomhe, F. O., & Cirella, G. T. (2022). COVID-19 and digitized education: Analysis of online learning in Nigerian higher education. *E-Learning and Digital Media*, *19*(1), 19–35. https://doi.org/10.1177/20427530211022808
Eli-Chukwu, N. C., Igbokwe, I. C., Ifebude, B., Nmadu, D., Iguodala, W., Uma, U., Onyeneke, R. U., & Akudo, F. U. (2023). Challenges confronting e-learning in higher education institutions in Nigeria amid Covid -19. *Journal of Applied Research in Higher Education*, *15*(1), 238–253. https://doi.org/10.1108/JARHE-09-2021-0346
Falebita, O. S., & Kok, P. J. (2024). Strategic goals for artificial intelligence integration among STEM academics and undergraduates in African higher education: a systematic review. *Discover Education*, *3*(1), 151. https://doi.org/10.1007/s44217-024-00252-1
Faulkner, A., & Reiter, L. (2025). Career advancement in academic libraries: A systematic review. *The Journal of Academic Librarianship*, *51*(3), 103046. https://doi.org/10.1016/j.acalib.2025.103046
Franzen, S. R., Stewart, C., Jallas, M., & Newport, J. (2024). Consulting with an embedded librarian: student perceptions on the value of required research meetings. *Journal of the Medical Library Association*, *112*(4), 324–331. https://doi.org/10.5195/jmla.2024.1793
Galimova, E. G., Oborsky, A. Y., Khvatova, M. A., Astakhov, D. V., Orlova, E. V., & Andryushchenko, I. S. (2024). Mapping the interconnections: a systematic review and network analysis of factors influencing teachers' technology acceptance. *Frontiers in Education*, *9*, 1436724. https://doi.org/10.3389/feduc.2024.1436724
Greer, K. S. (2023). A pedagogy of care for information literacy and metaliteracy asynchronous online instruction. *The Journal of Academic Librarianship*, *49*(3), 102676. https://doi.org/10.1016/j.acalib.2023.102676
Hsieh, M. L., Dawson, P. H., & Yang, S. Q. (2021). The ACRL Framework successes and challenges since 2016: A survey. *The Journal of Academic Librarianship*, *47*(2), 102306. https://doi.org/10.1016/j.acalib.2020.102306
Inuwa, S., & Abrizah, A. (2018). Embedded Librarianship in Research in Nigerian Universities: Practices and Sources of Practice Knowledge. *The Journal of Academic Librarianship*, *44*(6), 738–746. https://doi.org/10.1016/j.acalib.2018.10.002
Kautonen, H., & Gasparini, A. A. (2024). B-Wheel – Building AI competences in academic libraries. *The Journal of Academic Librarianship*, *50*(4), 102886. https://doi.org/10.1016/j.acalib.2024.102886
Keenan, C., & Meredith, W. (2024). Amplifying Value: Assessment of Asynchronous Embedded Library Instruction and the Influence of Faculty Endorsements. *Internet Reference Services Quarterly*, *28*(4), 339–371. https://doi.org/10.1080/10875301.2024.2396388
Khalil, O., Khalil, H., & Khalil, N. (2024). Academic libraries' knowledge sharing and service innovation: The mediating role of management and IT innovations. *The Journal of Academic Librarianship*, *50*(1), 102832. https://doi.org/10.1016/j.acalib.2023.102832
Ko, C. R., & Chiu, M. (Phoebe). (2024). How Can Academic Librarians Support Generative AI Literacy: An Analysis of Library Guides Using the ACRL Information Literacy Framework. *Proceedings of the Association for Information Science and Technology*, *61*(1), 977–979. https://doi.org/10.1002/pra2.1159
LaFlamme, K. A. (2025). Scaffolding AI literacy: An instructional model for academic librarianship. *The Journal of Academic Librarianship*, *51*(3), 103041. https://doi.org/10.1016/j.acalib.2025.103041
LeMire, S., Xu, Z., Dorsey, L. G., & Hahn, D. (2024). Information literacy skill mastery across the undergraduate degree: An examination of first-generation and continuing-generation students. *The*

Journal of Academic Librarianship, *50*(5), 102932. https://doi.org/10.1016/j.acalib.2024.102932

Lo, L. S. (2023). The CLEAR path: A framework for enhancing information literacy through prompt engineering. *The Journal of Academic Librarianship*, *49*(4), 102720. https://doi.org/10.1016/j.acalib.2023.102720

Martínez-Camacho, H., Saavedra-Alamillas, C., Pacheco-Mendoza, J., & Machin-Mastromatteo, J. D. (2025). Generative artificial intelligence and university libraries in Latin America. *IFLA Journal*, *51*(3), 647–659. https://doi.org/10.1177/03400352251348246

Mbandje, D. C., Loureiro, M. J., & Lucas, M. (2023). Digital competence and information literacy: clarifying concepts based on a literature review. *Educational Media International*, *60*(3–4), 306–316. https://doi.org/10.1080/09523987.2023.2324584

Mbaya, M., & Ouma-Mugabe, J. (2024). A systematic literature review and mapping of systemic barriers to digital learning innovation in Africa in the context of changing global value chains. *African Journal of Science, Technology, Innovation and Development*, *16*(4), 491–511. https://doi.org/10.1080/20421338.2023.2287803

Mikeladze, T., Meijer, P. C., & Verhoeff, R. P. (2024). A comprehensive exploration of artificial intelligence competence frameworks for educators: A critical review. *European Journal of Education*, *59*(3). https://doi.org/10.1111/ejed.12663

Miltenoff, P. (2024). Academic Librarians in Times of AI and AI Literacy: Tasks, Responsibilities, and Leadership. *The International Information & Library Review*, *56*(3), 296–305. https://doi.org/10.1080/10572317.2024.2381182

Molaudzi, A. I., & Marutha, N. (2025). Contributory factors to attitudes towards the adoption of artificial intelligence technology in public academic libraries in South Africa. *Information Development*, *41*(3), 615–625. https://doi.org/10.1177/02666669241304704

Montesi, M., Bornstein, B. Á., Puig, N. B., Ochando, M. B., & Díez, A. S. (2025). AILIS 1.0: A new framework to measure AI literacy in library and information science (LIS). *The Journal of Academic Librarianship*, *51*(5), 103118. https://doi.org/10.1016/j.acalib.2025.103118

Moshagen, M., & Bader, M. (2023). semPower: General power analysis for structural equation models. *Behavior Research Methods*, *56*(4), 2901–2922. https://doi.org/10.3758/s13428-023-02254-7

Mushi, C., Mwantimwa, K., & Wema, E. (2023). Librarians' competencies for implementing embedded librarianship in university libraries. *Journal of Librarianship and Information Science*, *55*(3), 798–812. https://doi.org/10.1177/09610006221104809

Nakaziba, S., & Ngulube, P. (2025). Continuing professional development strategies for digital transformation among academic librarians in Africa: A systematic review. *Journal of Librarianship and Information Science*, *57*(1), 296–306. https://doi.org/10.1177/09610006231207659

Nazaretsky, T., Cukurova, M., & Alexandron, G. (2022). An Instrument for Measuring Teachers' Trust in AI-Based Educational Technology. *LAK22: 12th International Learning Analytics and Knowledge Conference*, 56–66. https://doi.org/10.1145/3506860.3506866

Ngulube, P., & Vincent Mosha, N. F. (2025). Integrating artificial intelligence-based technologies 'safely' in academic libraries: An overview through a scoping review. *Technical Services Quarterly*, *42*(1), 46–67. https://doi.org/10.1080/07317131.2024.2432093

Nguyen, A., Ngo, H. N., Hong, Y., Dang, B., & Nguyen, B.-P. T. (2023). Ethical principles for artificial intelligence in education. *Education and Information Technologies*, *28*(4), 4221–4241. https://doi.org/10.1007/s10639-022-11316-w

Odelami, B. J., Ebhonu, S. I., Oradugba, F. L., & Usman, A. I. (2026). Librarians' propensity to use AI technologies for knowledge sharing in Nigeria based on technology acceptance model. *Alexandria: The Journal of National and International Library and Information Issues*, 09557490251414717. https://doi.org/10.1177/09557490251414717

Oladokun, B. D., & Umar, L. (2025). Artificial intelligence skills and competencies among librarians in 5IR libraries: Systematic review. *Information Services and Use*, *45*(3–4), 201–214. https://doi.org/10.1177/18758789261418488

Or, C. (2024). Thirty-Five Years of the Technology Acceptance Model: Insights From Meta-Analytic Structural Equation Modelling. *The Open/Technology in Education, Society, and Scholarship Association Journal*, *4*(3), 1–26. https://doi.org/10.18357/otessaj.2024.4.3.66

Pienaar, C., & Bartlett, J. C. (2024). Discipline as Context: Arts and Science Students' Views on Key Concepts in the ACRL Framework. *Proceedings of the Association for Information Science and Technology*, *61*(1), 1068–1070. https://doi.org/10.1002/pra2.1187

Pinski, M., & Benlian, A. (2024). AI literacy for users – A comprehensive review and future research directions of learning methods, components, and effects. *Computers in Human Behavior: Artificial Humans*, *2*(1), 100062. https://doi.org/10.1016/j.chbah.2024.100062

Ramgadwala, H. (2024). Impact of multimedia on academic information literacy instruction in libraries. *IFLA Journal*, *50*(2), 273–291. https://doi.org/10.1177/03400352231222042

Reed, C., Aria, P., Mondésir, G., & Long, H. (2025). Ongoing Changes in Virtual Reference and Online

Instruction in Academic Libraries. *College & Research Libraries*, *86*(2). https://doi.org/10.5860/crl.86.2.294

Ruano-Borbalan, J.-C. (2025). The transformative impact of artificial intelligence on higher education: A critical reflection on current trends and futures directions. *International Journal of Chinese Education*, *14*(1). https://doi.org/10.1177/2212585X251319364

Santini, F. de O., Sampaio, C. H., Rasul, T., Ladeira, W. J., Kar, A. K., Perin, M. G., & Azhar, M. (2025). Understanding students' technology acceptance behaviour: A meta-analytic study. *Technology in Society*, *81*, 102798. https://doi.org/10.1016/j.techsoc.2024.102798

Scoulas, J. M., De Groote, S. L., Shotick, K., & Osorio, N. L. (2024). A holistic approach to understanding undergraduates: Campus engagement, library use and psychological factors. *The Journal of Academic Librarianship*, *50*(5), 102936. https://doi.org/10.1016/j.acalib.2024.102936

Shahzad, K., Khan, S. A., Iqbal, A., Ahmed, S., Javeed, A. M. D., & Mohamed, O. (2025). Factors influencing the adoption of artificial intelligence in libraries: A systematic literature review. *Information Development*, *41*(3), 592–614. https://doi.org/10.1177/02666669241313368

Shal, T., Ghamrawi, N., & Naccache, H. (2024). Leadership styles and AI acceptance in academic libraries in higher education. *The Journal of Academic Librarianship*, *50*(2), 102849. https://doi.org/10.1016/j.acalib.2024.102849

Susiani, A., Wennie, J., & Masliha, M. (2025). Digital Transformation in Nursing Practice: Leveraging Technology for Patient Education and Clinical Decision Support. *International Journal of Nursing Information*, *4*(2), 1–11. https://doi.org/10.58418/ijni.v4i2.165

Torres, J. M. (2024). Leveraging ChatGPT and bard for academic librarians and information professionals: a case study of developing pedagogical strategies using generative AI models. *Journal of Business & Finance Librarianship*, *29*(3), 169–182. https://doi.org/10.1080/08963568.2024.2321729

Waddington, J. (2023). Self-efficacy. *ELT Journal*, *77*(2), 237–240. https://doi.org/10.1093/elt/ccac046

Wong, W. K. O. (2024). The sudden disruptive rise of generative artificial intelligence? An evaluation of their impact on higher education and the global workplace. *Journal of Open Innovation: Technology, Market, and Complexity*, *10*(2), 100278. https://doi.org/10.1016/j.joitmc.2024.100278

Yang, X., Ding, J., Chen, H., & Ji, H. (2024). Factors affecting the use of artificial intelligence generated content by subject librarians: A qualitative study. *Heliyon*, *10*(8), e29584. https://doi.org/10.1016/j.heliyon.2024.e29584

Zhu, X., Whitaker, E., Cho, M., & Zhang, M. (2025). Student Engagement in Academic Libraries: A Conceptual Framework. *College & Research Libraries*, *86*(2). https://doi.org/10.5860/crl.86.2.275