JOURNAL OF ARTS OF SOCIAL SCIENCES, KONTAGORA (JASSK)
FACULTY OF ARTS AND SOCIAL SCIENCES
FEDERAL UNIVERSITY OF EDUCATION, KONTAGORA, NIGER STATE-NIGERIA
Vol. 1, No 2 September, 2026
E ISSN: 3156-5336

REIMAGINING THE LIS CURRICULUM: INTEGRATING GENERATIVE AI AND MACHINE LEARNING IN TEACHER TRAINING AT KADUNA STATE COLLEGE OF EDUCATION, GIDAN WAYA

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DOI: https://doi.org/10.5281/zenodo.22802462

ABSTRACT

The rapid emergence of Generative Artificial Intelligence (GenAI) and Machine Learning (ML) is fundamentally transforming the global information landscape, creating an urgent imperative for curriculum reform in Library and Information Science (LIS) teacher training programs within Nigerian Colleges of Education. This conceptual study explores the strategic integration of GenAI and ML into LIS teacher education, grounded in the Technological Pedagogical Content Knowledge (TPACK) framework. Key areas for curricular renewal include automation of technical services (cataloging, metadata generation), AI-driven reference services, and algorithmic transparency ethics. Significant barriers identified include faculty AI knowledge gaps, inadequate digital infrastructure, and lack of structured pedagogical guidelines. The study recommends that successful integration requires a multi-level approach: updating course content to include prompt engineering and data science, establishing AI-experiential labs for hands-on teacher training, and embedding ethical AI literacy as a core competency. The paper also recommends consistent professional development for in-service teachers and collaborative policy reform between the Teachers Registration Council of Nigeria (TRCN) and LIS stakeholders are essential. This study concludes that reimagining the LIS curriculum is not merely a technical update but a survival strategy for the profession, ensuring graduates are equipped for an AI-augmented workforce.

Keywords: Generative AI; LIS curriculum; Teacher education; Digital literacy; Nigeria

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INTRODUCTION

Background to the Study

The global information landscape is undergoing a profound transformation following the rapid emergence of Generative Artificial Intelligence (GenAI) and Machine Learning (ML), which are reshaping how information is created, organized, accessed, and disseminated. According to Albadarin et al. (2024), the growing integration of ChatGPT and other generative AI technologies into education demonstrates their expanding influence on knowledge creation, teaching, and learning processes. In line with this development, Celik (2023) stated that artificial intelligence has become an important component of contemporary educational practice by supporting intelligent learning environments and enhancing teachers' technological capabilities. Similarly, Chigwada and Pasipamire (2024) affirmed that large language models are creating new possibilities for information retrieval, organization, dissemination, and professional practice within Library and Information Science (LIS), thereby transforming the information environment in which future librarians and educators will operate.

For the Library and Information Science profession, these technological developments present significant opportunities and emerging responsibilities for teacher education and professional preparation. According to Cao et al. (2026), teachers' AI-related technological, pedagogical, and content knowledge has become increasingly important for effective digital transformation in education. In line with this perspective, Ayanwale et al. (2025) observed that Nigerian educators are increasingly engaging with large language models and generative AI, highlighting the growing need for competencies that enable meaningful educational application of these technologies. Furthermore, Bakre and Tukur-Bello (2026) emphasized

that the integration of AI into educational practice must be accompanied by ethical awareness relating to responsible use, privacy, accountability, and appropriate decision-making. These developments suggest that LIS teacher education must evolve beyond traditional instructional approaches to prepare educators capable of integrating GenAI and ML into teaching, learning, and future library practice.

Within the Nigerian educational context, teacher-training institutions occupy a strategic position in preparing professionals for an increasingly AI-driven information society. Kaduna State College of Education, GidanWaya, through its Department of Library and Information Science, is responsible for preparing future LIS educators with the professional knowledge and pedagogical competencies required for effective teaching and information service delivery. The increasing relevance of GenAI and ML therefore creates an urgent need to reimagine the LIS curriculum by incorporating emerging technological competencies, practical AI applications, ethical literacy, and innovative pedagogical approaches. Consequently, this paper examines the integration of Generative Artificial Intelligence and Machine Learning into the LIS teacher-training curriculum at Kaduna State College of Education, GidanWaya, with the aim of proposing conceptual strategies for curriculum renewal and sustainable professional development within LIS education.

Statement of the Problem

Despite the transformative potential of GenAI and ML for library and information services, the LIS curriculum in Nigerian Colleges of Education has remained remarkably static in its response to these technological developments. Graduates of LIS teacher training programmes continue to be prepared primarily for traditional library roles, with limited exposure to AI

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concepts, tools, and application. This curriculum-practice gap has several implications of grave concern.

First, newly qualified LIS teachers enter the profession ill-equipped to prepare their own students for an AI-augmented information landscape. Second, the absence of AI competencies in the curriculum perpetuates a cycle of technological obsolescence, where each generation of librarians falls further behind global standards of practice. Third, Nigerian libraries risk becoming increasingly irrelevant in a digital ecosystem where users expect intelligent, responsive, and personalized information services. The problem is further compounded by several contextual factors. Faculty members in LIS departments often lack the requisite knowledge and skills to teach AI-related content. Institutional infrastructure, including computing resources and internet connectivity, is frequently inadequate for hands-on AI training. Moreover, there is a notable absence of structured pedagogical guidelines for integrating AI into LIS teacher education. The result is a curriculum that, while theoretically acknowledging the importance of technology, fails to meaningfully prepare graduates for the realities of contemporary library practice.

Objectives of the Study

The objectives of this study are to:

1. Identify specific curriculum areas in LIS teacher education that need to be updated to include GenAI and ML content.

2. Examine the barriers hindering the integration of GenAI and ML into the LIS curriculum.

3. Propose practical strategies for embedding GenAI and ML competencies into LIS teacher training.

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4. Explore the implications of AI integration for the LIS teaching profession.

Research Questions

This study is guided by the following research questions:

1. What are the key areas of LIS teacher education curriculum that require renewal to incorporate GenAI and ML competencies?

2. What are the primary barriers to integrating GenAI and ML into the LIS curriculum at Kaduna State College of Education, GidanWaya?

3. What strategies can be employed to effectively integrate GenAI and ML into LIS teacher training programmes?

4. What are the implications of GenAI and ML integration for the professional identity and practice of LIS educators?

LITERATURE REVIEW

Generative Artificial Intelligence: Concepts and Applications

Generative Artificial Intelligence refers to a class of AI systems capable of producing new content including text, images, audio, video, and code based on patterns learned from training data (Radloff, Yeter& Chiu, 2025). Unlike traditional AI systems that primarily analyse or classify existing data, GenAI creates novel outputs that mimic human-generated content ((Bakre&Tukur-Bello, 2026). The emergence of large language models (LLMs) such as OpenAI's GPT series, Google's Gemini, and Anthropic's Claude has democratised access to powerful generative capabilities, enabling users across various domains to leverage AI for content creation, problem-solving, and decision support.

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For library and information science, in line with Cao et al (2026)GenAI presents a range of applications. In technical services, AI can automate cataloguing and metadata generation, reducing the time and effort required for these essential but labour-intensive tasks (American Library Association, 2023). In reference services, AI-powered chatbots and virtual assistants can provide round-the-clock support to library users, answering queries, guiding research, and recommending resources (Formanek, 2025). In information literacy instruction, GenAI can generate customised learning materials, create interactive tutorials, and simulate research scenarios for student practice

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Machine Learning in Library and Information Science

Machine learning is a branch of AI in which algorithms learn patterns from data to classify, predict or recommend outcomes. In LIS, according (Zhang, 2024) ML can support automated classification, recommendation, text analysis, semantic search, usage prediction and other data-intensive activities. These applications change the competencies required of LIS graduates because professionals need a basic understanding of data, model limitations, evaluation and bias even when they are not themselves developing algorithms.

Celik,(2023) stated that the integration of ML into library practice requires LIS professionals to possess foundational knowledge of data science principles, including data collection, cleaning, analysis, and visualization. Furthermore, understanding the limitations and biases inherent in ML algorithms is essential for responsible implementation**.**

THEORETICAL FRAMEWORK

The TPACK Framework in LIS Education

The Technological Pedagogical Content Knowledge (TPACK) framework, developed by Koehler and Mishra provided a valuable lens for understanding the integration of technology into teaching and learning. TPACK identifies three core knowledge domainscontent knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK)and emphasizes the intersections between them. Effective technology integration, according to the framework, requires teachers to develop TPACK: the ability to use technology to teach specific content in pedagogically appropriate ways (Mishra & Koehler, 2006). In this study, TPACK provides a basis for examining how LIS educators can combine knowledge of LIS content, appropriate teaching methods, and emerging technologies such as GenAI and ML. For LIS teacher education, the TPACK framework offers guidance for curriculum design (Bakre&Tukur-Bello, 2026). Content knowledge in LIS encompasses the principles and

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practices of library and information science, including cataloguing, reference, collection development, and information literacy. Pedagogical knowledge involves understanding how LIS content is best taught and learned (Mishra & Koehler, 2006). Technological knowledge includes familiarity with AI tools, platforms, and applications relevant to library practice. Applying the TPACK framework to GenAI and ML integration requires LIS educators to develop TPACK in three key areas: understanding how AI tools can be used to teach LIS content (technological content knowledge); knowing how to design AI-enhanced learning experiences (technological pedagogical knowledge); and recognizing the interplay between AI, pedagogy, and LIS content in specific teaching contexts (TPACK itself)

Global Perspectives on AI Integration in LIS Curricula

Internationally, LIS programmes have begun to respond to the AI revolution in various ways (Celik, 2023). In North America and Europe, many LIS schools have introduced courses on data science, AI applications in libraries, and information ethics in the digital age (Albadarinet al 2024). Some programmes offer specializations or certificates in areas such as digital curation, data analytics, and user experience designall of which incorporate AI competencies. However, the pace and depth of AI integration vary considerably across institutions ((Formanek, 2025). A survey of LIS programmes in the United States found that while most programmes offered some coverage of AI-related topics, few required these topics as part of core curricula (American Library Association, 2023). Similarly, in the United Kingdom, LIS education has been described as "lagging behind" the technological demands of the profession.

In developing countries, the challenges of AI integration are even more pronounced. Deng et al (2024)opined that Limited infrastructure, faculty capacity constraints, and competing

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educational priorities often result in minimal AI content in LIS curricula. Some African LIS programmes have partnered with technology companies and international organizations to develop AI-focused modules and workshops.

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Research Design

This study adopts a conceptual research design to examine the integration of Generative AI (GenAI) and Machine Learning (ML) into LIS teacher education.The design is appropriate because the study is based on the analysis and synthesis of existing scholarly literature, policies, and relevant theoretical perspectives rather than primary empirical data.It enables the researcher to critically examine existing knowledge and identify emerging issues related to AI integration in LIS education.The design also provides a basis for developing practical strategies for curriculum renewal, faculty development, infrastructure, and ethical AI education.Therefore, the conceptual research design is suitable for generating a coherent understanding of AI integration and informing future empirical research and policy development.

DISCUSSION

The Imperative for Curriculum Renewal

The study underscore the urgent imperative for curriculum renewal in LIS teacher education. The rapid emergence of GenAI and ML is not a passing trend but a fundamental transformation of the information landscape (Deng et al, 2024). LIS educators who fail to prepare their students for an AI-augmented world risk rendering their programmes obsolete and their graduates uncompetitive.

The TPACK framework provides a valuable lens for understanding what curriculum renewal entails (Koehler & Mishra, 2009). It is not simply about adding new content but about developing integrated knowledge that enables educators to use AI tools to teach LIS content

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in pedagogically appropriate ways. This requires attention to all three domaintechnology, pedagogy, and contentand the intersections between them (Koehler & Mishra, 2009)

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The Role of Ethical AI Literacy

A particularly important finding is the need to embed ethical AI literacy throughout the curriculum . As libraries increasingly rely on AI systems, the ethical implications of these systems become more pressing (Formanek, 2025). Algorithmic bias can perpetuate and amplify existing inequalities (Bakre& Tukur-Bell 2026). Lack of transparency can undermine trust in library systems (American Library Association, 2023). Privacy concerns arise from the collection and analysis of user data. LIS educators have a responsibility to prepare their students to navigate these ethical challenges. This requires not only knowledge of ethical principles but also the ability to apply these principles in practice. Students should be prepared to critically evaluate AI systems, advocate for ethical AI use, and engage in ongoing reflection on the ethical implications of their professional practice (American Library Association, 2023).

Implications for LIS Educators

The integration of GenAI and ML into LIS teacher education has significant implications for LIS educators themselves. Educators must engage in continuous learning to stay current with rapidly evolving AI technologies ((Tella, 2023). They must be willing to experiment with new pedagogical approaches and to learn alongside their students. They must also navigate the challenges of academic integrity in an age of AI-generated content, developing policies and practices that promote ethical use of AI while harnessing its potential for learning (Deng et al, 2024).Perhaps most fundamentally, LIS educators must grapple with questions about the future of their profession. Tella, (2023) opined that as AI systems become capable of performing tasks that were once the exclusive domain of librarians, what is the distinctive value of the LIS professional? The answer, this study

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suggests, lies not in competing with AI on technical tasks but in focusing on uniquely human capabilities: critical thinking, ethical judgment, empathy, and the ability to understand and respond to the complex information needs of diverse users (American Library Association, 2023).

Aligning with National Policy

The recommendations of this study align closely with Nigeria's National Artificial Intelligence Strategy (2024) (Federal Ministry of Communications, Innovation and Digital Economy, 2024). The strategy's emphasis on building AI talent and capacity, fostering innovation, and ensuring ethical AI development resonates with the curriculum renewal priorities identified in this study (Federal Ministry of Communications, Innovation and Digital Economy, 2024). By integrating GenAI and ML into LIS teacher education, Nigerian Colleges of Education can contribute directly to the realisation of national AI goals (Mai, Da&Hanh, 2024). Furthermore, the strategy's recognition of education as a critical enabler of AI adoption underscores the importance of preparing teachers who can foster AI literacy among their students (Cao et al 2026). LIS educators, as teachers of teachers, have a multiplier effect: by preparing LIS teachers who are AI-literate, they contribute to the development of AI literacy across the educational system (Federal Ministry of Communications, Innovation and Digital Economy, 2024).

Barriers to AI Integration

The integration of Generative AI (GenAI) and Machine Learning (ML) into the LIS curriculum at Kaduna State College of Education, GidanWaya, is constrained by several interconnected challenges. These include inadequate AI knowledge and skills among faculty members, unreliable digital infrastructure, limited access to modern computing facilities and

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AI platforms, absence of structured pedagogical guidelines for teaching AI, and curriculum frameworks that may not adequately reflect emerging AI competencies (Deng et al, 2024). In addition, Zhang (2024) opined that financial limitations may restrict investment in infrastructure, staff training, curriculum development, and AI learning resources, while institutional and regulatory requirements can make curriculum modification difficult and time-consuming. These barriers collectively limit opportunities for LIS educators and students to acquire practical AI competencies needed for contemporary professional practice.

Strategies for Effective Integration

Effective integration of GenAI and ML requires a coordinated approach involving curriculum renewal, practical learning, ethical education, faculty development, and institutional policy support. LIS curricula should be updated by introducing AI-related courses or integrating topics such as prompt engineering, data science, AI ethics, machine learning applications, and evaluation of AI tools into existing courses (Mai, Da and Hanh (2024). Establishing AI experiential laboratories with adequate computers, reliable internet, and relevant AI platforms would provide students with practical and project-based learning opportunities.in line with Ayanwale et al, (2025) Ethical AI literacy should also be embedded across the curriculum to address privacy, bias, transparency, accountability, and responsible use of AI. Furthermore, regular faculty training, collaboration with AI specialists, AI-focused research, and incentives for developing new teaching materials can strengthen educators' capacity (Zhang, 2024). Finally, collaboration among NCCE, TRCN, LIS professional bodies, and institutions is necessary to incorporate relevant AI competencies into curriculum, accreditation, and professional standards.

Recommendations

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Based on the discussions and conclusions of the study, the following recommendations are made:

1. Curriculum Renewal: LIS teacher-training institutions should regularly review and update their curricula to incorporate relevant GenAI and ML knowledge, skills, applications, and ethical considerations.

2. Faculty Development: Institutions should provide continuous professional development opportunities that equip LIS educators with the knowledge, practical skills, and pedagogical approaches required to teach and apply GenAI and ML effectively.

3. ICT Infrastructure: Adequate investment should be made in reliable internet connectivity, modern computing facilities, AI tools, software, and other digital infrastructure necessary for effective AI-supported teaching and learning.

4. Practical AI Learning: LIS programmes should provide opportunities for students to acquire practical experience through AI laboratories, projects, demonstrations, simulations, and other hands-on learning activities.

5. Ethical AI Education: AI ethics should be integrated into LIS education to prepare students to address issues relating to privacy, bias, transparency, accountability, intellectual property, and responsible use of AI technologies.

6. Institutional and Policy Support: Relevant educational authorities and professional bodies should develop supportive policies, curriculum guidelines, and professional standards that encourage responsible integration of GenAI and ML into LIS teacher education.

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7. Stakeholder Collaboration: Colleges of Education, regulatory bodies, LIS professional associations, technology experts, and other stakeholders should collaborate in developing appropriate AI teaching resources, training programmes, curriculum materials, and professional development initiatives.

8. Further Research: Researchers should undertake empirical and comparative studies to assess the effectiveness of AI integration in LIS education, identify emerging challenges, and provide evidence for continuous curriculum improvement.

Conclusion

The study concludes that integrating Generative Artificial Intelligence (GenAI) and Machine Learning (ML) into LIS teacher education is essential for preparing graduates for an increasingly AI-driven information environment. The review identified important areas for curriculum renewal, including AI applications in technical services and reference services, data science, prompt engineering, AI ethics, and information literacy, while also highlighting barriers such as faculty knowledge gaps, inadequate infrastructure, limited pedagogical guidance, curriculum constraints, and resource limitations. Effective integration therefore requires continuous curriculum renewal, faculty development, adequate ICT infrastructure, practical AI learning opportunities, ethical AI education, and supportive institutional and regulatory policies. Ultimately, a reimagined LIS curriculum can equip future LIS educators with the knowledge, skills, and ethical awareness required to use emerging technologies effectively and contribute meaningfully to the evolving library and information profession.

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