Repositioning Library and Information Science Graduates for the Fourth Industrial Revolution: Emerging Career Opportunities and Competency Requirements

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Abstract

The Fourth Industrial Revolution (4IR) marked by artificial intelligence, big data, machine learning, cloud computing, IoT, blockchain, and automation is fundamentally reshaping the Library and Information Science (LIS) profession. It is pushing practice beyond traditional library and archival functions into areas such as data management, digital curation, knowledge management, and information governance. To keep pace, LIS graduates must now develop a broad range of competencies spanning digital and ICT skills, AI literacy, and information organisation and retrieval. Equally important are digital scholarship, research support, cybersecurity, and information ethics, alongside strong communication, critical thinking, creativity, and entrepreneurial skills. These competencies are opening new career pathways in digital librarianship, data librarianship, information consultancy, knowledge management, and information analytics, extending well beyond conventional library roles. However, repositioning LIS graduates for this new labour market is not without obstacles. Persistent skills gaps, rapidly evolving technologies, weak digital infrastructure, limited funding, and outdated curricula continue to hinder progress. These difficulties are compounded by the high cost of AI adoption, ethical concerns, poor data quality, resistance to change, and an uneven digital divide. Overcoming them will require continuous curriculum renewal, industry-aligned training, sustained digital upskilling, and stronger collaboration between LIS schools, employers, and professional bodies. Ultimately, the paper argues that a genuine transformation not merely incremental adjustment is essential to keep LIS graduates competitive and relevant in the 4IR era.

Keywords: Fourth Industrial Revolution, Library and Information Science, LIS Graduates, Career Opportunities, Employability, Emerging Skills, Digital Transformation, Artificial Intelligence.

Introduction

The Library and Information related activities are ever evolving partly as a result of the effects of the Fourth Industrial Revolution thereby repositioning the library and information science graduates in terms of career opportunities and competency requirements. The revolution is characterised by the rapid integration and application of emerging technologies, including artificial intelligence (AI), big data analytics, machine learning, cloud computing, the Internet of Things (IoT), blockchain, robotics, automation, cybersecurity and advanced digital platforms, alongside increasing demand for contemporary professional, interpersonal, strategic and entrepreneurial competencies. The integration of these technology applications has transformed the processes through which information throughout its life cycle is created, organised, processed, stored, retrieved, disseminated and preserved.

According to Tella, Bamidele, Olaniyi, and Ajani (2023), the Fourth Industrial Revolution has introduced new expectations for Library and Information Science graduates in Nigeria, especially concerning digital and technological skills. Their research revealed a gap between the competencies held by LIS graduates and those demanded by employers in a workplace increasingly shaped by 4IR. As a result, they stress that LIS programs must regularly update their curricula to equip students with the skills needed to remain employable in technology-driven work environments. Among the competencies the authors highlight as growing in importance are digital literacy, information management, analytical thinking, innovation, communication, and various other technology-related abilities.

The information landscape now therefore today has grown markedly more digital, interconnected, data-driven, and technologically complex, pushing LIS practice well beyond the conventional confines of libraries, archives, and information centres. As a result, the field now extends into emerging domains such as data management, digital curation, knowledge management, information governance, digital preservation, research data management, and intelligent information services. Importantly, this evolution does not render traditional LIS competencies obsolete; rather, it opens up new settings in which those established skills can be applied in tandem with newer technological capabilities. As a consequence, LIS graduates must now cultivate a broader mix of technological, analytical, professional, and interpersonal competencies if they are to operate effectively amid increasingly complex and fast-evolving information, data, and knowledge environments.

Fourth Industrial Revolution and Its Implications for LIS Graduates

The 4IR refers to the on-going transformation of traditional manufacturing and industrial practices with the integration of digital technologies. The 4IR is the current and emerging environment where disruptive trends and technology are altering how people live and work. It is imperative to note that library and information professionals specialists respond to it since doing so will give them the chance to build capacity and implement the paradigm change in their service delivery. (**Okwoli**, 2023 & Ekeh, 2025). The fourth industrial revolution is associated with a number of advancements that seek to force networking, virtualization, and digitization in every aspect of life, including academic libraries. It has to deal with automation and data transfer in digitally based manufacturing technologies (Spotti and Windelband, 2020).

In order LIS graduates to handle complex situations, taking advantage of technologies such as artificial intelligence (AI), big data analytics, the Internet of Things (IoT), robotics, cloud computing, blockchain, virtual and augmented reality, advanced automation, and emerging

computational technologies, integrating these technologies is a must, thereby mandating the LIS graduates to be equip with necessary competencies required, so that carrier opportunities available will be harnessed. Emiri (2023) contends that the defining characteristics of 4IR are its unprecedented velocity, scope, depth, and systemic impact, with these technologies becoming increasingly interconnected and embedded within social and organisational processes.

The Fourth Industrial Revolution demands requires fluency in AI, data analytics, and automation tools alongside traditional information management skills, positioning them as data curators, digital literacy educators, and intermediaries between complex algorithmic systems and end users. It requires them to master emerging competencies coding, metadata for machine-readable and linked data, UX design, and management of digital repositories and -makerspaces while retaining core LIS values like ethical information access, privacy, and equity. Ultimately, 4IR pushes LIS graduates beyond custodianship of collections toward being adaptive knowledge professionals who can critically evaluate, teach, and apply rapidly evolving technologies in service of their communities.

Competency Requirements for LIS Graduates in 4IR Era

The Fourth Industrial Revolution (4IR) has substantially transformed the competencies required of Library and Information Science (LIS) graduates. With artificial intelligence, automation, cloud computing, big data, robotics, and digital platforms becoming integral to information work, the scope of LIS practice now extends far beyond traditional library functions. Consequently, today's LIS graduates need to bring together professional, technological, digital, analytical, interpersonal, managerial, and adaptive competencies to function effectively in the field. This is buttressed by Sibiya (2023), who argues that the 4IR has brought about a fundamental paradigm shift within LIS, generating demand for new knowledge, skills, and competencies, particularly in the realm of digital scholarship.

Digital Scholarship

Digital and ICT competency stands as one of the most fundamental requirements for LIS graduates in the 4IR era. LIS professionals are now expected to apply digital technologies effectively across the full information cycle acquisition, organisation, storage, retrieval, preservation and dissemination. This encompasses proficiency in digital libraries, electronic databases, institutional repositories, online information services, web technologies, cloud applications and digital communication platforms (Ayinde & Kirkwood, 2020).

Artificial Intelligence and Emerging Technology Competency

The increasing integration of AI and other intelligent technologies within library settings means that LIS graduates need to be able to understand and confidently engage with these emerging tools. This competency should include at least a foundational understanding of artificial intelligence, machine learning, automated information services, AI-assisted retrieval, intelligent recommendation systems, chatbots, and comparable applications. In his study of cataloguing education within the context of the 4IR, Monyela (2021) observed that traditional cataloguing curricula fell short in addressing programming, coding, software development, and AI-related applications in cataloguing work, and consequently called for curriculum reform to align with 4IR requirements. Similarly, research examining librarians' evolving roles in the 4IR era indicates that ongoing technological change is redefining library-related tasks, requiring professionals to develop not only new technical capabilities but also new modes of thinking.

Information Retrieval and Information Organisation Competency

Notwithstanding the extent of technological change, traditional LIS competencies remain no less essential. LIS graduates are still expected to organise, classify, index, describe, and retrieve information effectively; what has changed is the far more sophisticated digital context in which these skills must now be applied. Monyela (2021) points out that the exponential growth of internet and web-based resources has intensified the need for more advanced approaches to information organisation and resource discovery. Likewise, Tella et al. (2023), in their study of LIS graduate skills in Nigeria, situate information professionals within an environment shaped by rapid technological change and ever-growing information and data demands.Cybersecurity, Privacy and Information Ethics Competency

The growing digitisation of information also introduces challenges around privacy, cybersecurity, intellectual property, and ethical information practice. As such, LIS graduates need a solid grounding in information privacy, data protection, cybersecurity, copyright, intellectual property, ethical information use, digital rights, and the responsible application of emerging technologies. These competencies are increasingly indispensable, as LIS professionals are more and more responsible for handling users' personal data, electronic resources, institutional information, and digital collections.

Communication and Interpersonal Competency

Technological proficiency alone cannot sustain effective LIS practice. LIS professionals continue to engage directly with individuals, communities, researchers, students, organisations, and fellow professionals, and this human-centred dimension of the work remains just as vital as ever. In their study of LIS professional skills, Toker, Zumer, and colleagues identified four broad competency categories: information-service provision, information organisation, technological skills, and personal competencies, finding that employers continued to place significant value on personal competencies alongside professional and technical expertise (Livi & Salubi, 2024). Accordingly, LIS graduates require strong oral and written communication skills, active listening, teamwork and collaboration, sound interpersonal relations, presentation ability, user-centred service orientation, and effective stakeholder engagement.

Critical Thinking and Problem-Solving Competency

The 4IR landscape requires LIS professionals to navigate decision-making within conditions of technological complexity and constant informational change. Critical thinking, in this context, enables graduates to assess technologies, information sources, systems, and services before endorsing or adopting them. In their study of librarians' perceptions of the 4IR, Mohideen et al. (2022) emphasise the importance of cultivating strong thinking skills and an adaptable mindset to cope with ongoing technological developments and the transition toward smart libraries.

Creativity and Innovation Competency

LIS graduates are increasingly expected to design innovative information services rather than merely maintain existing systems. Creativity, in this respect, allows them to develop new approaches to information delivery, digital content creation, user engagement, and service design. This is well captured in the LISI4C framework put forward by Livi and Salubi (2024), which integrates technical proficiencies, soft skills, adaptability, stakeholder collaboration, experiential learning, and predictive skills into the design of LIS education geared toward Industry 4.0.

Entrepreneurship and Consultancy Competency

The Fourth Industrial Revolution (4IR) has considerably broadened employment prospects for LIS graduates beyond the traditional library setting. As technological change accelerates and information assumes greater strategic value for organisations, new opportunities have opened up for LIS professionals in fields such as information consultancy, knowledge management, digital publishing, content development, data services, information brokerage, and other emerging information-related roles (Ayinde & Kirkwood, 2020; Igbinovia, Odelami, & Malgwi, 2025). This shifting nature of information work correspondingly requires LIS graduates to build entrepreneurial competencies alongside their existing professional and technological skill sets. These competencies include the ability to identify opportunities, provide information consultancy, develop business ventures, engage in digital marketing, design information products and services, undertake freelance work, manage projects, and maintain client relationships.

Emerging Career Opportunities for LIS Graduates in the 4IR Era

The Fourth Industrial Revolution is quietly rewriting what it means to have a career in Library and Information Science. Gone are the days when a LIS degree pointed almost exclusively toward a job behind a library desk. With artificial intelligence, big data, cloud computing, digital platforms and automation now woven into how information is created and managed, graduates are finding doors open into digital librarianship, data librarianship, research data management, digital scholarship, knowledge management, information analytics, digital curation, information architecture and digital preservation. Sibiya and Ngulube (2023) capture this shift well their research shows employers now expect LIS graduates to be comfortable with digital scholarship, open access, research data management and the workings of digital publishing, which really just confirms that a whole new set of roles is forming around research support and digitally-mediated information work.

The employment opportunities available to LIS graduates now extend well beyond conventionally "technical" roles. Increasingly, graduates are entering fields such as information consultancy, knowledge management, digital content creation, scholarly communication, competitive intelligence, information governance, digital publishing, and information entrepreneurship. This diversification reflects a broader organisational need for professionals capable of organising, analysing, curating, and preserving information in ways that support effective decision-making.

This trend is corroborated by recent study by Gautam (2025) that identified information technology proficiency, digitisation, internet search skills, and competence in database and content management systems as among the cross-sector competencies that are reshaping the LIS profession in the twenty-first century, alongside interpersonal skills such as time management, negotiation, and conflict resolution, which are broadly applicable across professional contexts. However, the study also cautions that many LIS graduates remain insufficiently competitive within the information industry, largely because curricula have not kept pace with these evolving demands.

Thus, the misalignment between LIS training and industry requirements helps explain why diversification into consultancy, knowledge management, and information entrepreneurship has become increasingly necessary rather than optional. Such alternative career pathways are emerging as essential routes into an information economy whose demands continue to outstrip the pace of curricular reform.

Challenges to Repositioning LIS Graduates in 4IR

Repositioning LIS graduates for the emerging roles created by the Fourth Industrial Revolution is no straightforward task it runs up against a web of interconnected challenges: persistent skills gaps, technologies that keep shifting under everyone's feet, weak digital infrastructure, tight funding, rigid curricula, unresolved questions of professional identity, and stiff competition from graduates of more overtly technology-oriented disciplines. The IFLA Trend Report (2024/2025) captures this well, observing that information and knowledge practices are changing rapidly, while the skills required of information professionals are becoming increasingly complex, particularly around artificial intelligence, data, digital technologies, and information literacy. IFLA goes further, noting that LIS education itself needs to respond to these emerging competencies AI, data science, and entirely new specialisations which points to a real mismatch between how LIS graduates are traditionally trained and what today's labour market actually expects.

Igbinovia et, al (2025) stressed that the adoption of AI compounds these difficulties. Inadequate technical skills, the high cost of new technology, limited institutional capacity, ethical concerns, poor data quality, and plain resistance to organisational change all stand in the way. And because digital technologies aren't distributed evenly, the digital divide only widens further, leaving graduates in resource-constrained environments with fewer chances to build the practical competencies they need. Thus, repositioning LIS graduates isn't something that happens through a single fix it demands continuous curriculum renewal, industry-oriented practical training, sustained digital and AI upskilling, genuine interdisciplinary collaboration, entrepreneurship development, adequate technological infrastructure, and much closer engagement between LIS schools, employers, and professional bodies.

Recommendations for Repositioning LIS graduates in 4IR

The challenges facing LIS graduates in the 4IR era make one thing pretty clear: LIS education, training and professional practice all need a serious rethink not a tweak here and there, but a genuine repositioning. LIS schools have to get into the habit of regularly revisiting their curricula, weaving in artificial intelligence, data analytics, cloud computing, digital curation, cybersecurity, digital scholarship and information governance, without losing sight of the traditional LIS competencies that still hold real value. Livi and Salubi (2024) drive this point home, having found a genuine mismatch between the skills Nigerian LIS graduates actually walk away with and what 4IR employers are actually looking for which really just confirms how much closer LIS schools and employers need to be working together.

LIS institutions need to invest more in continuous professional development, hands-on and experiential learning, industry partnerships, interdisciplinary training, and education around entrepreneurship and emerging technologies. Governments and institutional authorities have their part to play too providing the ICT infrastructure, funding and qualified instructors that make any of this possible in the first place. Get these pieces in place, and LIS graduates stand a much better chance of moving beyond the traditional library job into areas like data management, AI-enabled information services, digital scholarship, knowledge management, digital preservation, information consultancy and digital content development which, in the end, is what actually keeps them employable and professionally relevant in the 4IR era.

Conclusion

The Fourth Industrial Revolution (4IR) has significantly transformed the roles and competency requirements of LIS professionals. The profession has expanded beyond traditional information organisation, preservation and retrieval to embrace digital and AI-enabled practices. LIS graduates now require competencies in digital technologies, artificial intelligence, data management and information analytics. They also need critical thinking, creativity, innovation, entrepreneurship and lifelong learning skills. However, skills gaps, outdated curricula and inadequate ICT infrastructure continue to limit their effective repositioning. Limited practical exposure and unequal access to digital technologies further constrain graduate employability. Addressing these challenges requires curriculum reform and stronger collaboration between LIS institutions and employers.

Greater investment in ICT infrastructure, experiential learning and continuous professional development is also essential. These measures can prepare graduates for emerging careers in data management, AI, digital scholarship and knowledge management.mUltimately, repositioning LIS graduates is essential for sustaining their relevance, employability and competitiveness in the digital knowledge society.

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