



Journal of eScience Librarianship

putting the pieces together: theory and practice



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About JeSLIB

The *Journal of eScience Librarianship (JeSLIB)* (ISSN 2161-3974) is an open access, peer-reviewed journal advancing the theory and practice of librarianship focusing on services related to data-driven research in science, technology, engineering, math, social sciences, medicine, and public health. *JeSLIB* explores the many roles of librarians in supporting eScience and welcomes articles by contributors from all areas of the globe related to education, outreach, collaborations, policy, tools, and best practices.

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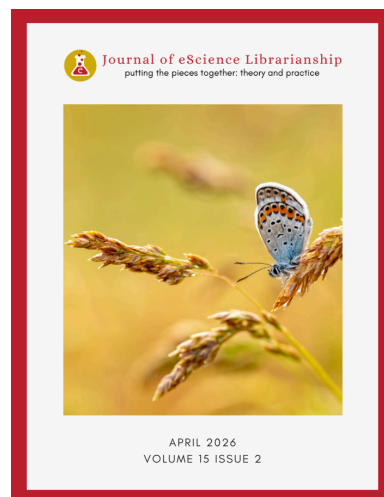
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JeSLIB at RDAP 2026!

Posted by Julie Goldman on 2026-05-07

JeSLIB at RDAP Summit 2026: Forging New Roles for Data Librarians in Open Access Publishing Last month, JeSLIB had the privilege of presenting at the annual Research Data Access & Preservation (RDAP) Summit. The theme for the 2026 Summit was “Practical, Personalized, Impactful: Research Data in the Real World.” Although the Summit was held virtually on Zoom, many attendees commented on how [...]

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Volume 15, Issue 1 Special Issue: Research Data Access and Preservation 2025 of the Journal of eScience Librarianship is Now Available

Posted by Julie Goldman on 2026-01-30

We are excited to announce our Special Issue highlighting works related to the Research Data and Preservation (RDAP) Summit 2025. The JeSLIB Editors thank the guest editors, Jennifer Chaput, University of Massachusetts Amherst, Yijing Angel Tang, University of Colorado Boulder, Wei Zakharov, Purdue University, and Heather Charlotte Owen, University of Rochester, for their dedication and [...]

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Volume 14, Issue 1 is Now Available

Posted by Julie Goldman on 2025-09-26

The latest issue of the Journal of eScience Librarianship (JeSLIB) has been published! This issue's focus is on the myriad of changes facing the current research environment. From AI to DEI, change is happening, and librarians must meet it head on...including the JeSLIB editorial team. In this new issue we highlight one major change to the journal. In December 2024, Lisa Palmer, Distribution [...]

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The *Journal of eScience Librarianship (JeSLIB)* (ISSN 2161-3974) is an open access, peer-reviewed journal advancing the theory and practice of librarianship focusing on services related to data-driven research in science, technology, engineering, math, social sciences, medicine, and public health. *JeSLIB* explores the many roles of librarians in supporting eScience and welcomes articles by contributors from all areas of the globe related to education, outreach, collaborations, policy, tools, and best practices. Submissions covering both theoretical and practical applications are welcomed.

General topics of interest may include but are not limited to:

- Research data management
- Librarians embedded on research teams
- Data services, including policy development
- Data curation
- Data sharing and re-use
- Data management plans
- Data preservation
- Metadata and discoverability
- Institutional and discipline-specific repositories
- Impact of governmental or institutional policies
- Open data and open science
- Data literacy and data education
- Data citation
- Tracking impact of research data, metrics
- Big data
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- 2022: Joshua Borycz, Alexander J. Carroll, and Honora N. Eskridge's article in JeSLIB entitled "[STEM Abstracting and Indexing \(A&I\) Tool Overlap Analysis in 2020: An Open Science Informed Approach Amid Pandemic Budgets \(https://doi.org/10.7191/jeslib.2021.1192\)](https://doi.org/10.7191/jeslib.2021.1192)" was the recipient of the [Best Publication Award \(https://sites.asee.org/eld/about-the-eld/awards/#paper\)](https://sites.asee.org/eld/about-the-eld/awards/#paper) from the Engineering Libraries Division of the American Society for Engineering Education.
- 2018: Elizabeth Berman's article in JeSLIB entitled "[An Exploratory Sequential Mixed Methods Approach to Understanding Researchers' Data Management Practices at UVM: Integrated Findings to Develop Research Data Services \(https://doi.org/10.7191/jeslib.2017.1104\)](https://doi.org/10.7191/jeslib.2017.1104)" was the recipient of the [Best Publication Award \(https://sites.asee.org/eld/about-the-eld/awards/#paper\)](https://sites.asee.org/eld/about-the-eld/awards/#paper) from the Engineering Libraries Division of the American Society for Engineering Education.
- 2012: Paul Vaiginas Professional Award from the Massachusetts Health Science Libraries Network (MAHSLIN), to Elaine Martin, Mary Piorun, Lisa Palmer, Raquel Abad, Donna Kafel, and Sally Gore for the Founding of the *Journal of eScience Librarianship*.

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Full-Length Paper

Librarian Roles in Supporting Open Science and Data Stewardship: A Case Study of LIS Lecturers in Federal Universities in North-Central Nigeria

Authors

- [Hussaini Musa](#)
- [Suleiman Lawal Attahiru](#)

Abstract

This study investigated the roles of Library and Information Science (LIS) lecturers in supporting Open Science and Data Stewardship in federal universities in North-Central Nigeria. A mixed-methods case study design was adopted, combining a structured questionnaire, semi-structured interviews, and document analysis. The study targeted the entire population of 96 LIS lecturers across seven federal universities, of whom 79 participated, representing an 82.3% response rate. Quantitative data were analyzed using descriptive statistics, while qualitative data from interviews and institutional documents were analyzed thematically to complement and contextualize the survey findings. The findings indicate that LIS lecturers demonstrate moderate to high awareness of Open Science and Data Stewardship and actively promote these practices through teaching, research supervision, advocacy for open access and support for institutional repositories.

However, the integration of Open Science into the LIS curriculum remains partial, while inadequate professional development, weak institutional policies, limited technological infrastructure and insufficient incentives continue to hinder effective implementation. The interview and document analysis findings corroborated the survey results, revealing that Open Science initiatives are largely driven by individual commitment rather than coordinated institutional frameworks. The study concludes that strengthening curriculum integration, institutional policies, professional capacity building and digital infrastructure is essential for advancing Open Science and Data Stewardship in LIS education. It recommends coordinated efforts by universities, the National Universities Commission and the Nigerian Library Association to institutionalize Open Science competencies and foster a sustainable culture of open and collaborative research in Nigerian universities.

Keywords: Open Science, Data Stewardship, Library and Information Science (LIS), Academic Librarianship, Research Data Management

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Introduction

Open Science has become a defining movement in contemporary research practice, advocating for openness, collaboration, and inclusivity throughout the research lifecycle. It promotes key practices such as open access to publications, open research data, reproducible research, citizen science, and broader stakeholder engagement (Vicente-Sáez and Martínez-Fuentes 2018; Madeyski, Lewowski, and Kitchenham 2021). The overarching goal of Open Science is to democratize access to scientific knowledge, improve the quality and reproducibility of research, and accelerate innovation to address complex societal challenges (European Commission 2016; UNESCO 2021).

Globally, the implementation of Open Science is gaining traction as governments and institutions adopt policies that require greater transparency, and sharing of research outputs. UNESCO's Recommendation on Open Science (2021) affirms the right of all to participate in and benefit from science, calling for inclusive policy frameworks that embed Open Science across national research systems. In Africa, regional bodies such as the African Open Science Platform have emphasized the importance of building enabling environments including infrastructure, skills, and governance structures for Open Science (Motshegwa 2024). However, in countries like Nigeria, while efforts are underway to promote open access and institutional repositories (Ezema and Onyancha 2017), the broader adoption of Open Science practices remains fragmented, constrained by limited awareness, capacity, and institutional support.

A central pillar of Open Science is data stewardship, which refers to the ethical and responsible management of research data throughout its lifecycle encompassing planning, collection, documentation, curation, storage, sharing, and long-term preservation. Effective data stewardship ensures compliance with legal, ethical, and technical standards, enabling data to be FAIR: Findable, Accessible, Interoperable, and Reusable (Wilkinson et al. 2016). It also supports the development of trusted research environments and fosters interdisciplinary collaboration (Sansone et al. 2019). While research data management has traditionally been associated with academic researchers and information professionals, a growing body of literature recognizes the shared responsibility of a broader ecosystem of stakeholders including educators, policymakers, and administrators in sustaining Open Science practices (Tenopir et al. 2020; Fecher and Friesike 2014).

In this ecosystem, Library and Information Science (LIS) educators hold a particularly strategic role. As curriculum designers and instructors, they are responsible for equipping future librarians and information professionals with the knowledge, skills, and values necessary to thrive in a data-driven research environment. Studies have shown that librarians are increasingly being called upon to support data curation, repository services, metadata creation, and research data management planning (Akers et al. 2014; Lyon 2016). Therefore, the extent to which LIS educators understand, practice, and promote Open Science and data stewardship directly influences the capacity of the next generation of librarians to serve as effective partners in scholarly communication.

Despite this critical role, there is a notable gap in empirical literature exploring the engagement of LIS academics especially in developing regions like Nigeria with Open Science concepts and data stewardship. Much of the existing research focuses on practicing librarians or repository managers (Tzanova 2020; Adekoya et al. 2026), with minimal attention given to how LIS lecturers integrate these concepts into teaching, research, or professional advocacy. A recent review by Jharotia (2026) stressed the importance of Open Science literacy as an academic competency, highlighting the need for its integration into LIS education globally. In Nigeria, LIS curricula remain largely traditional, with limited coverage of data ethics, open data policies, or research reproducibility, suggesting an urgent need for pedagogical innovation (Abubakar 2021; Siyao et al. 2017).

Furthermore, LIS lecturers in Nigerian federal universities often face structural and institutional challenges that hinder their ability to promote Open Science. These include lack of training opportunities, limited access to data infrastructure, inadequate policy frameworks, and insufficient collaboration with research and technology departments (Baro and Nwabueze-Echedom 2023). As universities undergo digital transformation and adopt open knowledge policies, the absence of LIS educators in these conversations risks perpetuating a skills gap among library graduates and weakening institutional research capacity.

This study addresses that gap by investigating the awareness, roles, challenges, and institutional support related to Open Science and data stewardship among LIS lecturers in federal universities in North-Central Nigeria. The study is guided by the following research questions:

1. What is the level of awareness of Open Science and data stewardship among Library and Information Science (LIS) lecturers in federal universities in North-Central Nigeria?
2. To what extent is Open Science and data stewardship integrated into the LIS curriculum in these universities?
3. What specific roles do LIS lecturers play in promoting Open Science practices and data stewardship within their institutions?
4. What challenges do LIS lecturers face in engaging with and promoting Open Science and data stewardship (e.g., policy limitations, inadequate training, or poor infrastructure)?
5. What forms of institutional or policy support are available to LIS lecturers to facilitate the implementation and promotion of Open Science and data stewardship?

By answering these questions, the study contributes to the global discourse on Open Science by highlighting the perspectives of an underrepresented yet essential group LIS academics in the Global South. It also offers insights into how LIS education can be reimagined to support a more open and inclusive scholarly communication environment.

Literature Review

Conceptual Foundations of Open Science and Data Stewardship

Open Science is a collective term that describes efforts to make scientific research more transparent, collaborative, accessible, and reproducible. Its key components include open access to publications, open data, open-source software, open peer review, citizen science, and broader public engagement (Vicente-Sáez and Martínez-Fuentes 2018). The movement seeks to democratize knowledge production, foster inclusivity and address barriers to access, particularly in developing regions (UNESCO 2021).

Closely linked to Open Science is the concept of data stewardship, which encompasses the responsible management of research data across its lifecycle spanning collection, documentation, storage, curation, sharing, and long-term preservation (Sansone et al. 2019; Tenopir et al. 2020). Data stewardship is underpinned by the FAIR Principles Findable, Accessible, Interoperable and Reusable which provide a framework for ensuring that research data can be ethically reused and integrated into future research (Wilkinson et al. 2016). As Open Science evolves, data stewardship has become a foundational practice for maintaining research integrity and promoting collaborative science.

Global and African Perspectives on Librarian Involvement in Open Science

Academic librarians have emerged as key facilitators of Open Science due to their expertise in information management, metadata standards, scholarly communication, and research support services (Akers et al. 2014; Corral et al. 2013). Globally, librarians are increasingly tasked with managing institutional repositories, guiding researchers in open access publishing, supporting data management planning, and providing training in research data literacy (Cox et al. 2017). In some countries, academic libraries are establishing research data services (RDS) units to offer formal support for data stewardship and compliance with funder mandates (Tenopir et al. 2014).

In Africa, the role of librarians in Open Science is still emerging but gaining recognition. The African Open Science Platform has highlighted the strategic importance of libraries in leading Open Science advocacy, managing repositories, and bridging gaps in digital scholarship (Motshegwa 2024). Despite this, librarians across the continent face challenges such as limited technical infrastructure, insufficient training and inadequate institutional support (Tzanova 2020; Baro and Nwabueze-Echedom 2023). In Nigeria, studies show that while librarians are aware of open access and institutional repositories, their engagement with research data management and data sharing is limited by skill gaps and policy fragmentation (Oladokun 2023; Adekoya et al. 2026).

The Role of LIS Educators in Curriculum Development and Open Science Literacy

LIS educators occupy a pivotal position in shaping the professional competencies of future librarians, including their ability to support Open Science. Through curriculum development and pedagogical innovation, LIS lecturers have the potential to embed Open Science principles such as open access publishing, data ethics, research integrity, and scholarly communication into foundational library education (Jharotia 2026).

Globally, there is growing momentum for integrating Open Science into LIS education. Several LIS schools in Europe and North America now include modules on research data management, scholarly publishing, and digital curation as part of their programs (Maye et al. 2026; Lyon 2016). These modules not only introduce students to Open Science tools and practices but also cultivate a mindset of openness and collaboration.

In contrast, many LIS programs in developing countries including Nigeria retain a traditional curriculum structure that does not adequately address evolving data-related roles (Abubakar 2021). Studies have noted the absence of critical topics such as data stewardship, metadata standards for open data, and institutional policy engagement in LIS training (Siyao et al. 2017). As a result, graduates are often unprepared to assume active roles in Open Science initiatives, which limits the potential of libraries to function as centers of data literacy and research support.

Gaps in Research Related to LIS Academic Staff Engagement

While the role of practicing librarians in Open Science has been widely studied, there is a noticeable gap in empirical research on the contributions of LIS academic staff particularly in African contexts. Most existing literature focuses on librarian-facilitated repository services, information literacy, or research support roles, with little attention paid to how LIS educators influence Open Science through teaching, research, or institutional advocacy (Jharotia 2026; Corral et al. 2013).

A few emerging studies have called for increased involvement of LIS academics in curriculum transformation and research on open scholarship (Kayode et al. 2026). However, there is limited documentation of how LIS lecturers in Nigeria perceive Open Science, incorporate it into course content, or collaborate on Open Science-related research. This knowledge gap poses a risk to sustainability, as the long-term success of Open Science initiatives depends on embedding these principles in formal education and training programs.

Understanding the perspectives, challenges, and institutional environments of LIS educators is therefore essential for advancing Open Science in Nigeria. Addressing this gap will not only strengthen LIS curricula but also ensure that future librarians are equipped to support data-intensive research practices in a rapidly evolving scholarly landscape.

Methodology

This study adopted a quantitative case study design to examine the roles of Library and Information Science (LIS) lecturers in supporting Open Science and data stewardship across federal universities in North-Central Nigeria. The case study design was deemed suitable because it enables a detailed exploration of a bounded group specifically LIS academic staff within their institutional and practical environments (Yin 2018). The target population comprised all LIS lecturers in federal universities within the North-Central geopolitical zone. Given the manageable size of this population, a census sampling method was used to include every eligible academic staff member, thereby enhancing the representativeness of the findings (Krejcie and Morgan

1970). According to data sourced from the registry departments of the selected universities, the total population of LIS lecturers across the seven federal institutions including the University of Ilorin, University of Jos, University of Abuja, Federal University Lokoja, Federal University Lafia, Federal University of Technology Minna and Joseph Sarwuan Tarka University was 96. Table 1 provides a breakdown of the lecturer population across the selected institutions.

Table 1: Population of LIS Lecturers in Selected Federal Universities in North-Central Nigeria

S/N	University	No. of Lecturers
1	University of Ilorin	15
2	University of Jos	10
3	University of Abuja	13
4	Federal University Lokoja	8
5	Federal University Lafia (Nasarawa State)	11
6	Federal University of Technology, Minna	22
7	Joseph Sarwuan Tarka University, Makurdi	17
Total		96

Source: Registry Departments of the Federal Universities in North-Central Nigeria (2025)

Primary data were collected using a structured questionnaire aimed at capturing lecturers’ awareness of Open Science, integration of data stewardship in teaching, and perceived challenges. The questionnaire was subjected to expert review for validation and pretested among LIS lecturers outside the study region to ensure reliability. To complement the quantitative data and enrich the contextual understanding, semi-structured interviews and institutional document analysis were conducted. The quantitative data obtained were analyzed using descriptive statistics such as frequencies, percentages, means, and standard deviations to summarize responses related to the core variables of the study. In parallel, qualitative data from interviews and document reviews were examined using thematic analysis, which allowed for the identification of common themes, barriers and institutional practices linked to Open Science integration in LIS education (Braun and Clarke 2006). Institutional documents, including LIS curricula, course outlines, university research policies, institutional repository policies, library strategic plans and research ethics guidelines, were reviewed using a structured document analysis checklist. The documents were examined for evidence of Open Science and Data Stewardship concepts, including curriculum content, institutional policies, repository services, research data management practices, and support mechanisms. Findings from the document review were used to triangulate and contextualize the survey and interview data.

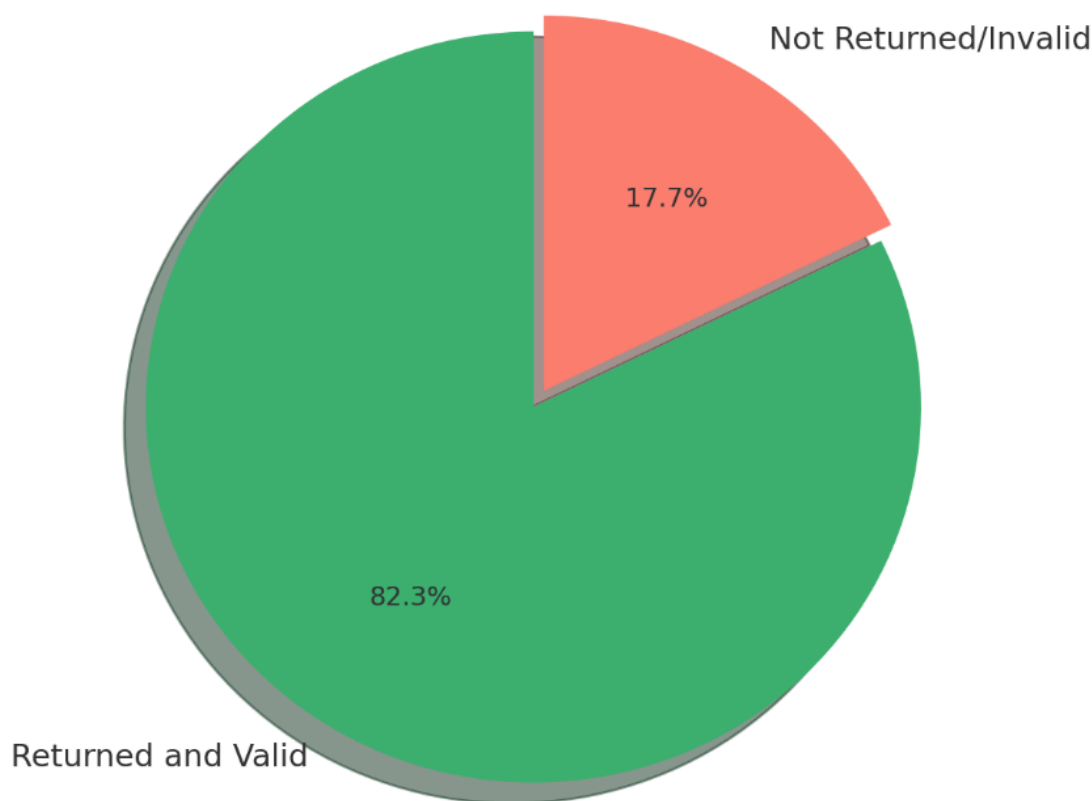
The Library and Information Science (LIS) programmes offered by the selected federal universities prepare students for careers in academic, public, school, and special libraries, archives and records management, knowledge management and other information-related professions. The curricula combine core librarianship with digital information management, research methods, information technology, and scholarly communication. Although the relevance of Open Science varies across professional settings, it is increasingly important for LIS graduates, particularly those supporting research, institutional repositories, research data management, digital scholarship, and open access initiatives in academic and research institutions. This context underscores the importance of assessing the extent to which Open Science and Data Stewardship are integrated into LIS education.

In ensuring research ethics, appropriate protocols were observed throughout the study. Ethical approval was granted by the Institutional Review Board (IRB) of the lead researcher’s university. Participation in the study was voluntary, with informed consent obtained from all respondents. Measures were taken to protect participants’ anonymity and ensure the confidentiality of responses. All collected data were stored securely and handled in accordance with data protection regulations to preserve the integrity and privacy of the research process.

Data Analysis and Interpretation of Results

Figure 1: Frequency Distribution of Response Rate of LIS Lecturers (N=79)

Response Rate of LIS Lecturers



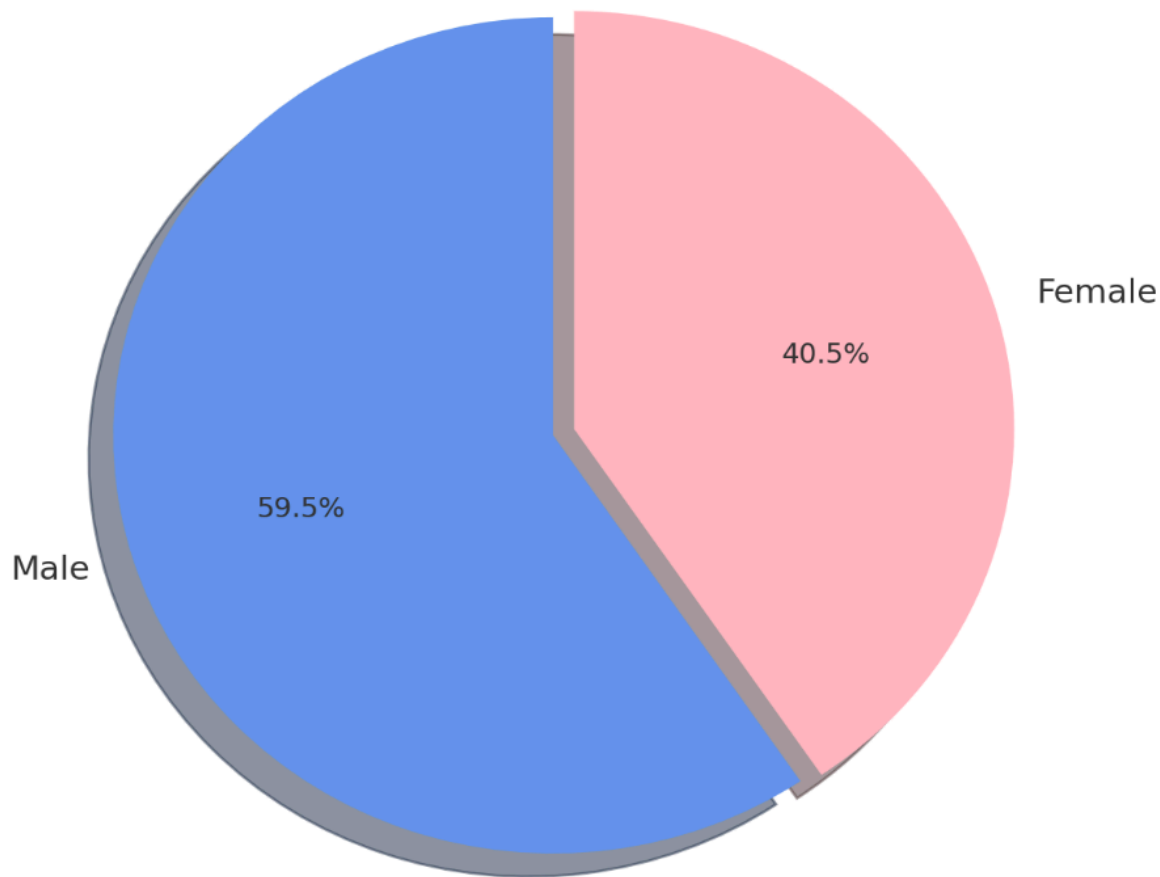
Source: Field Survey (2025)

Figure 1 shows total of 96 questionnaires were distributed to LIS lecturers, out of which 79 were returned and valid. This gives a response rate of 82.3%. The remaining 17 questionnaires, representing 17.7%, were either not returned or invalid. This indicates that a majority of the respondents participated in the study, providing a good representation of the target population.

The high response rate enhances the reliability and representativeness of the study findings, as it reflects participation from a substantial proportion of the target population. This relatively high level of participation may be attributed to the census approach adopted for the study, in which all eligible LIS lecturers in the selected universities were invited to participate, rather than drawing a sample. In addition, the researchers employed direct, face-to-face distribution of questionnaires, followed by repeated follow-up visits and reminders through departmental contacts, which encouraged timely completion and return of the questionnaires. No monetary or material incentives were offered to participants. The strong response rate also suggests a high level of professional interest among LIS lecturers in the emerging issues of Open Science and Data Stewardship, thereby increasing confidence that the findings reasonably reflect the perspectives of the study population.

Figure 2: Frequency Distribution of Respondents Gender of LIS Lecturer (N = 79)

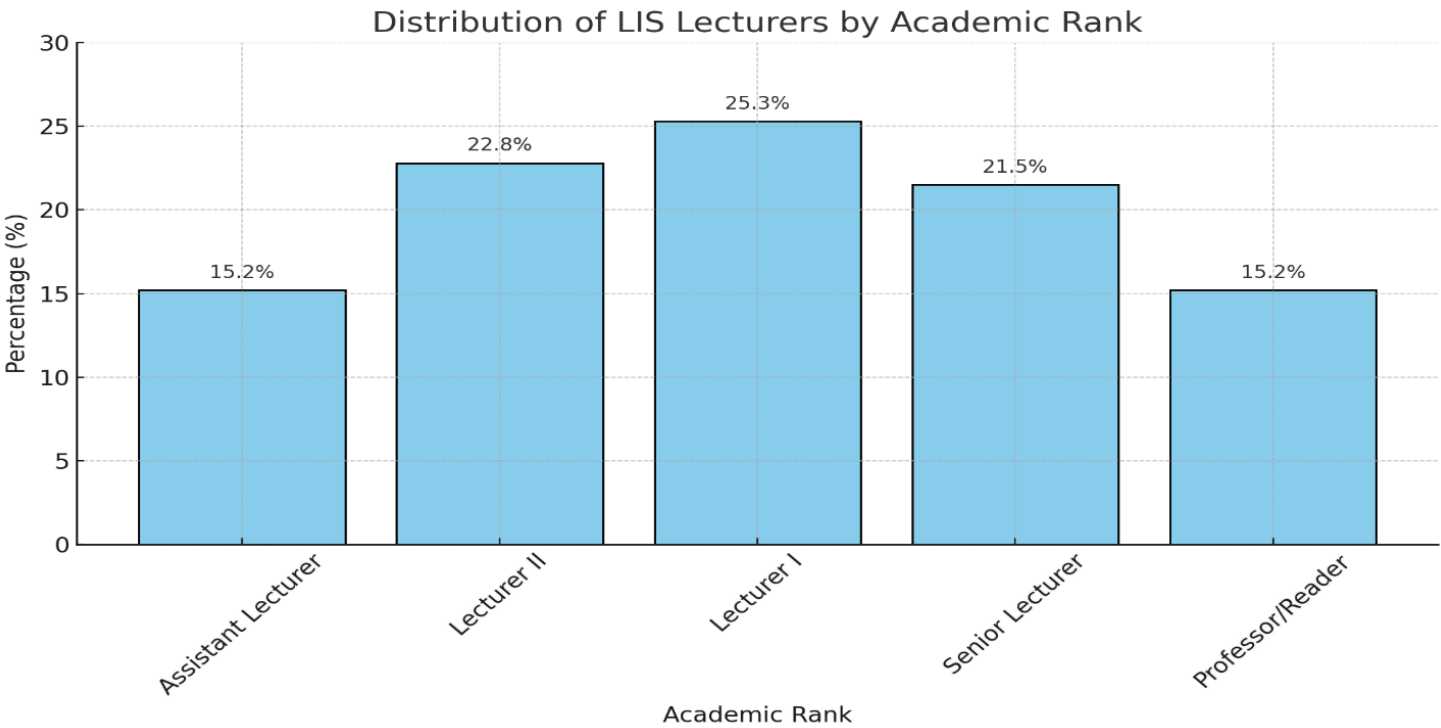
Gender Distribution of Respondents



Sources: Researcher's field-report (2025)

Out of the 79 respondents, 47 (59.5%) were male, while 32 (40.5%) were female. This shows that male LIS lecturers slightly outnumbered their female counterparts in the study.

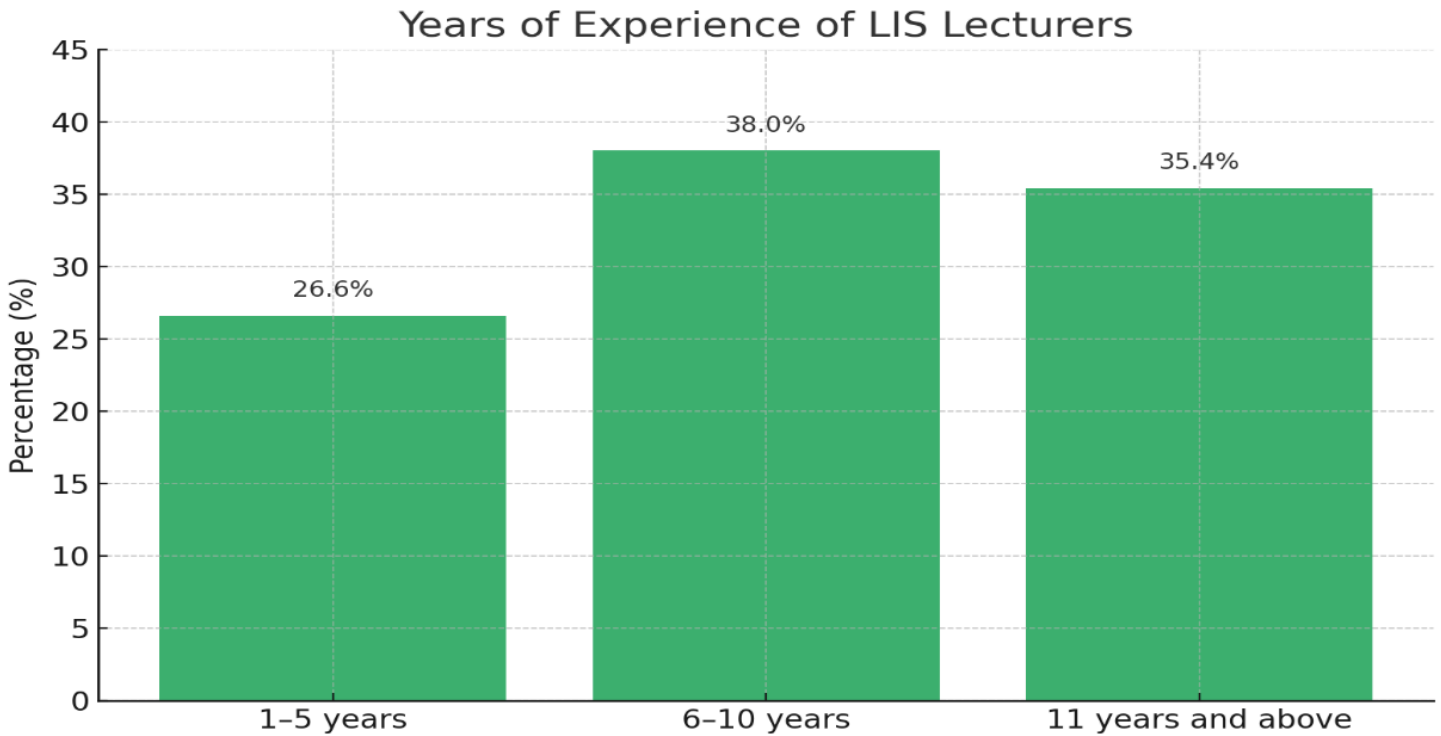
Figure 3: Frequency Distribution of LIS lecturers by academic rank (N = 79)



Source: Field Survey (2025)

Among the 79 respondents, the highest proportion were Lecturer I with 20 individuals (25.3%), followed by Lecturer II with 18 (22.8%) and Senior Lecturers with 17 (21.5%). Assistant Lecturers and Professors/Readers both accounted for 12 respondents each (15.2%). This indicates a balanced representation across academic ranks, with a slight concentration in mid-level academic positions.

Figure 4: Frequency Distribution of LIS lecturers by years of experience (N = 79)



Source: Field Survey (2025)

Table 2: Awareness of Open Science and Data Stewardship (N = 79)

S/N	Statement	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Score
1	I am familiar with the concept of Open Science.	5 (6.3%)	10 (12.7%)	15 (19.0%)	30 (38.0%)	19 (24.0%)	3.74
2	I understand the benefits of sharing research data openly.	3 (3.8%)	8 (10.1%)	20 (25.3%)	28 (35.4%)	20 (25.3%)	3.80
3	I am aware of policies promoting Open Science in my institution or country.	8 (10.1%)	15 (19.0%)	25 (31.6%)	20 (25.3%)	11 (13.9%)	3.26
4	I have received training or guidance on Open Data practices.	20 (25.3%)	25 (31.6%)	15 (19.0%)	12 (15.2%)	7 (8.9%)	2.39
5	I believe that Open Science enhances research visibility and collaboration.	2 (2.5%)	7 (8.9%)	10 (12.7%)	35 (44.3%)	25 (31.6%)	4.01
6	I am familiar with platforms or repositories used for Open Data sharing.	10 (12.7%)	20 (25.3%)	20 (25.3%)	18 (22.8%)	11 (13.9%)	3.04
7	I actively support the idea of making research data publicly accessible.	3 (3.8%)	8 (10.1%)	15 (19.0%)	30 (38.0%)	23 (29.1%)	3.84
8	I am aware of ethical considerations in sharing Open Data.	5 (6.3%)	12 (15.2%)	20 (25.3%)	28 (35.4%)	14 (17.7%)	3.56
9	I have used open datasets in my research or teaching.	8 (10.1%)	15 (19.0%)	20 (25.3%)	20 (25.3%)	16 (20.3%)	3.30
10	Open Science is vital for the advancement of academic research.	1 (1.3%)	3 (3.8%)	8 (10.1%)	40 (50.6%)	27 (34.2%)	4.15

Source: Field Survey (2025)

The responses indicate that LIS lecturers generally possess a moderate to high level of awareness of Open Science and data stewardship. The highest mean score of 4.15 was recorded for the statement that Open Science is vital for the advancement of academic research, suggesting that most respondents strongly recognize its significance. Similarly, a high mean of 4.01 was observed for the belief that Open Science enhances research visibility and collaboration, while a mean score of 3.80 shows that many lecturers understand the benefits of sharing research data openly.

Despite this general awareness, the data reveal areas of limited exposure and engagement. For instance, the mean score for having received training or guidance on Open Data practices was relatively low at 2.39, indicating that a majority of the respondents had not undergone formal training. Awareness of institutional or national policies promoting Open Science yielded a mean of 3.26, while familiarity with platforms or repositories used for data sharing scored a mean of 3.04, both reflecting moderate awareness levels.

There was a relatively positive attitude towards supporting the idea of making research data publicly accessible, with a mean of 3.84 and a fair level of awareness of ethical considerations in sharing Open Data, recorded at 3.56. The use of open datasets in research or teaching was moderately practiced, with a mean of 3.30. Overall, the findings suggest that while LIS lecturers support the concept of Open Science and appreciate its benefits, there is a need for increased training, policy awareness and technical engagement to fully integrate Open Science practices into their academic roles.

The interview responses corroborated the survey results, indicating that most participants possessed a good conceptual understanding of Open Science but had acquired this knowledge primarily through conferences, webinars and self-directed learning rather than formal institutional training. One participant observed:

"Most of my understanding of Open Science came from conferences and online workshops. We have not received structured institutional training on research data management." (P3)

The review of course outlines and curriculum documents indicated that Open Science concepts were introduced in selected courses such as Research Methods, Digital Libraries, and Scholarly Communication. However, no standalone module dedicated to Open Science or Research Data Management was identified. Similarly, institutional policy documents contained limited references to Open Science, suggesting that lecturers' awareness is driven more by professional engagement than by formal curricular or institutional frameworks.

Table 3: Integration of Open Science in the LIS Curriculum (N = 79)

S/N	Statement	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Score
1	Open Science concepts are adequately included in the current LIS curriculum.	10 (12.7%)	15 (19.0%)	20 (25.3%)	22 (27.8%)	12 (15.2%)	3.17
2	The LIS curriculum provides sufficient practical training on Open Science tools and platforms.	12 (15.2%)	20 (25.3%)	18 (22.8%)	17 (21.5%)	12 (15.2%)	2.90

3	Faculty members are knowledgeable about Open Science principles relevant to LIS education.	8 (10.1%)	18 (22.8%)	21 (26.6%)	20 (25.3%)	12 (15.2%)	3.09
4	Students are encouraged to engage with Open Science practices in their coursework and research.	7 (8.9%)	15 (19.0%)	18 (22.8%)	25 (31.6%)	14 (17.7%)	3.33
5	There are institutional policies supporting the integration of Open Science in LIS programs.	14 (17.7%)	20 (25.3%)	18 (22.8%)	15 (19.0%)	12 (15.2%)	2.80
6	Open Science topics are regularly updated to reflect current trends and technologies in LIS.	12 (15.2%)	22 (27.8%)	20 (25.3%)	15 (19.0%)	10 (12.7%)	2.76
7	Collaborative projects involving Open Science are part of the LIS curriculum activities.	13 (16.5%)	20 (25.3%)	22 (27.8%)	15 (19.0%)	9 (11.4%)	2.71
8	Resources and materials related to Open Science are readily available for LIS students and staff.	11 (13.9%)	18 (22.8%)	21 (26.6%)	19 (24.1%)	10 (12.7%)	2.93
9	The LIS curriculum prepares students to effectively contribute to Open Science initiatives.	9 (11.4%)	16 (20.3%)	20 (25.3%)	22 (27.8%)	12 (15.2%)	3.19
10	Integration of Open Science in LIS enhances the overall quality of education and research skills.	5 (6.3%)	10 (12.7%)	15 (19.0%)	30 (38.0%)	19 (24.1%)	3.74

Source: Field Survey (2025)

The results indicate that the integration of Open Science into the LIS curriculum is viewed as moderate, with some areas showing more promise than others. The highest mean score of 3.74 was recorded for the belief that integrating Open Science enhances the overall quality of education and research skills, showing that respondents generally recognize its academic value.

The inclusion of Open Science concepts in the LIS curriculum received a mean score of 3.17, suggesting that while these concepts are present, they may not be thoroughly or consistently covered. Similarly, the preparation of students to contribute effectively to Open Science initiatives had a comparable mean of 3.19, reflecting moderate agreement.

However, practical training on Open Science tools and platforms scored a lower mean of 2.90, indicating insufficient hands-on exposure. Faculty knowledge of Open Science principles (mean = 3.09) and encouragement of student engagement in Open Science (mean = 3.33) were seen as fairly adequate but not strong.

The results also show limited institutional support and infrastructure. For instance, the existence of institutional policies supporting Open Science integration (mean = 2.80), the regular updating of Open Science topics (mean = 2.76) and the presence of collaborative projects within the curriculum (mean = 2.71) all scored below the midpoint, reflecting perceived gaps in institutional and curricular support. Similarly, the availability of resources and materials scored a modest 2.93.

Overall, while respondents acknowledge the importance of Open Science and its benefits to LIS education, there are clear indications that more robust curriculum development, practical training and institutional backing are needed to strengthen its implementation.

Interview participants explained that Open Science concepts are introduced mainly within Research Methods and Digital Libraries courses rather than through dedicated modules. As one lecturer remarked:

"We discuss open access publishing and institutional repositories in some courses, but Open Science is not yet a standalone course in our curriculum." (P5)

Analysis of undergraduate and postgraduate curriculum documents confirmed that Open Science-related topics were embedded within broader courses such as Digital Libraries, Research Methods and Information, and Communication Technology. However, explicit learning outcomes relating to Research Data Management, FAIR principles, or Open Science competencies were not identified, indicating partial rather than comprehensive curriculum integration.

Table 4: Roles of LIS Lecturers in Promoting Open Science (N = 79)

S/N	Statement	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Score
1	LIS lecturers educate students on the principles and practices of Open Science.	5 (6.3%)	8 (10.1%)	15 (19.0%)	30 (38.0%)	21 (26.6%)	3.87
2	I incorporate Open Science concepts into my lectures and curriculum.	7 (8.9%)	12 (15.2%)	18 (22.8%)	25 (31.6%)	17 (21.5%)	3.57
3	I guide students on how to publish in open access journals.	10 (12.7%)	15 (19.0%)	20 (25.3%)	20 (25.3%)	14 (17.7%)	3.17
4	I advocate for the use of institutional repositories for data sharing.	8 (10.1%)	12 (15.2%)	20 (25.3%)	25 (31.6%)	14 (17.7%)	3.43

5	I mentor students and colleagues on Open Data and Open Access principles.	6 (7.6%)	10 (12.7%)	22 (27.8%)	28 (35.4%)	13 (16.5%)	3.56
6	I organize or participate in workshops/seminars on Open Science.	9 (11.4%)	18 (22.8%)	20 (25.3%)	20 (25.3%)	12 (15.2%)	3.12
7	LIS lecturers are key stakeholders in promoting a culture of research openness.	5 (6.3%)	8 (10.1%)	17 (21.5%)	30 (38.0%)	19 (24.1%)	3.87
8	I collaborate with library professionals to advance Open Science initiatives.	10 (12.7%)	15 (19.0%)	18 (22.8%)	20 (25.3%)	16 (20.3%)	3.29
9	I promote ethical considerations in Open Data and research transparency.	6 (7.6%)	10 (12.7%)	19 (24.1%)	28 (35.4%)	16 (20.3%)	3.63
10	My department supports LIS lecturers in Open Science advocacy roles.	12 (15.2%)	20 (25.3%)	18 (22.8%)	18 (22.8%)	11 (13.9%)	2.91

Multiple responses allowed

Source: Field Survey (2025)

The data presented in Table 4 reveals the roles played by LIS lecturers in promoting Open Science, with responses indicating varying levels of engagement and institutional support.

The highest mean scores were observed for the statements “*LIS lecturers educate students on the principles and practices of Open Science*” and “*LIS lecturers are key stakeholders in promoting a culture of research openness*,” both with a mean of 3.87. This suggests strong agreement among respondents that LIS lecturers are actively involved in shaping Open Science awareness and fostering openness in academic research.

Other areas also reflect moderate to strong engagement. For example, lecturers mentoring students and colleagues on Open Data and Open Access (mean = 3.56), incorporating Open Science concepts into teaching (mean = 3.57) and promoting ethical considerations in Open Data and research transparency (mean = 3.63) all point to a commendable level of responsibility being assumed by LIS educators.

However, practical support activities such as organizing or participating in Open Science workshops and seminars (mean = 3.12), guiding students on publishing in open access journals (mean = 3.17) and collaborating with library professionals (mean = 3.29) showed relatively lower mean values. This suggests that while conceptual support is more common, active institutional and collaborative engagements may be less frequent.

Significantly, the lowest mean score (2.91) was recorded for departmental support for lecturers in Open Science advocacy roles. This indicates a perceived deficiency in institutional encouragement or infrastructure that could further enable lecturers to promote Open Science more effectively.

In summary, LIS lecturers appear to be engaged in promoting Open Science principles and mentoring students, yet their efforts may be hampered by limited institutional backing and fewer opportunities for practical engagement through structured programs or collaboration. Strengthening departmental support and encouraging inter professional partnerships could further enhance their roles in Open Science advancement.

Interview participants described their roles as advocates, mentors, and facilitators of Open Science. Many reported encouraging students to use institutional repositories and publish in Open Access journals. One participant stated:

"Whenever I supervise students, I encourage them to deposit their work in the institutional repository and to consider publishing in reputable Open Access journals." (P2)

The university library strategic plans reviewed emphasized repository management, information literacy training and digital scholarship support. However, few documents explicitly assigned LIS lecturers formal responsibilities for Open Science advocacy, suggesting that these roles remain largely informal.

Table 5: Challenges Faced in Promoting Open Science (N = 79)

S/N	Statement	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Score
1	Lack of institutional support hinders the promotion of Open Science.	6 (7.6%)	10 (12.7%)	15 (19.0%)	28 (35.4%)	20 (25.3%)	3.75
2	There is insufficient training on Open Science for LIS lecturers.	7 (8.9%)	14 (17.7%)	18 (22.8%)	22 (27.8%)	18 (22.8%)	3.49
3	Inadequate funding limits engagement with Open Science initiatives.	8 (10.1%)	15 (19.0%)	20 (25.3%)	21 (26.6%)	15 (19.0%)	3.27
4	Technological infrastructure for Open Science is lacking in my institution.	10 (12.7%)	20 (25.3%)	19 (24.1%)	17 (21.5%)	13 (16.5%)	3.03

5	Many LIS lecturers are not aware of current Open Science policies.	9 (11.4%)	18 (22.8%)	20 (25.3%)	19 (24.1%)	13 (16.5%)	3.09
6	Cultural resistance to sharing data among researchers poses a challenge.	8 (10.1%)	16 (20.3%)	22 (27.8%)	18 (22.8%)	15 (19.0%)	3.17
7	There is limited access to open access journals and repositories.	11 (13.9%)	20 (25.3%)	18 (22.8%)	17 (21.5%)	13 (16.5%)	2.92
8	Concerns about intellectual property rights discourage Open Science practices.	12 (15.2%)	18 (22.8%)	21 (26.6%)	17 (21.5%)	11 (13.9%)	2.83
9	Lack of collaboration between LIS departments and libraries affects advocacy.	10 (12.7%)	17 (21.5%)	19 (24.1%)	21 (26.6%)	12 (15.2%)	3.09
10	The absence of national policies on Open Science makes promotion difficult.	13 (16.5%)	20 (25.3%)	18 (22.8%)	17 (21.5%)	11 (13.9%)	2.82

Multiple responses allowed

Source: Field Survey (2025)

The findings presented in Table 5 highlight the key challenges faced by LIS lecturers in promoting Open Science. The most significant barrier identified is the *lack of institutional support*, which recorded the highest mean score of 3.75. This finding aligns with the earlier results from Table 4, where institutional backing was also seen as limited, confirming that structural and administrative support remains a major impediment to effective Open Science advocacy.

Another critical challenge is the *insufficient training on Open Science for LIS lecturers* (mean = 3.49), indicating that professional development in this emerging area is inadequate. This gap likely affects lecturers' confidence and ability to incorporate Open Science practices into their teaching and research mentorship roles.

Funding constraints also appear prominent, with *inadequate funding for Open Science engagement* receiving a moderate mean score of 3.27. This reflects the financial barriers that hinder participation in conferences, subscription to platforms, or the organization of relevant programs and workshops.

Challenges related to infrastructure, awareness and policy were also evident but to a slightly lesser extent. For instance, *lack of technological infrastructure* (mean = 3.03), *lack of awareness of Open Science policies* (mean = 3.09) and *absence of national policies on Open Science* (mean = 2.82) suggest systemic and policy-level gaps that could hamper wider adoption and sustainability of Open Science efforts.

Other issues such as *cultural resistance to data sharing* (mean = 3.17), *limited access to open access journals and repositories* (mean = 2.92) and *concerns about intellectual property rights* (mean = 2.83) point to attitudinal and legal concerns that need to be addressed through advocacy and policy clarification.

Moreover, the *lack of collaboration between LIS departments and libraries* (mean = 3.09) further underscores the fragmented approach to Open Science promotion, where synergies between key institutional actors are underutilized.

In summary, while LIS lecturers recognize their role in advancing Open Science, they are constrained by institutional, infrastructural, financial, and policy-related challenges. Addressing these issues through comprehensive support mechanisms, targeted training, improved funding, and strategic collaborations is essential for effective and sustained Open Science advocacy in LIS education.

The interviews provided further insight into the barriers identified in the survey. Participants consistently cited inadequate institutional support, limited professional development opportunities, poor internet connectivity, and the absence of comprehensive Open Science policies as major impediments. One participant explained:

"The willingness is there, but we need better infrastructure, institutional policies and continuous training before Open Science can be fully implemented." (P4)

Institutional policy documents contained little evidence of dedicated Research Data Management policies or structured Open Science implementation strategies. Similarly, strategic plans rarely identified funding mechanisms or staff development programmes specifically supporting Open Science, corroborating the challenges reported by respondents.

Table 6: Institutional or Policy Support Available (N = 79)

S/N	Statement	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Score
1	My institution has clear policies that support Open Science practices.	8 (10.1%)	12 (15.2%)	18 (22.8%)	25 (31.6%)	16 (20.3%)	3.44
2	There are institutional guidelines on Open Access publishing.	9 (11.4%)	15 (19.0%)	17 (21.5%)	23 (29.1%)	15 (19.0%)	3.30

3	The university library supports Open Science through awareness and training.	6 (7.6%)	11 (13.9%)	20 (25.3%)	27 (34.2%)	15 (19.0%)	3.53
4	My institution funds or subsidizes Open Access publishing for staff.	12 (15.2%)	18 (22.8%)	20 (25.3%)	18 (22.8%)	11 (13.9%)	2.88
5	There is a dedicated office or unit promoting Open Science in my institution.	10 (12.7%)	14 (17.7%)	22 (27.8%)	20 (25.3%)	13 (16.5%)	3.09
6	My institution encourages staff to deposit data in open repositories.	7 (8.9%)	13 (16.5%)	19 (24.1%)	26 (32.9%)	14 (17.7%)	3.45
7	Open Science is included in institutional research and development plans.	9 (11.4%)	15 (19.0%)	20 (25.3%)	22 (27.8%)	13 (16.5%)	3.26
8	Policies related to research ethics support Open Data sharing.	8 (10.1%)	13 (16.5%)	21 (26.6%)	24 (30.4%)	13 (16.5%)	3.32
9	I am aware of national or international Open Science policies my institution adopts.	10 (12.7%)	18 (22.8%)	19 (24.1%)	20 (25.3%)	12 (15.2%)	3.08
10	My institution provides incentives for researchers who engage in Open Science.	11 (13.9%)	20 (25.3%)	18 (22.8%)	19 (24.1%)	11 (13.9%)	2.91

Source: Field Survey (2025)

The data indicates a moderate level of institutional support for Open Science among respondents. A majority agreed that their institutions have clear policies supporting Open Science (mean = 3.44) and guidelines on Open Access publishing (mean = 3.30). The university libraries appear to be fairly supportive, offering awareness and training (mean = 3.53). However, institutional funding or subsidies for Open Access publishing was less positively rated (mean = 2.88), suggesting financial support is limited.

Support mechanisms such as dedicated offices for promoting Open Science (mean = 3.09) and encouragement to deposit data in open repositories (mean = 3.45) were viewed somewhat positively. Inclusion of Open Science in institutional research plans (mean = 3.26) and ethical policies supporting data sharing (mean = 3.32) also received moderate support. Awareness of national or international Open Science policies adopted by institutions was not strong (mean = 3.08) and incentives for engaging in Open Science were among the least supported items (mean = 2.91).

Overall, the results suggest that while some structures and policies promoting Open Science exist, gaps remain in areas such as financial support, policy awareness, and incentives for researchers.

Interview participants acknowledged that university libraries have taken the lead in promoting Open Science through repository management and awareness programmes. However, they observed that institutional support remains fragmented. As one participant noted:

"The library is doing its best to promote Open Science, but stronger support from university management is needed through policies, funding and incentives." (P1)

Review of institutional documents showed that while repository policies and research ethics guidelines existed in several universities, comprehensive Open Science policies, staff incentive schemes, and Research Data Management frameworks were generally absent. This documentary evidence supports the survey finding that institutional support remains moderate and uneven.

The interview and document analysis findings largely corroborated the quantitative results. While lecturers demonstrated moderate- to high-awareness of Open Science, both interviews and institutional documents indicated that curriculum integration remains partial and largely dependent on individual lecturers. The qualitative evidence also highlighted gaps in institutional policies, Research Data Management frameworks, funding and professional development opportunities. Conversely, university libraries emerged as key institutional actors supporting repository services and Open Science awareness, although their efforts were constrained by limited institutional support.

Discussion of the Findings

The findings indicate that Library and Information Science (LIS) lecturers in federal universities in North-Central Nigeria demonstrate a moderate to high level of awareness of Open Science and Data Stewardship. The high mean scores for the perceived importance of Open Science in advancing research (mean = 4.15), enhancing research visibility and collaboration (mean = 4.01) and promoting research data sharing (mean = 3.80) suggest a positive disposition toward these emerging scholarly practices. Interview participants similarly described Open Science as a means of improving research transparency, accessibility, and collaboration, although many acknowledged that their knowledge had been acquired primarily through conferences, webinars and self-directed learning rather than formal institutional training. This supports the observations of Yoon and Schultz (2017) and Tenopir et al. (2016) that awareness of Open Science is increasing among academic communities worldwide, while practical competencies continue to require institutional support.

The study further found that Open Science and Data Stewardship are integrated into the LIS curriculum to a moderate extent, primarily through courses such as Research Methods, Digital Libraries and Scholarly Communication rather than as dedicated modules. Interview findings confirmed that curriculum coverage often depends on individual lecturers' initiatives, while document analysis revealed limited explicit learning outcomes relating to Research Data Management, FAIR data principles and Open Science competencies. These findings are consistent with

Okafor et al. (2022), who observed that many African LIS programmes are gradually adapting their curricula to meet the evolving demands of digital scholarship and research data management.

Regarding the roles of LIS lecturers, the findings demonstrate that they actively promote Open Science through teaching, research supervision, advocacy for open access publishing, and support for institutional repositories. Interview participants emphasized their efforts to encourage students to adopt responsible data management practices despite the absence of formal institutional mandates. Document analysis also showed that university libraries have increasingly incorporated repository services and digital scholarship initiatives into their strategic priorities. These findings support Pasek and Mayer (2019) assertion that librarians are well positioned to advance Open Science but require stronger institutional recognition and support to maximize their impact.

The study also identified several barriers to the effective implementation of Open Science and Data Stewardship. Limited professional development opportunities, insufficient technological infrastructure, and inadequate institutional policies emerged as the principal constraints. The relatively low mean score for training opportunities (mean = 2.39) and moderate levels of awareness of institutional policies (mean = 3.26) and data-sharing platforms (mean = 3.04) indicate that awareness has not yet translated into widespread practice. Interview participants consistently identified inadequate training, unreliable internet connectivity, and limited policy support as major challenges, while document analysis revealed few institutional policies specifically addressing Open Science or Research Data Management. These findings corroborate those of Jharotia (2026), who highlighted similar infrastructural and policy constraints affecting Open Science implementation in developing countries.

Finally, the findings suggest that institutional support for Open Science remains developing rather than fully established. Although university libraries have initiated awareness programmes and repository services (mean = 3.53), comprehensive institutional policies, funding mechanisms, and incentive structures are generally lacking. Both the interview and document analysis findings indicate that Open Science initiatives are largely sustained through individual commitment rather than coordinated institutional strategies. This observation aligns with the recommendations of the OECD (2015) and UNESCO (2021), which emphasize that sustainable Open Science implementation requires supportive policies, investment in infrastructure, capacity building, and appropriate reward systems.

Overall, the convergence of the survey, interview, and document analysis findings demonstrates that while LIS lecturers possess positive attitudes towards Open Science and Data Stewardship, the transition from awareness to sustained implementation requires stronger curriculum integration, institutional commitment, professional development, and policy support. Strengthening these areas will better position LIS programmes to prepare graduates capable of supporting research, digital scholarship and Open Science initiatives within Nigerian universities and beyond.

Conclusion

This study examined the roles of Library and Information Science (LIS) lecturers in supporting Open Science and Data Stewardship in federal universities in North-Central Nigeria. Evidence from the survey, semi-structured interviews and document analysis indicates that LIS lecturers generally possess good awareness of Open Science and recognize its importance for research visibility, collaboration and scholarly communication. However, the integration of Open Science and Data Stewardship into LIS curricula and institutional practice remains partial, with implementation influenced by curriculum limitations, insufficient professional development, inadequate institutional policies and infrastructural constraints.

Although lecturers actively promote Open Science through teaching, research supervision, and advocacy for open access and institutional repositories, these efforts are largely dependent on individual commitment rather than coordinated institutional strategies. Strengthening curriculum content, institutional policies, professional development opportunities and technological infrastructure will be essential to preparing future LIS professionals to effectively support Open Science and research data management. Addressing these areas will contribute to a more sustainable Open Science ecosystem within Nigerian universities and enhance the capacity of academic libraries to support transparent, collaborative and impactful research.

Recommendations

The survey, interview and document analysis findings indicate that while LIS lecturers demonstrate positive attitudes toward Open Science and Data Stewardship, implementation is constrained by curriculum gaps, limited institutional support, inadequate professional development, and insufficient infrastructure. Accordingly, the following recommendations are proposed:

1. **Strengthen capacity building** through regular training, workshops and seminars on Open Science, Research Data Management and the use of institutional repositories.
2. **Enhance curriculum integration** by incorporating Open Science and Data Stewardship as dedicated or well-defined components of undergraduate and postgraduate LIS programmes.
3. **Strengthen institutional support** by establishing policies, incentives, and collaborative initiatives that enable LIS lecturers to promote Open Science and research data management.
4. **Improve infrastructure** by investing in reliable internet connectivity, institutional repositories, and other digital research support systems.
5. **Develop national guidelines** through the National Universities Commission (NUC) and the Nigerian Library Association (NLA) to standardize Open Science and Data Stewardship competencies across LIS programmes.

Implementing these recommendations will strengthen LIS education, enhance institutional capacity for Open Science, and improve the visibility, accessibility and impact of research in Nigerian universities.

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