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COLLABORATIVE PRACTICES AND ICT INTEGRATION FOR IMPROVED RESEARCH OUTPUT AMONG LIBRARY AND INFORMATION SCIENCE PROFESSIONALS IN UNIVERSITIES IN NORTH-EAST, NIGERIAN

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Abstract

This study investigates collaborative practices and ICT integration for improved research output among LIS professionalss in universities in North-Eastern Nigeria. Guided by two research questions, the study adopted a descriptive survey design. Data were collected using a validated questionnaire structured on a four-point rating scale. Questionnaires were administered to the entire population of 120 LIS professionals, of which 110 were returned, representing a response rate of 91.7%. The data were analysed using descriptive statistics, specifically mean and standard deviation (SD), with the analysis conducted using SPSS. The findings revealed that collaborative practices and ICT integration both significantly improve research output among LIS professionals (= 3.01, SD = 0.67), collaborative practices improve the quality of research work and overall research output, while ICT integration enhances the visibility of published work (= 3.00, SD = 0.63). Among other recommendations, the study

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advocates the provision of stable internet access and basic ICT infrastructure within library and LIS departments to ensure both effective collaborative practices and quality research outputs.

Keywords: Collaborative practices, effective research output, library and information science professionalss, universities and North-Eastern Nigeria.

Introduction

The global environment is becoming increasingly complex, with diverse forms of collaboration emerging as researchers work together to make informed decisions and address complex problems, particularly within university systems. In the 21st century, collaboration among university libraries has become increasingly necessary as partnerships across university libraries can help meet client needs and meet institutional objectives efficiently and innovatively as well (Ukaegbu & Ukwu, 2023). Collaborative practices and ICT integration for improved research output among library and information science professionalss in universities are increasingly promoted by institutions and funding agencies, and often provide opportunities for mentoring and supporting early-career researchers. Adekoya (2023) confirms that by combining the strengths of multiple perspectives, collaborative research provides a stronger foundation for generating new ideas and developing solutions. Collaborative practices involve teamwork and the division of labour, which can increase efficiency, create time for additional research activities, and consequently improve research output (Roy & Habib 2024). Collaborative research has become an important means of developing solutions that can have a significant impact on the society or on a profession, including the library and information science (LIS) profession.

Collaborative research has several advantages and is believed to enhance research output. Adekoya (2023) emphasised the importance of collaborative research practices in

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library and information science (LIS) professionals in university libraries. Amogu further stated that, various types of collaborative research needed by LIS professionals for their career progression such as intra-institutional and interdisciplinary collaboration; elements of collaborative research, benefits of collaborative research, and challenges of successful collaborative research such as challenges associated with sharing responsibilities and credit, conflicts, poor communication, name tagging, etc. The paper mapped out strategies for successful collaborative research such as clear communication, collaborative agreement among other considerations. The paper recommended that LIS professionals who participate in collaborative research must consider the ethical implications of research and to ensure that the rights and privacy of participants are respected, among other considerations.

Information and communication technology (ICT) integration among LIS professionalss in university systems, Obiadazie, Agbanu, and Nwankwo (2022), stressed that, library and information science professionals need ICT skills to effectively develop and enhance web-based applications; access and deliver e-mails, e-resources and databases, and so on. Professionals need to acquire ICT skills such as sending e-mails; internet searching; typing and printing documents; providing information literacy education, among others. Omehia (2019) in Nmecha and Nsirim (2022) noted that library and information science education as a field of study, focuses on equipping learners with information collection, classification, manipulation, storage, analysis, interpretation and dissemination skills including skills in teaching information literacy skills to learners. It is expected to prepare and equip professionals with needed skills and knowledge required to work in any libraries upon graduation. Given its multidisciplinary and interdisciplinary nature, the LIS curriculum

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draws from other subject areas in order to expose librarians to the skills and competencies required to function effectively in an increasingly competitive environment.

However, changes in society's information needs and information-seeking behaviour influenced and facilitated by the rapid development and proliferation of Information and Communication Technology (ICT) have influenced librarians' modes of service delivery and the pattern of training of potential librarians who are expected to be ICT-savvy and competent. Consequently, LIS programmes and curriculum have undergone several modifications as researchers have criticized the curriculum for failing to meet current labour-market demands and not corresponding to the variation in the nomenclature, Library and Information Science and library and information technology. Partnership is a phenomenon in the university environment that embraces strategies through which people with common interests share and generate knowledge through knowledge sharing and collaboration Enakrire, Chisita and Adeyinka (2020). Nmecha and Nsirim (2022) Therefore, the implementation of ICT practicum is imperative for the future of library and information science.

In order to resolve this anomaly, the Librarians Registration Council of Nigeria (LRCN) which is a professional body responsible for development of curriculum has come up with a curriculum that is hoped to equip potential librarians with the skills necessary to meet the current information demands of the society. This curriculum has in its course contents ICT related courses. Notwithstanding, ICT can enhance students' learning when teachers are digitally literate and understand how to integrate it into curriculum by practical application. This is because technological skills have become essential for students to survive in the

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evolving world of information because the practical knowledge would give them competitive advantages in the job market. Hence, the necessity of the integration of ICT courses in LIS programs. Wiche and Nsirim (2021), the evolutionary transformation in LIS Schools culminated by the developments in Information and Communication Technologies (ICTs) and information explosions has influenced the change in LIS curriculum to meet the information needs of the 21st century information seekers. The 21st century information is high technology driven and the activity of it has to correspond thus, LIS schools have integrated ICT courses into the curriculum without implementation of its practicum.

Research output is a measure of academic achievement, mostly in terms of quantity and quality of publications over a given period of time. According Iwu-James and Yacob (2023), is the number of publications per researcher over a given period. They further maintained that, it is a production process involving physical, tangible, intangible resource processes. The output of a research maybe tangible or intangible. According to Acord, and Harley in Iwu-James and Yacob (2023), stressed that, globally, research output is highly relevant to universities, it is a central task and a key feature of universities. It is among the most highly valued academic activities after teaching. They further maintained that; universities are ranked based on the number of research outputs in publications.

Improved research output is crucial in shaping the reputation and ranking of universities, serving as a key criterion for evaluating the promotion and tenure of librarians in Nigerian universities (Abdulsalam, & Buhari, 2025). The improved research output of library and information professional significantly contributes to the growth, progress and development of universities. Findings revealed that the improved research output level of

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librarians in these universities was low, with notable challenges such as high-quality publication charges, time constraints, and the submission process identified as major obstacles (Abdulsalam, & Buhari, 2025). These challenges reflect both external factors, including financial constraints and institutional procedures, and internal factors such as workload and time management. Librarians exhibit varying levels of research output across different publication formats in universities in Nigeria and so the study emphasises the need to foster a supportive and collaborative environment to address these challenges, thereby enhancing research output and efficiency among librarians in universities (Abdulsalam, & Buhari, 2025).

To achieve educational excellence, the university library is an essential a foundational element. The valuable information stored in libraries helps establish a stable groundwork that makes scholarly work in the future possible while contributing to the creation of transformative scientific technologies. The accessibility of shared resources within university libraries maintains intellectual continuity between generations, protecting students and scholars from the need to develop new methods or engineer novel technologies. Research output is vital in shaping the reputation and ranking of universities, serving as a key criterion for evaluating the promotion and tenure of librarians in Nigerian universities (Abdulsalam, Babarinde, & Oyewole, 2025). The importance of librarians' research output plays a significant role in the growth, progress and development of universities. However, despite the benefits of high research output among librarians, previous (Abdulsalam, Babarinde, & Oyewole, 2025)

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University libraries play a central role in educational system through the services they render to the host communities, one of which is the provision of essential information resources for learning, teaching, research and recreation (Agbo, Echezona, & Ozioko 2022). The extent to which the higher institutions carry out their basic roles and objectives is fundamentally dependent on the support they receive from the library through their services. Demi (2023) stressed that the university library exists to acquire, organize, preserve and disseminate information resources in print or non-print format to their clientele. It serves as a vital support for teaching, learning, research and community services. University library is expected to provide relevant and up-to-date resources both for staff and students to help them achieve and maintain academic excellence in the institution.

Consequently, Ozioko (2022) outlined the general objectives of university libraries to include: conservation of knowledge amassed from time immemorial, dissemination of knowledge through teaching, learning, publication and extension programmes, helping the faculty and students to achieve highest academic honour, adopting new techniques, and establishing information centres. The objectives of academic libraries as discussed by Harrison and Beenham in Ozioko (2022) include: to serve the need of the academic community, to provide reference resources at the appropriate levels and time, to provide study areas for users, to provide a lending service appropriate to the different types of users, and to provide an active information service that may extend beyond the institution to local industry and commerce.

Human resources such as librarians are a library and information professional or person who is engaged in or qualified in library and information science profession. A

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librarian according to the University of Iowa (2023), is a professional who collects, records, organizes, stores, preserves, retrieves, and disseminates printed or digital information. There are several different kinds of librarians with unique roles within their community and one example is the academic librarians (information professionals) who work in college and university libraries. The versatile term "library and information professional" according to University of Iowa (2023) is used to describe similar and sometimes overlapping professions, such as librarians, archivists, information managers, information systems specialists, information scientists, records managers, and information consultants, although terminology differs among sources and organizations. Omokaro (2022) stated that, an academic librarian should possess a master's or doctoral degree to be employable. They are responsible for training of all library and information science professionalss.

Academic librarian can refer to that person who acquired professional/specialist qualifications in library and information science and is involved in teaching and research on library and information science (Omokaro, 2022). An academic librarian must be employed in tertiary institutions of training like the university, polytechnics or college of education in Nigeria. There are academics in this category whose careers have developed and are renowned professors today. Librarians play a vital role in learning and research as outlined by Demi, Longben and Dungse (2019) are: practical role of acquiring and sharing expensive information resources in both print and non-print format for users; cultural role of organizing and preserving artifacts and ideas and also, social and intellectual role of bringing people together and ideas for the advancement and exchange of knowledge. They possess a variety of skills, depending on the sector in which the person is employed. Some essential

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cross-sector skills are: ICT skills, customer service, language proficiency, soft skills and management training.

Statement of the Problem

There is a need to examine the collaborative practices among LIS scholars in these universities, in North East Nigeria and how ICT can be effectively integrated to enhance research productivity and academic performance. The widespread adoption and integration of ICT skills among LIS professionalss, driven by their numerous benefits across various fields, especially in library and information science, has led to their incorporation into diverse LIS academic programmes. The integration of ICT skills in library services, fueled by electronic networks and the growing demand for digital information enhances user experiences, promote library services in the universities, and maintain librarians' relevance in a changing information landscape. Librarians in university libraries and lecturers in Nigeria have limited engagement in research collaboration. The rationale for research collaboration includes to increase the quality of research output in the library profession, deepen research within the library profession and facilitate the cross-fertilisation of ideas for generating novel insights. This concern is reflected in the study's finding that that ICT has been integrated into LIS courses but many LIS educators lacked the skills to teach the practical application and could not train students properly on the practical application of ICT as embedded in the course contents.

Practical Implications It is the engagement of library and information science professionalss in institutional libraries and the lecturers in the LIS department in the exchange of knowledge at national and international levels through research collaboration

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that can enhance the quality of research that emanates from the library profession. Social Implications: Promotion of the library profession requires the integrated effort of library professionals in university libraries and lecturers in the department of LIS through research collaboration. Promotion of the library profession requires the integrated effort of library professionals in university libraries and lecturers in the department of LIS through research collaboration.

Despite the critical role of LIS professionals in supporting research and academic excellence, universities in North East Nigeria face significant challenges in promoting effective research output and ICT skills integration among their professionals. Effective research output remains limited and ICT skills integration among LIS professionalss in the universities in the region including inadequate collaborative practices, inadequate ICT infrastructure, and limited training opportunities which hinder the ability of LIS professionals to provide optimal support for researchers, ultimately affecting the quality and quantity of research output. This study aims to investigate the collaborative practices and ICT skills integration among LIS professionalss in the universities in the region, with a view to identifying strategies for enhancing research output and promoting effective ICT skills integration. Limited literature is available in collaborative practices for effective research output and ICT skills integration among LIS professionalss in North East Nigerian universities, hence the need for the present study.

Research Questions

1. What are the ways in which collaboration among LIS professionalss, along with the integration of ICT, can enhance research output in universities in North East Nigeria?

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2. What are the benefits of collaborative research output and ICT skills practices among LIS professionalss?

Literature Review

Library and information science professionals are professionals who pursue knowledge and evidence-based practice and play an essential role in supporting the academic system as they synthesise current knowledge on contributions, challenges and future directions of librarianship (Blake, 2023). In any university setting, LIS professionals exist, for human resource engagement required for the smooth running and achievement of the organizational objectives. These personnel are individuals who are engaged in or qualified for in LIS profession (Demi, 2023). According to the University of Iowa (2023), they are those who collect, record, organize, store, preserve, retrieve, and disseminate printed or digital information resources. The broad term LIS professional according to University of Iowa (2023) is used to describe similar and sometimes overlapping professions, such as medical librarians, archivists, information managers, information systems specialists, information scientists, records managers, and information consultants, although terminology differs among sources and organizations.

While the mandatory academic qualifications for librarians are first degree in LIS, masters or PhD degree in same to be employable, a master's-degree is required for special knowledge in finding, accessing, and sharing quality information resources for patrons and provide information services to users (Omokaro, 2022; Nardini, et al., (n.d). LIS professionals possess specialised knowledge in quality information resources and have a direct impact on the quality of services, helping clients and researchers remain informed about about new

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trends in their fields (Blake, 2023). Kadiri (2008) affirmed that their academic status, they are involved in research and publication activities. Generally, possession of a master's degree in LIS qualifies an individual to be a professional librarian and to be an academic librarian is determined by the institutional environment or the setting in which a librarian works (Adegbite-Badmus & Joda, 2018). Similarly, LIS professionals contribute to students, staff, and faculty in the universities as asserted Blake (2023) through literature searching or expert search and analysis, improved outcomes, instruction and training or information literacy, evidence-based practice, research support and skilled information management.

The National Institutes of Health (NIH) (2025) found that collaborative practices involve joint research projects, co-authorship, international conferences and workshops, knowledge sharing and exchange, capacity building and training, collaborations in publishing in reputable journals, collaborations in mentorship practices, collaborations in attracting grants, and collaborations in international scholarships won by post-doctoral researchers. Samuel et al. (2024) described research collaboration as an important foundation of modern scientific progress, enabling the pooling of resources, expertise, and perspectives to address complex global challenges. They liken research collaboration as "a nation that has more collaborative relationships with other nations in a better position, allowing it to take advantage of foreign investments in research and development (R&D) and use it S&T skills. This is supported by the complexity of the global environment that is increasing daily due to different types of collaborations that are emerging and have become critical and stakeholders are coming together through collaborative practices to make informed decisions and solve difficult challenges especially in university systems (Demi et al., 2025).

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In the 21st century, however, collaboration among library and information science professionals is no longer an option but a necessity as partnerships across university libraries can help meet client needs and meet institutional objectives efficiently and innovatively as well as make research endeavours more efficient by collaborations (Ukaegbu & Ukwu, 2023; Enago, 2023). Collaborative practices and ICT integration among diverse groups of librarians are now highly promoted by institutions and funding agencies, and very often provide a form of mentoring and support to younger professionals and researchers (Demi et al., 2025). Supporting the assertion, Adekoya (2023) argues, combining the strengths of multiple perspectives, collaborative research provides a stronger foundation for generating new ideas and developing solutions to numerous research problems thereby resulting to quality research productivity. Moreover, collaborative teamwork styles and practices characterize the present state of sciences in which working together across organisational and cultural boundaries widen the scope of scientific discovery (Auanassova, 2023).

In university settings, collaboration and partnerships are essential for driving innovation, sharing knowledge, and advancing scholarship (Aliyu, 2024). Ultimo (2021) in Aliyu (2024) defines collaboration as a partnership or union where participants collectively create something. It emphasizes involvement of anyone, from strangers to close acquaintances, aiming to produce outcomes superior to individual efforts. Collaboration therefore, could be a joint effort, involving learning, teaching, knowledge sharing, and research among stakeholders and other educational participants. Aliyu (2024) noted that, in library profession, collaboration involves: co-authorship and research teams,

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interdisciplinary collaboration, mentorship, partnership and knowledge sharing, research workshops and training programmes and utilisation of technology for collaboration. According to Olaniyi and Olaojo (2017), it is the coming together of two or more partners and working with each other to carry out a task and to achieve shared organisational goals and objectives.

The National Institutes of Health (2025) affirmed that collaborative efforts can lead to a variety of outcomes such such as: publications, digital resources, online platforms, websites, digital tools, data and models, intellectual property, processes and standards, educational outcomes, increased mentorship, enhanced student learning, and improved teaching within institutions and cross-fertilization. It characterized the quality of improved research outputs as high external validity, innovation, reproducibility, reliability and trustworthiness/impact that enables outputs have significant real-world applications and contribute to societal advancement. In order to facilitate high-quality collaborative research to achieve effective outcomes, certain factors need to be considered such as: providing cloud-based, model development, and sharing clear governance, strategic planning (HIH, 2025).

According to Abdulsalam et al. (2025), research outputs such as journal articles, textbooks, monographs, conference proceedings, technical reports, book chapters/festschrift, theses, dissertations, peer reviews, co-authorship textbooks, occasional papers patents produced by scholars within a specific period of time. However, when viewed from the perspective of mentoring future library and information science professionalss, Abdulsalam, et al. (2025) see research development as the process by which mentees' capacity and willingness to engage in research is enhanced. Given the critical role of research

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in a nation's development and survival, the concept of sustainability becomes paramount in manning a continuous cycle of research productivity. They further maintained that, just as success is fleeting without a successor, research productivity cannot be sustained without an effective plan to mentor and train library and information science professionalss as researchers who will eventually take over in the future because it is believed that, all categories will eventually transition out of the system.

Research productivity is an important aspect of academic activity that provides crucial background for academic staff (library and information science professionalss) to become successful, as documented by previous studies that other researches have done (Arua, et al. 2025). They also emphasized it plays a vital role in determining the promotion, tenure, and salary of library and information science professionalss. Furthermore, research productivity is a measure of scholarly output, such as journal articles, books, conference papers and other academic contributions. It reflects the intellectual activities and professional development of academic/medical libraries (Ajiboye, et al. 2023; in Igboon, et al. 2025). Igboon, et al. (2025) identified the factors influencing research output to include time availability, institutional support, skill level, access to information and collaboration opportunities. The ability to access and utilise library resources and services plays a pivotal role in supporting consistent and high-quality research output.

Collaboration is defined as a process of joint working, learning and sharing process that specifically focuses on the activities of teaching, learning and research among researchers, scholars, library and information professionals and other education participants. Aslam (2022) found that librarians face challenges in keeping abreast of

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evolving competences and embracing innovative systems and approaches due to the rapid pace of change and increasing diversity.

Yila, and Temboge (2024) argued that librarians adept at collaboration foster interdisciplinary research by connecting researchers from diverse fields of endeavours. Thus, identifying common research themes and facilitating cross-disciplinary dialogue, librarians contribute to the cross-pollination of ideas and methodologies. Collaborative librarians, extend their expertise to grant-writing teams, offering valuable insight into information dissemination plans and data management strategies. Aslam, Kuhlthau, Martzoukou, Montiel-Overall, Pham & Williamson in Roy & Habib, (2024) emphasise the importance of collaboration between LIS education academics and library professionals. (Austin & Baldwin in Roy & Habib 2024) argued that, "many scholars argue that collaboration increases research output/productivity, maintain motivation, stimulates creativity and risk-taking, maximizes the use of limited resources and enhance the quality of teaching and research." Collaboration is also essential due to changes in the higher education environment, a paradigm shift in LIS and the changing role of teaching faculty and librarians. Collaboration brought about economic value, resource sharing, training and other benefits (Iwu-James & Yacob, 2023)

Research Methods

The study was conducted across North-Eastern Nigeria, comprising Adamawa, Bauchi, Borno, Gombe, Taraba, and Yobe States and host thirteen public universities. The population was 120 LIS professionals, including academic librarians and LIS lecturers across the 13 public universities in the region. No sampling technique was required because the entire

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population of 120 LIS professionals was covered through total enumeration. However, six universities were selected through purposive sampling, while simple random technique was used to select the participants for the study.

A structured questionnaire designed by the researchers was used for data collection. It was structured in line with the research questions and adopted a 4-point rating scale of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). A trial test involving 10 LIS professionals from neighbouring zone was conducted to establish the internal consistency of the instrument. Data were collected through physical (printed copies) and electronic medium (staff email and WhatsApp platforms) approaches. Follow-up reminders were sent at two-week intervals to improve the response rate. 110 out of the 120 copies of the questionnaire administered were correctly completed and returned, which gave a return rate of 91.7%. These 110 copies formed the basis for the quantitative analysis. The data collected were analysed using mean and standard deviation and using a criterion mean of 2.50 as the benchmark for decision-making, hence, any item with a mean score of 2.50 or above was interpreted as agreement, otherwise as disagreement.

Results

Research Question 1: What are the ways in which collaboration among LIS professionalss, along with the integration of ICT, can enhance research output in universities in North East Nigeria?

Table 1: Mean Responses of LIS Professionals on Ways Collaboration and ICT Integration Enhance Research Output

S/N	Item Statements	Mean	SD	Dec.
1	Sharing e-books, journals and databases with colleagues enhances	3.21	0.61	Agreed

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	research output.			
2	Sharing expertise in information literacy with researchers improves research study.	3.18	0.68	Agreed
3	Joint training programmes on research methodology improves research capacity.	3.02	0.72	Agreed
4	Collaborative literature search and citation management increases research work.	3.25	0.60	Agreed
5	Access to digital libraries makes research work easier and faster.	3.16	0.69	Agreed
6	Use of Web of Science, Scopus, or JSTOR and other research databases improve the quality of research.	2.94	0.73	Agreed
7	Reference management tools such as Mendeley, Zotero, or EndNote saves time in academic writing.	2.87	0.75	Agreed
8	Depositing research article in an open access repository increases the visibility of academic research.	3.01	0.73	Agreed
9	Use of virtual platforms, such as video conferencing, enhances collaboration with researchers in other institutions and countries.	2.65	0.78	Agreed
10	Co-authoring research papers with colleagues from other institutions increases publications output.	2.90	0.77	Agreed
	Grand Mean	3.01	0.67	Agreed

Table 1 shows that all ten items recorded mean scores above the criterion mean of 2.50, with a grand mean of 3.01 and a grand standard deviation of 0.67. This indicates that the respondents agreed that both collaboration and ICT integration enhances research output in the universities studied.

Research Question 2: What are the benefits of collaborative research output and ICT skills practices among LIS professionalss?

Table 2: Mean Responses of LIS Professionals on Benefits of Collaborative Research and ICT Skills Practices

S/N	Item Statements	Mean	SD	Dec.
1	Collaboration increases my overall research output.	3.14	0.63	Agreed
2	Collaboration improves the quality of my research work.	3.07	0.66	Agreed
3	Collaboration and ICT integration enhances the visibility of my published work.	3.15	0.71	Agreed
4	Collaboration builds my capacity through exposure to new research methods.	3.08	0.75	Agreed

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5	Collaboration helps me maintain motivation to keep researching.	2.91	0.80	Agreed
6	Collaboration encourages creativity in research activities.	2.69	0.82	Agreed
7	Collaboration provides access to limited institutional resources.	3.02	0.77	Agreed
8	Collaboration with researchers from other disciplines exposes me to new ideas.	3.11	0.73	Agreed
9	Integration of ICT in research reduces time for completing a research study.	2.72	0.69	Agreed
10	ICT integration improves data management and analysis in research	3.01	0.76	Agreed
	Grand Mean	3.00	0.63	Agreed

Results in Table 2 indicate that all the ten benefit items were rated above the criterion mean, with a grand mean of 3.00 and a grand standard deviation of 0.63. This indicates that LIS professionals agreed that the listed items are benefits of collaborative research and ICT skills practices.

Discussion of Findings

The findings showed that collaboration and ICT integration contribute substantially to improving research output among LIS professionals. This finding is consistent with Adekoya's (2023) report that research collaboration provides LIS professionals in Nigerian universities with a firmer foundation for new ideas. Similarly, Oluwafemi, Bada and Omidiji (2025) reported a positive relationship between ICT skills and research output including productivity. Overall, the results underscore the importance of collaboration and ICT integration for enhancing research activities.

The study findings further showed that collaborative practices improve the quality of research work and overall research output, while ICT integration enhances the visibility of published work. In support, Austin and Baldwin, cited in Roy and Habib (2024), revealed that

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collaboration allows researchers to increase productivity, stay motivated, and allocate scarce resources more efficiently. While Yila and Temboge (2024) associated collaboration with the ability to connect researchers across disciplines. In essence, the role of collaborative research and ICT integration cannot be overstated.

Educational Implications

The findings have some fundamental implications for LIS education and professional practice in the North East Nigeria. First, it was found that LIS professionals have relatively lower competence in reference management tools and research databases. By implication, LIS programmes in the region should shift their focus from merely incorporating ICT courses into curricula to actual implementation in a hands-on way or practice. In essence, reference management and research databases need to receive greater attention from LIS curriculum designers and providers of continuing professional development programmes opportunities. This is because, general ICT skill-building alone cannot translate directly to every subfield.

Second, as it was reported that collaboration was not generally viewed as an opportunity for intellectual exchange among colleagues, there may be a role for mentorship built into LIS education. This implies bringing junior professionals together with senior colleagues for guidance and mentorship. This mentorship can be structured into LIS programmes at the postgraduate and staff-onboarding levels.

Third, given the finding that a lack of adequate infrastructure was found to hinder collaboration more than any deficit in knowledge or skills, LIS educators and university administrators should not assume that courses on collaborative skill sets are enough. Overall, if the internet and other ICT infrastructure remain, then any training on

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collaboration will not matter when applied to research projects or facility management. This suggests that library schools and university administration should work more closely with their ICT departments and decanal planning offices to ensure that efforts to improve research infrastructure and training are aligned.

Finally, the clear support for a zone-wide consortium points to an implication that involves LIS educators and university administrators generally. Collaborative, regionally-informed planning of LIS training, rather than each university developing its schedule independently, may lead to more cost-effective and collaborative educational programmes. However, joint subscriptions to research databases and rotation of hosting of certain workshops and conferences could enhance collaborative research and ICT integration among LIS professionals could be options to explore.

Recommendations

Based on the findings and conclusions above, the following recommendations are made:

1. University authorities should pay more attention to providing stable internet access and basic ICT infrastructure within library and LIS departments to ensure both effective collaboration and research output.
2. University administrators in the zone need to organize continuous ICT workshops that focus on skills acquisition particularly database use and reference management software. Such workshops should be based on hands-on practicum rather than one-time lectures.

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3. Universities across North East Nigeria should establish a formal university libraries consortium that jointly negotiate database subscriptions, coordinate training programmes, and organise a recurring zonal research symposium for LIS professionals.

4. There is a need for institutional policies that recognise staff that participate in collaborative research when considering personnel for promotion. This will help maintain the already existing willingness to collaborate among respondents.

Conclusion

This study was conducted to assess the extent of collaborative practices and ICT integration among Library and Information Science professionals in universities in North East Nigeria. It determined how both might be strengthened to improve research output. The findings revealed that LIS professionals across the zone recognise and practise, to a fair extent collaboration and ICT use for the purpose of increasing research productivity. It was found that they recognise its benefits, but constrained by physical infrastructure deficits, poor internet connectivity, lack of ICT amenities, insufficient funding and security instability. It is therefore noteworthy that the path to stronger collaborative practices and ICT skills integration for sufficient research output requires deliberate plans to provide the needed infrastructure and sustained training for the LIS professionals in the zone.

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