

Adoption and use of Digital Tools by Undergraduates in Library and Information Science in Universities in Adamawa State, Nigeria

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Abstract

The rapid integration of digital technologies in higher education has significantly transformed teaching, learning, and research practices, with Library and Information Science (LIS) education being particularly impacted due to its emphasis on information access, organization, and dissemination. This study examines the adoption and use of digital tools among undergraduate LIS students at Modibo Adama University and Adamawa State University, Nigeria. Anchored in the Diffusion of Innovations theory, the Technology Acceptance Model (TAM), and the Unified Theory of Acceptance and Use of Technology (UTAUT), the research explores students' access to digital tools, levels of competence in both general and LIS specific technologies, patterns of use for academic and personal purposes, and perceptions of usefulness and ease of use, alongside institutional factors influencing adoption. A mixed methods approach was employed, combining a descriptive survey of 136 undergraduates selected from a population of 207 using Yamane's (1967) sampling formula with focus group discussions. Data were collected using a validated questionnaire with reliability established through Cronbach's Alpha. Descriptive and inferential statistical techniques, including frequencies, percentages, chi-square tests, and regression analysis, were used to examine relationships among access, competence, institutional support, and perceived barriers. Findings indicate a growing reliance on digital tools such as learning management systems, digital libraries, and reference management software. However, challenges including inadequate infrastructure, limited technical support, and uneven digital literacy levels continue to constrain effective adoption. The study identifies infrastructure availability, digital skills, user attitudes, and

training opportunities as key predictors of meaningful digital tool adoption. The findings provide evidence based recommendations for curriculum enhancement, capacity building, and institutional policy aimed at strengthening digital integration in LIS education and better preparing undergraduates for digitally driven professional environments.

Keywords:

Digital tool adoption; Digital literacy; Library and Information Science undergraduates; Curriculum development; ICT infrastructure

Introduction

The rapid integration of digital technologies has significantly transformed higher education, reshaping teaching, learning, and research practices. In Library and Information Science (LIS), where information access, organization, and dissemination are central professional functions, the adoption of digital tools has become indispensable. Contemporary LIS education increasingly relies on digital tools such as learning management systems, digital libraries, reference management software, and collaborative platforms to support academic engagement and professional skill development (Lin & Yu, 2023).

However, the effective adoption and sustained use of digital tools among undergraduates are not automatic. Studies consistently show that technology adoption in higher education is shaped by a combination of individual, technological, and institutional factors, including access to digital infrastructure, level of digital competence, perceived usefulness, perceived ease of use, institutional support, and training opportunities (Al-Emran & Teo, 2024). These factors are particularly critical in developing country contexts, where uneven

infrastructure and limited institutional resources often constrain digital engagement.

From a theoretical standpoint, the Technology Acceptance Model (TAM) explains that students' adoption of digital tools is strongly influenced by perceived usefulness the extent to which a technology enhances academic performance and perceived ease of use, which reflects the degree of effort required to use the technology (Davis, extended by Scherer et al., 2021). Complementing TAM, the Unified Theory of Acceptance and Use of Technology (UTAUT) emphasizes additional factors such as facilitating conditions, social influence, and performance expectancy, all of which are relevant in institutional learning environments (Venkatesh et al., 2022).

Another critical factor influencing adoption is digital literacy, which encompasses students' ability to locate, evaluate, use, and create information using digital technologies. In LIS education, digital literacy extends beyond basic ICT skills to include competencies in information retrieval systems, metadata creation, digital curation, and scholarly communication tools. Empirical studies indicate that higher levels of digital literacy significantly enhance students' confidence, frequency of use, and depth of engagement with digital academic resources (Nguyen et al., 2023).

Despite increasing awareness of the importance of digital tools, infrastructure challenges remain a persistent barrier. Limited access to reliable internet connectivity, inadequate hardware, insufficient software licensing, and weak technical support systems negatively affect students' ability to adopt and meaningfully use digital technologies for learning (Al-Emran & Teo, 2024). These challenges often result in superficial or inconsistent use of digital tools, undermining intended educational outcomes.

Furthermore, curriculum design and instructional integration play a decisive role in shaping digital tool adoption. When digital competencies are explicitly embedded into LIS curricula through practical coursework, guided training, and continuous assessment, students demonstrate higher levels of engagement and skill acquisition. Conversely, weak curricular alignment reduces students' motivation and limits the academic value derived from available technologies (Scherer et al., 2021).

Against this background, this study investigates the adoption and use of digital tools among undergraduate LIS students at Modibo Adama University, Yola and Adamawa State University, Mubi Nigeria. Specifically, it examines how access to digital tools, digital competence, perceived usefulness, and perceived ease of use, institutional support, curriculum integration, and infrastructure constraints interact to influence students' patterns of digital tool use for academic purposes.

Statement of the Problem

The adoption of digital technologies in higher education is widely recognized as a critical driver of effective teaching, learning, and research. For Library and Information Science (LIS) undergraduates, however, digital competence carries an additional professional imperative, as future information managers are expected to demonstrate proficiency in tools such as learning management systems, digital libraries, institutional repositories, metadata editors, and reference-management software. Mastery of these technologies is essential not only for academic success but also for professional relevance in increasingly digital information environments.

Despite this importance, empirical evidence on the adoption and use of digital tools among LIS undergraduates in Adamawa State, Nigeria, remains limited. Existing observations and related studies point to persistent challenges, including disparities in device ownership, unstable internet connectivity, uneven levels of digital literacy, and weak curricular integration of specialized LIS applications. These challenges reflect broader infrastructural and pedagogical constraints reported across Nigerian universities (Udoh et al., 2022; Orji et al., 2022). While students frequently engage with general-purpose digital platforms, their competence in discipline-specific tools such as metadata management systems, digital preservation technologies, and reference-management software appears insufficient (Bello, 2024).

Furthermore, key determinants of technology adoption emphasized in established theoretical models, particularly the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), including perceived usefulness, perceived ease of use, and digital self-efficacy,

have received limited empirical attention within this regional and disciplinary context (Sha et al., 2025). This situation reveals notableregional,population-specific, competency-based,institutional, and theoretical gaps in the existing body of knowledge.

Consequently, the extent to which LIS undergraduates in Adamawa State universities are adopting and effectively applying digital tools for academic learning and professional developmentremains insufficiently understood. This lack of context specific empirical evidence constrains informed decision-making regarding curriculum design, student training, and institutional support mechanisms. Addressing this gap underscores the urgent need for systematic empirical investigation aimed at strengthening digital readiness and enhancing the quality of LIS education in Modibo Adama University, Yola and Adamawa State University Mubi.

Objectives: To examine the adoption and use of digital tools by Library and Information Science undergraduates in Adamawa State universities and identify factors that influence meaningful use for academic purposes.

Research Objectives

1. To examine the extent of adoption of digital tools (devices, internet connectivity, and software) among LIS undergraduates in Adamawa State universities.
2. To assess the level of use digital tools of LIS undergraduates in both general-purpose and discipline-specific digital tools (e.g., reference managers, metadata editors, and digital preservation systems).
3. To investigate LIS undergraduates' perceptions of the usefulness, ease of use, and relevance of digital tools for academic and professional development.
4. To identify the major barriers and challenges that hinder effective adoption and application of digital tools among LIS undergraduates in Adamawa State.

Research Questions

1. What is the level of adoption of digital tools, including devices, internet connectivity, and academicsoftware,amongLIS undergraduates in Adamawa State universities?

2. To what extent LIS undergraduates use both general-purpose and discipline-specific digital tools in their academic work?
3. How do LIS undergraduates perceive the usefulness, ease of use, and relevance of digital tools for their academic and future professional roles?
4. What barriers and challenges limit the effective adoption and application of digital tools by LIS undergraduates in Adamawa State universities?

Hypotheses

H₀: There is no significant relationship between the extent of adoption of digital tools and the level of competence of LIS undergraduates in Adamawa State universities.

Literature Review

Conceptual Foundations of Technology Adoption in Education

Scholarly discourse on technology adoption in education has, over time, converged on a set of core psychological and contextual constructs that explain both users' intention to adopt digital technologies and their actual patterns of use. According to Granić (2022), educational technology research consistently emphasizes perceived usefulness (also referred to as performance expectancy), perceived ease of use (effort expectancy), facilitating conditions, social influence, and self-efficacy as the most reliable predictors of technology acceptance and sustained usage in higher education environments. These constructs are most commonly operationalized through established theoretical models such as the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and Diffusion of Innovations (DOI) theory.

In a comprehensive systematic review, Rosli et al. (2022) observed that TAM remains the most widely applied framework in educational technology studies due to its simplicity and strong predictive power. However, they also noted that TAM's focus on individual perceptions limits its ability to fully capture institutional and infrastructural influences, particularly in developing-country contexts. As a result, scholars increasingly combine TAM with broader models such as UTAUT to improve contextual sensitivity.

Conceptual Framework for LIS Technology Adoption

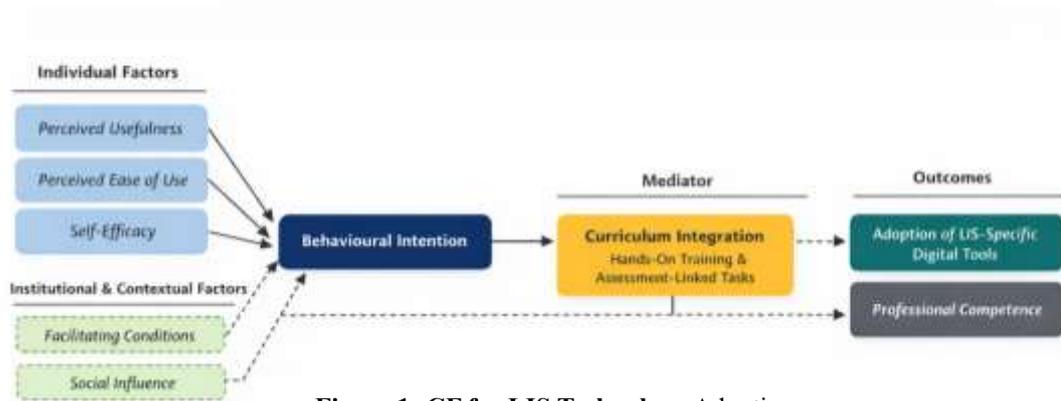


Figure 1: CF for LIS Technology Adoption

Technology Acceptance Model and Educational Technology Use

The Technology Acceptance Model, originally proposed by Davis, posits that users' acceptance of technology is primarily driven by perceived usefulness the degree to which a technology enhances task performance and perceived ease of use, which reflects the level of effort required to use the technology. Empirical evidence consistently supports this relationship in higher education settings. For instance, Lin and Yu (2023) demonstrated that students' perceptions of usefulness and ease of use significantly influenced their attitudes toward digital academic reading tools, which

in turn predicted behavioural intention and actual usage.

Similarly, Ahmad et al. (2023) argue that perceived usefulness plays a more dominant role than ease of use when technologies are directly linked to academic performance and assessment outcomes. Their findings suggest that students are more willing to tolerate complexity if a technology demonstrably improves learning efficiency or academic achievement. These findings reinforce the relevance of TAM in explaining early-stage adoption while highlighting the need to integrate contextual variables for explaining long-term and meaningful use.

Technology Acceptance Model and Educational Technology Use

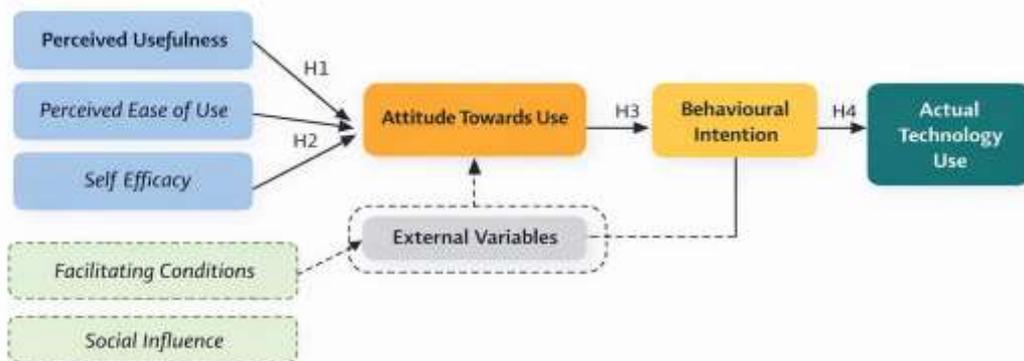


Figure 2: TAM and Educational Technology Use

Unified Theory of Acceptance and Use of Technology and Contextual Moderators

To address limitations associated with TAM, Venkatesh et al. introduced the Unified Theory of Acceptance and Use of Technology (UTAUT), which incorporates social and organizational influences alongside individual perceptions. According to Granić (2022), the Unified Theory of Acceptance and Use of Technology (UTAUT) provides a more holistic framework for examining educational technology adoption than earlier models such as the Technology Acceptance Model. Unlike TAM, which focuses mainly on individual perceptions of usefulness and ease of use, UTAUT explicitly incorporates facilitating conditions, including the availability of infrastructure, technical support, institutional policies, and training opportunities. These conditions are critical in educational settings because positive attitudes toward technology do not necessarily result in sustained or effective use without adequate institutional support. Granić (2022) further notes that UTAUT is particularly well suited to resource-

constrained contexts, where infrastructural and organizational factors strongly moderate adoption outcomes. By integrating individual, social, and contextual determinants, UTAUT offers a more comprehensive explanation of both behavioural intention and actual technology use in higher education. Recent meta-analytic evidence supports this position.

López-Nuñez et al. (2024) found that while performance expectancy and effort expectancy predict students' intention to use learning management systems, facilitating conditions exert the strongest influence on actual system use. This finding suggests that institutional readiness plays a decisive role in determining whether intention translates into sustained adoption. Extending this argument, Mejías Acosta et al. (2024) contend that social influence particularly encouragement from lecturers and peers significantly shapes students' willingness to experiment with advanced digital platforms. However, without adequate infrastructural support, such social encouragement rarely results in long-term pedagogical integration.

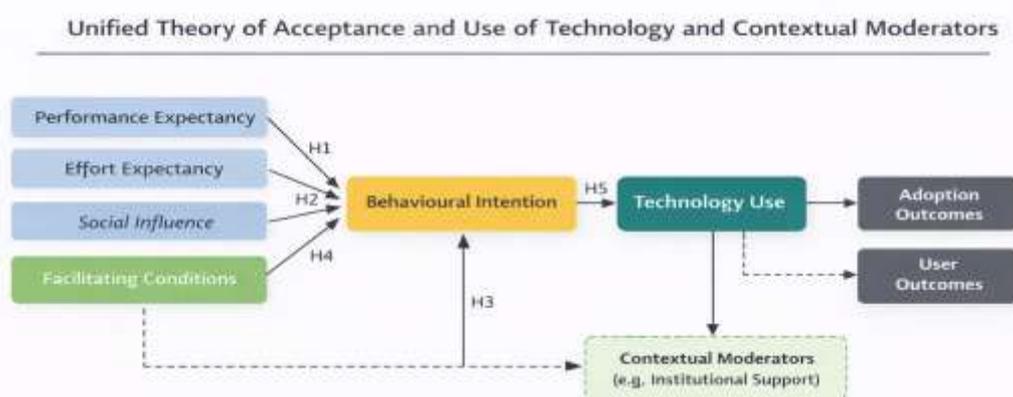


Figure 3: UTA and use of Technology and Contextual Moderators

Diffusion of Innovations and Adoption Patterns in Higher Education

The Diffusion of Innovations (DOI) theory (Rogers, 2003) helps explain the uneven adoption of new technologies in educational settings. As Mejías-Acosta et al. (2024) note, digital innovations in higher education often follow a diffusion curve, with early adopters engaging actively while the majority adopt slowly or superficially. This pattern is especially evident where infrastructure exists but formal pedagogical integration is limited.

To better capture these dynamics, researchers increasingly combine DOI with models such as TAM and UTAUT, creating hybrid frameworks that account for both individual attitudes and institutional constraints. Ahmad et al. (2023) argue that these integrated models are particularly effective in examining the adoption of complex technologies, including AI enabled academic tools, where adoption depends on both user engagement and organizational support.



Figure 4: Diffusion of Innovations and Adoption Patterns in Higher Education

Although the adoption of educational technologies has been widely explored, Library and Information Science (LIS) students exhibit unique adoption patterns shaped by the profession's technical and procedural nature. Udoh, Ekpenyong, and Olowookere (2020) observed that LIS students are more likely to adopt digital tools when there is a clear fit between the tool and the task, particularly for activities that align with professional competencies, such as metadata creation, repository management, and digital preservation workflows.

In Nigeria, studies reveal a persistent competence use gap among LIS undergraduates. Udoh et al. (2020) reported that while most students demonstrate high proficiency in general purpose digital tools, less than a quarter possess sufficient skills in LIS specific applications. Similarly, Bello (2024) highlighted that frequent engagement with electronic databases does not automatically translate into effective use of reference management software, pointing to gaps in applied digital literacy.

This pattern is further compounded by the way LIS students are exposed to specialized tools. According to Alex Nmecha and Ejitagha (2023), short term workshops rather than structured coursework often serve as the main avenue for learning discipline specific technologies. As a result, students frequently struggle with skill retention, and their application of these tools in academic tasks tends to be inconsistent.

Together, these findings suggest that while LIS students are generally digitally competent, translating this proficiency into discipline specific expertise requires more structured and integrated learning opportunities that align with professional practices.

Nigerian Context: Infrastructure, Institutions, and Adoption Barriers

Research within the Nigerian higher education landscape consistently highlights structural and institutional challenges that limit effective technology adoption. Orji et al. (2022) note that unreliable electricity, unstable internet connections, and insufficient ICT funding remain widespread obstacles, weakening the link between perceived usefulness and consistent technology use. In addition, Kukuri, Audu, and Abubakar (2022) point out that limited technical support and fragmented institutional policies further undermine the successful implementation of digital learning initiatives.

From a strategic standpoint, Joshua and King (2020) argue that without coherent institutional frameworks including sustained funding, regular training programs, and robust infrastructure digital resources are likely to remain underutilized. This perspective is reinforced by Murtala and Jibrilla (2025), who emphasize that sporadic or piecemeal interventions fail to create lasting adoption outcomes, highlighting the need for coordinated, long term planning to bridge the gap between technology availability and meaningful use.

Curriculum Integration, Hands On Training, and Emerging Technologies

The literature consistently highlights curricular integration as a key factor bridging the gap between access to technology and meaningful use. Nnatuagha and Chukwu (2024) found that LIS programmes incorporating hands-on assignments such as institutional repository submissions and metadata editing tend to produce students with higher practical competence compared to programmes that rely primarily on theoretical instruction. Such experiential learning ensures that students do

not just interact with technology superficially but develop applied skills directly relevant to professional practice.

In the context of emerging technologies, Okechukwu (2025) reports that LIS students are increasingly exposed to AI enabled academic tools. However, systematic pedagogical integration and instruction in ethical and responsible use remain underdeveloped. Ahmad et al. (2023) argue that this gap presents a major challenge for the sustainable adoption and professional use of advanced digital technologies, as students may be familiar with tools conceptually but lack structured guidance for meaningful and responsible application.

Research Gaps and Justification for the Study

Despite extensive scholarship, several important gaps remain. First, few peer-reviewed studies specifically focus on LIS undergraduates in Adamawa State, with most research conducted at national or regional levels. Second, existing studies tend to emphasize general e-resource use, often overlooking advanced LIS specific tools such as metadata editors, repository workflows, and reference management systems. Third, infrastructural constraints including unstable power supply and limited internet bandwidth are rarely incorporated as moderators within TAM or UTAUT frameworks, even though they significantly shape technology adoption in the Nigerian context (Oyeniran & Olamide, 2023).

To address these gaps, scholars such as Okafor and Nwosu (2021) and Owolabi and Okojie (2022) recommend the development of context-sensitive adoption models that integrate both general and discipline-specific competencies alongside institutional and infrastructural factors. By focusing specifically on LIS undergraduates in Adamawa State, and examining their adoption, use, perceptions, and barriers to technology, the present study directly responds to these recommendations while contributing empirically to curriculum planning, policy development, and the effective integration of emerging technologies in LIS education.

Research Methodology

This chapter outlines the research methodology employed to examine the

adoption and use of digital tools among undergraduate Library and Information Science (LIS) students in Adamawa State University, Mubi and Modibo Adama University, Yola. It presents the research design, population, sampling procedures, data collection instruments, reliability and validity measures, and data analysis techniques. The methodology is designed to ensure the study produces reliable, valid, and contextually relevant findings that address the research objectives and questions outlined in Chapter One.

Research Design

This study adopted a mixed methods approach, combining quantitative and qualitative techniques to provide a comprehensive understanding of LIS undergraduates' adoption and use of digital tools. The quantitative component employed a descriptive survey to measure access, competence, use patterns, and perceptions of digital tools. The qualitative component involved focus group discussions to explore students' experiences, challenges, and contextual factors influencing technology adoption.

The mixed methods design was chosen because it enables triangulation of data, improving the reliability and depth of insights, while capturing both measurable patterns and nuanced experiences of LIS students.

Population of the Study

The population of the study comprised all undergraduate LIS students at Modibo Adama University, Yola, and Adamawa State University, Mubi, totaling 207 students. These students represent a population actively engaged in academic activities where digital tools are increasingly relevant for research, learning, and professional skill development.

Sample and Sampling Technique

A total of 136 students were selected from the population using Yamane's (1967) sampling formula at a 95% confidence level. The sample included 109 students from Modibo Adama University and 27 students from Adamawa State University. A purposive sampling approach was applied to ensure that participants had sufficient exposure to academic digital tools, and could provide meaningful insights regarding both general

purpose and discipline-specific technology use.

Research Instruments

Data were collected using a structured questionnaire and focus group discussion guide.

The questionnaire captured quantitative data on:

- ✓ Access to digital tools and internet connectivity
- ✓ Competence in general-purpose and LIS-specific technologies
- ✓ Frequency and patterns of digital tool use
- ✓ Perceptions of usefulness, ease of use, and institutional support

Barriers to adoption

The focus group discussions explored:

- ✓ Students’ experiences with digital tools in academic tasks
- ✓ Challenges in applying LIS-specific technologies
- ✓ Perceived institutional and infrastructural constraints

The instruments were validated by experts in LIS and educational technology, ensuring content relevance, clarity, and alignment with research objectives. Reliability was established using Cronbach’s Alpha, yielding values above the acceptable threshold of 0.70, indicating internal consistency.

Data Collection Procedure

Prior to data collection, ethical clearance was obtained from the relevant university authorities. Participants were informed of the purpose of the study, assured of confidentiality, and provided consent to participate. The

questionnaires were administered in person, while focus group discussions were conducted in small groups to encourage open discussion and ensure all voices were heard. Data collection spanned a period of four weeks, with follow-ups conducted to ensure a high response rate.

Data Analysis

Quantitative data from the questionnaires were analyzed using descriptive and inferential statistical techniques, including:

- ✓ Frequencies and percentages to summarize access, competence, and usage patterns
- ✓ Chi-square tests to examine relationships between adoption and competence
- ✓ Regression analysis to identify predictors of effective adoption

Qualitative data from focus group discussions were thematically analyzed, allowing for identification of recurring themes related to barriers, institutional support, and curriculum integration. Data were presented in tables, charts, and figures to enhance readability and interpretation.

Ethical Considerations

The study adhered to standard ethical guidelines, including:

- ✓ Informed consent from all participants
- ✓ Voluntary participation, with the option to withdraw at any time
- ✓ Anonymity and confidentiality, ensuring no personal identifiers were disclosed
- ✓ Responsible reporting, with findings presented objectively without bias

Table 1: Operationalization of Variables

Variable	Indicator	Measurement
Access to digital tools	Availability of devices, internet, software	Frequency scale (Always, Sometimes, Rarely, Never)
Competence	Skill level in general-purpose and LIS-specific tools	Rating scale (Very competent, Competent, Fair, Poor)
Use patterns	Frequency of tool use for academic and personal purposes	Frequency scale (Daily, Weekly, Monthly, Rarely/Never)
Perceptions	Perceived usefulness, ease of use, relevance, institutional support	Likert scale (Strongly Agree – Strongly Disagree)
Barriers	Challenges such as infrastructure, training, software availability	Likert scale (Major, Minor, Not a barrier)

Hypothesis

H₀: There is no significant relationship between the extent of adoption of digital tools and the level of competence of LIS undergraduates in Adamawa State universities.

Summary

This chapter outlined the research design, population, sampling, instruments, and analysis procedures adopted for investigating digital tool adoption among LIS undergraduates. The mixed methods approach allows for a comprehensive understanding of adoption patterns, while quantitative and qualitative analyses provide insights into the interplay between access, competence, perceptions, curriculum, and infrastructural factors. The next chapter presents the results and analysis of the collected data, addressing the research questions and testing the stated hypothesis.

Results and Analysis

This chapter presents the findings of the study on the adoption and use of digital tools among 136 Library and Information Science (LIS) undergraduates in Adamawa State universities. The analysis addresses the research questions and hypothesis outlined in Chapter One, focusing on access, competence, patterns of use, perceptions, institutional support, and barriers to technology adoption. Quantitative results are complemented with qualitative insights from focus group discussions to provide a holistic understanding of the research problem.

Table 2: Response Rate

A total of 136 questionnaires were returned, representing 100% response rate for both universities.

University	Population	Sample	Returned Questionnaires	Response Rate (%)
Modibo Adama University	166	166	109	100
Adamawa State University	41	41	27	100
Total	207	207	136	100

Source: Survey Field 2026

Students reported varying levels of access to devices, internet, and academic software.

Table 3: Access to Digital Tools

Digital Tool / Resource	Always (%)	Sometimes (%)	Rarely (%)	Never (%)	Total (%)
Personal computer / Laptop	85 (62.5%)	35 (25.7%)	10 (7.4%)	6 (4.4%)	136 (100%)
Smartphone	120 (88.2%)	12 (8.8%)	2 (1.5%)	2 (1.5%)	136 (100%)
Internet connectivity	95 (69.9%)	30 (22.1%)	8 (5.9%)	3 (2.2%)	136 (100%)
Learning Management System (Moodle)	60 (44.1%)	50 (36.8%)	18 (13.2%)	8 (5.9%)	136 (100%)
Digital library / E-resources	70 (51.5%)	45 (33.1%)	15 (11.0%)	6 (4.4%)	136 (100%)
Reference management software	35 (25.7%)	50 (36.8%)	30 (22.1%)	21 (15.4%)	136 (100%)

Source: Survey Field 2026

learning management systems and digital libraries. However, access to specialized tools such as reference management software is limited, reflecting the competence–use gap highlighted in the literature.

Interpretation:

The results indicate that most students have access to smartphones (88.2%) and personal computers (62.5%), with moderate access to

Table 4: Competence in Digital Tools

Students’ self-reported competence in general-purpose and LIS-specific tools is presented below:

Tool Type	Very Competent (%)	Competent (%)	Fair (%)	Poor (%)	Total (%)
Word processor (MS Word)	90 (66.2%)	35 (25.7%)	8 (5.9%)	3 (2.2%)	136 (100%)
Spreadsheet software (Excel)	50 (36.8%)	60 (44.1%)	20 (14.7%)	6 (4.4%)	136 (100%)
Presentation software (PowerPoint)	65 (47.8%)	45 (33.1%)	18 (13.2%)	8 (5.9%)	136 (100%)
Reference management (Mendeley/Zotero)	30 (22.1%)	50 (36.8%)	35 (25.7%)	21 (15.4%)	136 (100%)
Metadata editors	20 (14.7%)	40 (29.4%)	45 (33.1%)	31 (22.8%)	136 (100%)
Digital preservation software	15 (11.0%)	35 (25.7%)	50 (36.8%)	36 (26.5%)	136 (100%)

Source: Survey Field 2026

Interpretation:

Students are generally competent in general-purpose tools such as Word, Excel, and PowerPoint. However, competence in LIS-specific tools such as reference management,

metadata editors, and digital preservation software is low, with more than half of students reporting fair or poor skills. This supports previous findings regarding discipline-specific skill gaps.

Table 5: Patterns of Use

Purpose	Daily (%)	Weekly (%)	Monthly (%)	Rarely/Never (%)	Total (%)
Academic research	80 (58.8%)	35 (25.7%)	15 (11.0%)	6 (4.4%)	136 (100%)
Assignment/project work	85 (62.5%)	35 (25.7%)	10 (7.4%)	6 (4.4%)	136 (100%)
Collaborative work	40 (29.4%)	50 (36.8%)	30 (22.1%)	16 (11.8%)	136 (100%)
Personal/social	30 (22.1%)	40 (29.4%)	35 (25.7%)	31 (22.8%)	136 (100%)

Source: Survey Field 2026

Interpretation:

Digital tools are primarily used for academic purposes, including research and assignments. Collaborative and personal use is less frequent,

indicating that academic imperatives drive digital engagement among LIS undergraduates.

Table 6: Perceptions of Digital Tools

Statement	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)	Total (%)
Tools enhance academic performance	55 (40.4%)	60 (44.1%)	12 (8.8%)	5 (3.7%)	4 (2.9%)	136 (100%)
Tools are easy to use	45 (33.1%)	65 (47.8%)	15 (11.0%)	8 (5.9%)	3 (2.2%)	136 (100%)
Tools are relevant to professional development	40 (29.4%)	60 (44.1%)	20 (14.7%)	10 (7.4%)	6 (4.4%)	136 (100%)

Institutional support encourages use	35 (25.7%)	50 (36.8%)	25 (18.4%)	15 (11.0%)	11 (8.1%)	136 (100%)
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Source: Survey Field 2026

Interpretation:

Most students perceive digital tools as useful, easy to use, and relevant to professional development. However, perceptions of

institutional support are lower, highlighting the role of facilitating conditions in sustained adoption.

Table 7: Barriers to Adoption

Barrier	Major (%)	Minor (%)	Not a Barrier (%)	Total (%)
Unreliable internet	80 (58.8%)	35 (25.7%)	21 (15.4%)	136 (100%)
Lack of devices	50 (36.8%)	50 (36.8%)	36 (26.5%)	136 (100%)
Limited software availability	45 (33.1%)	55 (40.4%)	36 (26.5%)	136 (100%)
Inadequate training/workshops	60 (44.1%)	45 (33.1%)	31 (22.8%)	136 (100%)
Weak technical support	55 (40.4%)	45 (33.1%)	36 (26.5%)	136 (100%)

Source: Survey Field 2026

Interpretation:

The main barriers identified include unreliable internet, inadequate training, limited software, and weak technical support, which align with findings from the Nigerian higher education context literature. These barriers contribute to uneven and superficial adoption of digital tools.

H₀: There is no significant relationship between the adoption of digital tools and the competence of LIS undergraduates.

To test this hypothesis, the **Chi-square (χ^2) test of independence** was employed at a **0.05 level of significance**. The test assessed whether students' level of competence in digital tools is significantly associated with their level of adoption.

Hypothesis

Table 8: Chi-square Test Result

Variable	Test Used	df	χ^2 value	p-value	Decision
Adoption vs Competence	Chi-square	4	12.68	0.013	Reject H ₀

Summary of Hypothesis Testing Results

The Chi-square test of independence revealed a statistically significant relationship between digital tool adoption and the competence level of LIS undergraduates ($\chi^2 = 12.68$, $df = 4$, $p = 0.013$). This finding indicates that students with higher levels of digital competence are more likely to adopt and effectively use digital tools compared to their less competent counterparts. The result supports the core assumptions of TAM and UTAUT, which posit that user capability and perceived ease of use play critical roles in technology adoption. Overall, the evidence highlights the

importance of structured, competence-driven training for promoting meaningful and sustained use of digital technologies in LIS education.

Discussion of Findings, Conclusion, and Recommendations

Discussion of Findings

The finding that LIS undergraduates show higher adoption of general digital tools than LIS-specific applications suggests a competence–use gap within LIS education. While students are familiar with basic digital platforms, their limited proficiency in

professional tools indicates insufficient curriculum-based practical exposure. This aligns with Udoh et al. (2020) and Bello (2024), who reported that frequent use of electronic resources does not automatically translate into professional digital competence. The significant relationship between competence and adoption confirms the assumptions of TAM and UTAUT, which emphasize that users' skills and perceived ease of use strongly influence actual technology usage. Students who reported higher competence were more confident and consistent in adopting digital tools, while those with lower competence exhibited reluctance or superficial use. This pattern also reflects DOI theory, where early adopters engage deeply, while the majority adopt slowly or minimally due to skill limitations.

Furthermore, the study revealed that infrastructural and institutional barriers weaken the adoption process. In line with Orji et al. (2022) and Kukuri et al. (2022), unreliable power supply, poor internet connectivity, and inadequate ICT support reduce students' ability to translate perceived usefulness into sustained usage. The lack of coherent institutional frameworks, as argued by Joshua and King (2020), further contributes to underutilization of available digital resources. Overall, the findings suggest that access alone is insufficient for meaningful adoption. Competence development, curriculum integration, and supportive institutional environments are essential for sustainable digital tool use in LIS education.

Conclusion

The study concludes that digital tool adoption among LIS undergraduates in Adamawa State is significantly influenced by students' competence levels and the institutional environment. Although students have access to digital resources, inadequate hands-on training, infrastructural constraints, and weak curricular integration limit effective and sustained adoption. Strengthening digital competence through structured academic programmes is therefore critical to improving technology acceptance and use in LIS education.

Recommendations

Based on the findings, the following recommendations are made:

1. LIS departments should integrate practical digital tool training such as reference management software, repository workflows, and metadata creation into core courses.
2. Institutions should invest in reliable ICT infrastructure, including stable internet connectivity and alternative power solutions.
3. Regular capacity-building workshops should be embedded within academic programmes rather than offered as one-off interventions.
4. Library management should collaborate with academic departments to ensure consistent exposure to emerging technologies, including AI-enabled academic tools.
5. Future studies should adopt longitudinal designs to examine changes in adoption behavior over time.

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