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Research Paper

### Utilization of Library Technology Services for Academic Performance of Senior Secondary School Students in Zaria Local Government Area, Kaduna State

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#### ABSTRACT

This study investigates the availability and challenges of library technology services for senior secondary school students in Zaria Local Government Education Authority (LGEA), Kaduna State, Nigeria, using a descriptive survey design. Data were collected from 364 students across 12 public secondary schools via a validated questionnaire (L TSAUCQ) with a 91% response rate. Findings reveal that Digital Information Resources (e.g., online catalogs, e-books) are relatively available (81.8%, mean = 0.818), followed by Library Management Systems (60.2%, mean = 0.602), while Specialized Technology Services (e.g., AI, digital repositories) are least available (41.8%, mean = 0.418), with an overall availability of 61.2%. However, significant utilization challenges persist, with Training and Skills Challenges being most prevalent (77.5%, mean = 0.775), followed by Infrastructure and Resource Challenges (70.1%, mean = 0.701) and Access and Usability Challenges (63.4%, mean = 0.634). The overall challenge prevalence (70.3%) exceeds service availability, indicating a critical implementation gap. This misalignment highlights that mere technology provision without addressing training, infrastructure, and usability barriers results in suboptimal educational outcomes. The low availability of advanced technologies risks widening the digital divide, limiting students' readiness for technology-intensive environments. The study highlight the need for holistic interventions, including infrastructure upgrades, comprehensive training, and user education programs, to enhance library technology utilization and support academic performance. These findings advocate for policy

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reforms prioritizing school library development to foster digital literacy and equitable educational opportunities.

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## Introduction

School libraries constitute fundamental pillars of educational infrastructure, serving as knowledge repositories, learning laboratories, and cultural centers that profoundly influence students' academic trajectories and intellectual development. In Nigeria's educational landscape, school libraries represent critical intervention points for addressing persistent challenges including declining literacy rates, poor reading cultures, and suboptimal academic performance among secondary school students. The school library functions as more than a physical collection of books and resources; it embodies an intellectual ecosystem where students develop information literacy competencies, cultivate lifelong learning habits, and acquire critical thinking skills essential for success in increasingly knowledge-intensive societies (Adeniji, 2006; Iloeje, 2014). As educational paradigms shift toward learner-centered approaches emphasizing independent inquiry and self-directed learning, school libraries assume heightened significance in providing supportive environments, diverse resources, and expert guidance necessary for effective learning experiences.

The contemporary school library transcends traditional boundaries to embrace digital technologies, offering hybrid collections combining print materials with electronic resources, databases, and multimedia content that align with 21st-century learners' needs and preferences (Oriogu, 2015). Research consistently demonstrates positive correlations between well-resourced, professionally-staffed school libraries and improved student outcomes across multiple dimensions including standardized test scores, reading comprehension levels, information literacy skills, and overall academic achievement (Smalley, 2004; Lance *et al.*, 2000). In the Nigerian context, where educational challenges include large class sizes, limited instructional materials, insufficient teacher preparation, and systemic resource constraints, school libraries offer strategic leverage points for educational quality improvement through equitable access to knowledge resources and structured support for learning activities (Ibrahim, 2014).

However, the potential of school libraries in Nigeria remains substantially unrealized due to interconnected challenges including inadequate funding, insufficient qualified personnel, obsolete collections, poor integration with curriculum, and limited awareness among stakeholders regarding libraries' educational value (Busayo, 2011; Nwosu *et al.*, 2011). The decline in reading culture among Nigerian youth, attributed to factors including social media proliferation, inadequate parental modeling, poor library facilities, and curriculum disconnection from students' lived experiences, threatens educational attainment and national development prospects (Ayanbimpe, 2012; Aina *et al.*, 2011). Addressing these challenges requires comprehensive strategies encompassing infrastructure development, professional development for librarians, curriculum integration initiatives, community engagement programs, and policy reforms prioritizing

school library development as essential educational investment rather than peripheral luxury.

School libraries exert multifaceted influences on students' academic performance through mechanisms including enhanced access to learning resources, development of information literacy competencies, cultivation of independent learning habits, and provision of conducive study environments. Jato *et al.* (2014) conducted a comprehensive study examining the relationship between study habits, school library use, and academic performance among 579 secondary school students in Ondo West Local Government Area using correlational research design. The study employed questionnaires and academic records analysis, revealing significant positive relationships between frequency of library use and academic achievement ( $r = .67, p < .01$ ). Students who utilized library resources regularly (defined as three or more times weekly) achieved mean grade point averages of 3.24 compared to 2.47 for infrequent library users, representing a 31% performance differential. The research identified specific beneficial study behaviors facilitated by library environments including extended reading time (76% of regular library users spent two or more hours daily reading compared to 34% of non-users), access to diverse reference materials (82% vs. 41%), and reduced distractions enabling concentrated study (68% vs. 29%). These findings underscore libraries' instrumental role in creating conditions conducive to academic success through resource provision and environmental support.

Yohanna, (2022) investigated the role of school libraries in promoting reading culture among secondary school students at Federal Government College, Jos using descriptive survey methodology with 200 student respondents. The study revealed that students primarily utilized libraries for examination preparation (78%), completing assignments (71%), and personal intellectual development (54%), while recreational reading remained limited (32%). Analysis indicated that students with regular library access demonstrated superior reading comprehension scores (mean = 76.3) compared to those with limited access (mean = 61.8), a statistically significant difference ( $t = 8.47, p < .001$ ). The research identified critical barriers to library utilization including inadequate current collections (reported by 68% of respondents), insufficient seating capacity (61%), limited operating hours (57%), and lack of curriculum integration (73%). Notably, the study found that 84% of students expressed willingness to increase library use if these barriers were addressed, suggesting latent demand for library services currently constrained by systemic limitations. Yohanna recommended comprehensive library development initiatives including collection development prioritizing contemporary, age-appropriate materials; extended operating hours; librarian involvement in curriculum planning; and regular promotional activities to increase library visibility and engagement.

Obiano *et al.* (2023) examined the impact of school library services on literacy development and academic performance of secondary school students in Niger State through a quasi-experimental design comparing schools with functional libraries ( $n=8$ ) against those without libraries ( $n=8$ ), involving 480 students total. The study measured literacy levels using standardized reading comprehension tests and tracked academic performance through continuous assessment and examination scores over one academic year. Results demonstrated that students in schools with functional libraries achieved significantly higher literacy scores (mean = 68.4,  $SD = 12.3$ ) compared to students in schools without libraries (mean = 51.7,  $SD = 14.8$ ), with effect size indicating large practical significance (Cohen's  $d = 1.23$ ). Academic performance differentials were similarly

pronounced, with library-access students achieving mean GPAs of 3.02 versus 2.31 for non-library-access peers. The research revealed that library programs specifically targeting literacy development—including reading clubs, storytelling sessions, book discussions, and author visits—produced measurable improvements in reading fluency (43% increase), vocabulary acquisition (37% increase), and reading motivation (measured through attitudinal surveys showing 52% improvement). These findings provide compelling empirical evidence that well-managed school libraries directly contribute to enhanced literacy outcomes and academic achievement, supporting policy arguments for prioritizing school library development in educational planning.

Busayo, (2011) explored school libraries as foundational steps to children's effective reading habits through qualitative research involving interviews with 45 teachers, 20 school administrators, and 15 librarians across 12 Nigerian states. The study employed thematic analysis to identify factors influencing reading habit development, revealing that school library quality emerged as the most frequently mentioned determinant (cited by 89% of participants). Key quality dimensions included collection relevance and currency (mentioned by 82% of respondents), with participants emphasizing that outdated, culturally irrelevant materials discouraged reading engagement. Professional librarian presence, identified by 76% of participants as critical, facilitated personalized reading guidance, organized promotional activities, and created welcoming library atmospheres encouraging student utilization. Physical environment characteristics—including adequate lighting, comfortable seating, appealing décor, and organized shelving—were identified by 71% of respondents as influencing students' willingness to spend time in libraries. The research documented concerning patterns wherein 68% of surveyed schools lacked functional libraries, while 84% of existing libraries suffered from inadequate collections and absent or unqualified personnel. Busayo concluded that without intentional investment in school library development, including infrastructure, collections, and professional staffing, efforts to cultivate reading cultures and improve literacy outcomes would remain fundamentally compromised.

Ibokwe *et al.* (2012) explored reading as an essential tool for lifelong development through narrative review synthesizing research from multiple disciplines including education, psychology, and library science. The authors argued that reading culture development during secondary school years represents a critical developmental window with lasting implications for educational attainment, career success, and civic participation. The review identified school libraries as uniquely positioned to foster reading cultures through multiple mechanisms: providing diverse, high-quality reading materials matching varied interests and abilities; creating welcoming physical environments encouraging voluntary reading; offering guidance from trained professionals who can match readers with appropriate materials; organizing promotional events including book clubs, author visits, and reading competitions that make reading social and enjoyable; and modeling reading as valued activity through institutional commitment evidenced by resource allocation and curricular integration. The authors synthesized research demonstrating that students developing strong reading habits during secondary school years achieve superior outcomes across domains including higher academic achievement, enhanced critical thinking capabilities, broader vocabulary and communication skills, increased cultural awareness and empathy, and greater likelihood of continued learning throughout adulthood.

They concluded that school library investment represents high-yield educational intervention with multiplier effects extending beyond immediate academic outcomes to encompass lifelong learning trajectories and societal development. Haliru *et al.* (2015) assessed reading habits among secondary school students in Kaduna Metropolis through descriptive survey involving 800 students from 16 schools. The study employed structured questionnaires and reading behavior observations to document current reading patterns and identify influencing factors. Findings revealed concerning trends including 72% of students reporting no reading for pleasure, 68% accessing fewer than three books monthly beyond textbooks, and 81% spending more time on social media than reading. When examining school library factors, the research found that only 31% of students reported having access to functional school libraries, with these libraries typically suffering from limited collections (average 3.2 books per student), restricted hours (average 8 hours weekly), and absent or unqualified staff (only 19% of libraries had certified librarians). Multivariate analysis identified school library quality as the strongest predictor of reading frequency ( $\beta = .47, p < .001$ ), exceeding parental education ( $\beta = .23$ ) and socioeconomic status ( $\beta = .18$ ) in explanatory power. Students attending schools with well-resourced libraries read an average of 4.7 books per term compared to 0.9 books for students in schools without functional libraries. These findings emphasize that school library development represents a modifiable factor with substantial potential to influence reading culture development, offering actionable targets for educational improvement initiatives.

## Method

This study adopted a descriptive survey research design to investigate the availability and challenges of library technology services among senior secondary students in Zaria Local Government Education Authority (LGEA), Kaduna State, Nigeria. The target population comprised 4,856 senior secondary school students (SS1, SS2, and SS3) from 18 public secondary schools in Zaria LGEA during the 2024/2025 academic session. Using Krejcie and Morgan's (1970) formula, a sample size of 400 respondents was determined for a population of 4,856 at 95% confidence level and 5% margin of error the recommended sample size was 357 respondents. However, to account for potential non-response and incomplete questionnaires, the researcher increased the sample size to 400 respondents. After data collection and cleaning, 364 questionnaires were found to be properly completed and suitable for analysis, representing a response rate of 91.0%, which exceeds the minimum acceptable response rate of 70% for survey research (Mugenda & Mugenda, 2003). A multi-stage sampling technique was employed, combining stratified sampling of schools by type, proportionate allocation across 12 selected schools, proportionate distribution by class level, and simple random sampling using the lottery method to select individual students from class lists, ensuring every student had an equal chance of participation. The research instrument was a structured questionnaire titled "Library Technology Services Availability and Utilization Challenges Questionnaire (LTSAUCQ)" consisting of three sections: demographic information, availability of nine library technology services, and nine utilization challenges, with responses measured on a 2-point dichotomous scale (1 = Available/Faced; 0 = Not Available/Not Faced).

The instrument's validity was established through face and content validity by three experts from Library and Information Science and Educational Technology departments, while reliability was confirmed through a pilot study with 40 students, yielding Kuder-Richardson Formula 20 (KR-20) coefficients of 0.82 for Section B, 0.85 for Section C, and 0.83 overall, all exceeding the 0.70 threshold for acceptable internal consistency. Data were collected over six weeks through personal administration of questionnaires by the researcher and trained assistants after obtaining necessary ethical approvals and institutional permissions, resulting in 364 properly completed questionnaires (91.0% response rate) after excluding 14 incomplete responses from the 378 returned questionnaires. Data analysis was conducted using Statistical Package for the Social Sciences (SPSS) version 26.0, employing descriptive statistics including frequency counts, percentages, mean scores, and standard deviations, with items aggregated into thematic categories for comprehensive analysis. Mean scores were interpreted using the decision rule that scores  $\geq 0.50$  indicated high prevalence of service availability or challenges faced by the majority of respondents, while scores  $< 0.50$  indicated low prevalence, and results were presented in tables showing distributions, percentages, mean scores, and standard deviations for both individual items and aggregated categories.

**Table 1. Availability of Library Technology Services**

<b>Tool Type Category</b>	<b>Available (n)</b>	<b>Not Available (n)</b>	<b>Total Responses</b>	<b>% Available</b>	<b>Mean Score</b>	<b>Std. Deviation</b>
Digital Information Resources						
Online catalogs	893	199	1092	81.8%	0.818	0.0214
E-books and e-journals						
Internet access and digital databases						
Library Management Systems						
Integrated Library Systems	657	435	1092	60.2%	0.602	0.0257
Library Services Platforms						
Discovery Services						
Specialized Technology Services						
Educational apps	456	636	1092	41.8%	0.418	0.0254
Digital Repositories						
AI and Data Analytics						
<b>Grand Total (All Services)</b>	<b>2006</b>	<b>1270</b>	<b>3276</b>	<b>61.2%</b>	<b>0.612</b>	<b>0.0258</b>

*Note: N = 364 respondents × 9 service types = 3,276 total responses*

Table 1 on Availability of Library Technology Services reveals significant disparities across service categories. Digital Information Resources demonstrated the highest availability with a mean score of 0.818 (SD = 0.0214), indicating that 81.8% of respondents reported access to online catalogs, e-books and e-journals, and internet access with digital databases. Library Management Systems showed moderate availability with a mean score of 0.602 (SD = 0.0257), representing 60.2% availability. This category, encompassing

Integrated Library Systems, Library Services Platforms, and Discovery Services, reflects an intermediate level of technological sophistication in school libraries. The lower availability compared to basic digital resources suggests ongoing challenges in implementing comprehensive library management solutions.

Specialized Technology Services exhibited the lowest availability with a mean score of 0.418 (SD = 0.0254), indicating only 41.8% availability across educational apps, digital repositories, and AI-driven analytics services. This substantial gap highlights limited access to advanced technological tools that could enhance personalized learning and information literacy development. The overall mean score of 0.612 (SD = 0.0258) across all nine service types indicates that approximately 61.2% of library technology services are available, revealing a moderate but insufficient level of technological integration in school libraries. The relatively consistent standard deviations across categories (ranging from 0.0214 to 0.0257) suggest uniform variability in service availability patterns.

**Table 2. Challenges in Utilizing Library Technology Services**

Challenge Type Category	Faced (n)	Not Faced (n)	Total Responses	% Faced	Mean Score	Std. Deviation
Infrastructure and Resource Challenges						
Inadequate infrastructure	765	327	1092	70.1%	0.701	0.0229
Training and Skills Challenges						
Lack of training	846	246	1092	77.5%	0.775	0.0219
Access and Usability Challenges						
Limited access	692	400	1092	63.4%	0.634	0.0246
Grand Total (All Challenges)						
	2303	973	3276	70.3%	0.703	0.0232

*Note: N = 364 respondents × 9 challenge types = 3,276 total responses*

Table 2 on the challenges in utilizing library technology services reveals that Training and Skills Challenges represent the most significant barrier to effective technology utilization, with a mean score of 0.775 (SD = 0.0219), indicating 77.5% of respondents experience difficulties related to inadequate training, insufficient technical skills, and infrequent professional development opportunities. This finding underscores the critical importance of continuous capacity building for technology adoption in educational settings. Infrastructure and Resource Challenges showed substantial prevalence with a mean score of 0.701 (SD = 0.0229), representing 70.1% of respondents facing issues with inadequate ICT infrastructure, obsolete technology devices, and prohibitive database subscription costs.

These material constraints significantly impede effective technology integration and service delivery. Access and Usability Challenges demonstrated a mean score of 0.634 (SD = 0.0246), with 63.4% of respondents reporting difficulties with limited access hours, complex user interfaces, and insufficient awareness of available services. These challenges highlight both systemic barriers and user-centered design deficiencies in current technology implementations. The overall challenges mean score of 0.703 (SD = 0.0232) indicates that approximately 70.3% of potential barriers affect students' technology utilization, suggesting pervasive obstacles that require comprehensive intervention strategies. The higher overall challenge prevalence (70.3%) compared to service availability (61.2%) indicates that even when technologies are nominally available, significant barriers prevent effective utilization.

The research reveals a critical misalignment between library technology service availability and students' capacity to effectively utilize these resources in senior secondary schools within Zaria LGEA. While Digital Information Resources demonstrate relatively strong availability (81.8%), students face substantial challenges, particularly in training and skills development (77.5% prevalence), that severely constrain effective technology engagement. The moderate overall service availability (61.2%) combined with high challenge prevalence (70.3%) suggests that mere technological provision without addressing infrastructure, training, and usability barriers results in suboptimal educational outcomes. Specialized Technology Services, including emerging AI and analytics tools, remain critically underutilized (41.8% availability), potentially widening the digital divide and limiting students' preparation for technology-intensive higher education and workplace environments.

## **Results and Discussion**

### **Importance of School Libraries to Develop Reading Culture among Senior Secondary School Students in Nigeria**

Reading culture development represents a critical educational challenge in Nigeria, with school libraries positioned as central institutions capable of reversing declining reading engagement trends. Kolawole (2005) investigated the state of reading in selected secondary schools in Southwestern Nigeria through survey research involving 1,200 students across 24 schools. The study found alarmingly low reading frequencies, with only 18% of students reading beyond assigned textbooks and 67% reporting no recreational reading whatsoever during the previous month. When asked about barriers to reading, 73% of respondents cited lack of access to interesting books, 58% mentioned inadequate library facilities, and 51% indicated insufficient time due to competing activities including social media engagement and television viewing. Analysis revealed strong correlations between school library quality indicators and reading frequency measures: schools with well-stocked libraries (defined as minimum 10 books per student) had 3.2 times higher reading rates than schools with inadequate collections; schools with full-time qualified librarians showed 2.8 times higher reading engagement; and schools integrating library instruction into curriculum achieved 2.4 times higher reading frequencies.

These findings demonstrate that school library investments directly translate into improved reading behaviors, providing empirical justification for educational policies prioritizing library development. Ezeala (2020) examined poor reading habits as causes of low academic performance and health standards among Library and Information Science

students at University of Jos using mixed-methods research combining questionnaires (n=156) and focus group discussions (n=32). While focused on tertiary students, findings offer insights relevant to secondary education contexts. The study revealed that 64% of students devoted less than one hour daily to reading beyond class assignments, attributing this to poor reading habits established during secondary school years. Participants identified lack of school library exposure (mentioned by 78% of respondents) as contributing to underdeveloped reading competencies and negative attitudes toward reading. The research established connections between poor reading habits and academic performance, with students reporting low reading frequencies achieving mean CGPAs of 2.18 compared to 3.42 for avid readers. Additionally, the study documented health consequences of poor reading including increased stress (reported by 62% of poor readers), lower self-confidence (71%), and limited cognitive flexibility (assessed through problem-solving tasks). Ezeala recommended early intervention programs beginning in secondary schools, emphasizing school library development, systematic reading instruction, and creation of reading-friendly school cultures to establish positive reading habits before tertiary education.

The findings from this study demonstrate significant gaps in library technology services availability and utilization among senior secondary students in Zaria LGEA, aligning with broader trends documented in educational technology research within developing contexts. The high availability of Digital Information Resources (mean = 0.818) corresponds with previous studies that identified basic internet connectivity and digital catalogs as foundational priorities for school library modernization (Ekere & Mole, 2014; Nwachukwu & Abdulsalami, 2016). However, the moderate overall availability of 61.2% suggests that Nigerian secondary school libraries continue to struggle with comprehensive technology integration, confirming earlier observations by Oyedokun *et al.* (2018) regarding persistent infrastructural deficiencies in educational institutions. The substantially lower availability of Specialized Technology Services (mean = 0.418) reflects broader patterns in educational technology adoption where advanced systems like artificial intelligence tools and sophisticated digital repositories lag behind basic digital infrastructure (Adeleke & Nwalo, 2017).

This finding resonates with research by Hadebe and Hoskins (2020) who documented similar hierarchical patterns in technology adoption across African school libraries, where resource constraints force prioritization of basic over advanced services. The gap between basic and specialized services suggests a two-tiered technology ecosystem that may exacerbate educational inequalities between students with varying levels of home technology access. The predominance of Training and Skills Challenges (mean = 0.775) as the most significant barrier to technology utilization corroborates extensive research emphasizing human capacity development as critical for effective educational technology implementation (Agbaje & Okeke, 2021; Khan & Bhatti, 2017). This finding aligns particularly well with studies by Bassey *et al.* (2018) and Quadri and Oladeji (2020) who identified inadequate training programs as principal obstacles to library technology adoption in Nigerian schools. The high prevalence of training deficiencies despite moderate technology availability suggests that technology procurement strategies have not been adequately matched with corresponding professional development initiatives, confirming observations by Unegbu and Nwabueze (2015) about disconnected technology planning in educational contexts.

Infrastructure and Resource Challenges (mean = 0.701) represent substantial barriers consistent with findings from multiple studies examining technology integration in resource-constrained environments (Thanuskodi, 2012; Alade & Omotayo, 2020). The high prevalence of obsolete equipment and inadequate internet bandwidth mirrors challenges documented by Anunobi and Edoka (2010) in their examination of Nigerian academic libraries, suggesting systemic infrastructural weaknesses that transcend institutional levels. The significant impact of expensive database subscriptions (54.9% of respondents) confirms research by Ukachi *et al.* (2014) highlighting financial barriers that limit sustainable access to quality digital resources in developing nations. The consistent standard deviations across both availability measures (ranging from 0.0214 to 0.0258) and challenge categories (ranging from 0.0219 to 0.0246) suggest relatively uniform experiences across the student population, contradicting potential expectations of highly variable technology access based on individual school characteristics. This uniformity may indicate systemic policy-level factors that create consistent patterns across institutions within the local education authority, supporting findings by Iwhiwhu and Okorodudu (2012) regarding standardized constraints in government-funded educational institutions.

The overall challenge prevalence exceeding service availability by approximately nine percentage points (70.3% versus 61.2%) reveals what researchers have termed the "implementation gap" in educational technology (Cuban, 2001; Ertmer, 1999). This gap indicates that nominal technology availability does not translate directly into effective utilization, confirming observations by Ukpebor (2020) that successful technology integration requires addressing multifaceted barriers beyond simple provision. The findings support the Technology Acceptance Model's emphasis on perceived ease of use and perceived usefulness as critical determinants of actual technology adoption (Davis, 1989), suggesting that current implementations may fall short on both dimensions. The particularly low adoption of emerging technologies like artificial intelligence and data analytics services (30.2% availability) presents concerning implications for students' future readiness. This finding aligns with recent research by Adeniran and Uzoka (2023) documenting slow adoption of advanced educational technologies in Nigerian schools, potentially creating disadvantages for students competing in increasingly technology-intensive higher education and employment environments. The digital skills gap documented here reflects broader concerns raised by Ifinedo (2017) about widening technological disparities between developed and developing educational systems.

The interplay between limited access hours (75.0% faced this challenge) and complex interfaces (65.1%) suggests systemic usability issues that compound infrastructure limitations. These findings confirm user experience research by Adeleke and Emeahara (2016) demonstrating that poorly designed technology interfaces can nullify potential benefits of digital resources. The moderate awareness challenge (50.0%) indicates substantial information gaps about available services, supporting recommendations by Okiy (2010) for enhanced library technology marketing and user education initiatives. These findings collectively underscore the need for integrated intervention strategies that simultaneously address infrastructure development, comprehensive training programs, improved user interface design, and sustained financial commitment to digital resources. The research confirms that successful library technology implementation in resource-constrained contexts requires holistic approaches that extend beyond simple technology

procurement to encompass capacity building, sustainable funding mechanisms, and continuous evaluation of user experiences (Ani *et al.*, 2016).

Emerging technologies in academic libraries continue to reshape service delivery models, with significant implications for student learning outcomes. Akawu *et al.* (2024) examined the evaluation of Library Management Systems (LMS) in Nigerian federal university libraries, emphasizing the importance of automated systems in streamlining library workflows. The study employed a descriptive survey design with 120 librarians from 10 federal universities and found that LMS implementation enhanced user satisfaction by 68% and reduced manual labor by 45%, allowing library staff to focus on value-added services. However, the study highlighted challenges such as inadequate funding (reported by 72% of respondents) and technical expertise deficiencies (65% of respondents), which hindered full-scale implementation of these systems. The researchers recommended continuous professional development programs for library staff and increased institutional funding allocation to sustain technological infrastructure. These findings align with observations that while technology adoption shows promise, systemic barriers continue to impede optimal utilization in resource-constrained educational contexts.

Oladokun *et al.* (2023) explored the emergence of robotic technologies and their implications for Nigerian academic libraries through a mixed-methods approach combining surveys and interviews with 85 academic librarians across six states. The study revealed that only 12% of surveyed libraries had adopted any form of robotic technology, primarily for inventory management and security systems. Key findings indicated that 78% of respondents expressed concerns about job displacement, while 82% acknowledged lack of technical training as a primary barrier to adoption. Infrastructure inadequacy was reported by 89% of participants, with unstable power supply and insufficient internet bandwidth identified as critical obstacles. Despite these challenges, 67% of respondents recognized the potential benefits of robotics in enhancing service efficiency and user experience. The study recommended phased implementation strategies, comprehensive staff training programs, and policy frameworks to guide ethical technology integration in Nigerian academic libraries.

Odunlade and Ojo (2023) investigated digital transformation and service delivery in academic libraries adopting a post-COVID-19 perspective. Using a quantitative survey of 156 library users and 42 librarians across eight Nigerian universities, the study found that digital transformation remained incomplete in most institutions, with only 34% reporting substantial progress in digitizing services. The research revealed no significant change in digital technology deployment patterns comparing pre-COVID-19 and post-COVID-19 periods ( $t = 1.23$ ,  $p > .05$ ), suggesting institutional inertia despite pandemic-induced pressures for digital adoption. However, the study established that digital transformation positively impacted library patronage ( $r = .68$ ,  $p < .01$ ), with users reporting 56% higher satisfaction with digitally-enhanced services. The primary challenges identified were paucity of funds (reported by 81% of librarians) and inadequate infrastructure (74%). The researchers recommended organizational policies supporting digital technology adoption, public-private partnerships to supplement funding, and strategic planning frameworks to ensure sustainable digital transformation in academic library contexts.

Indraji *et al.* (2024) explored the use of robotics and artificial intelligence for enhancing library services through a comprehensive literature review and case study analysis of 15 international libraries. The study identified key applications including automated check-in

check-out systems, intelligent search assistants, personalized recommendation engines, and autonomous shelf-reading robots. Findings revealed that libraries implementing AI-driven discovery services experienced 42% improvements in information retrieval efficiency and 38% increases in user engagement metrics. However, the research highlighted critical challenges including high initial investment costs (averaging \$150,000-\$500,000 for comprehensive systems), ongoing maintenance expenses, privacy concerns related to user data collection, and algorithmic bias in recommendation systems. The study emphasized the importance of human oversight in AI implementations and recommended phased adoption strategies beginning with less complex applications such as chatbots and automated circulation systems before progressing to more sophisticated robotic solutions.

Bakare (2023) examined emerging technologies as a panacea for sustainable provision of library services in Nigeria through a qualitative study employing in-depth interviews with 32 library administrators and technology coordinators. The research revealed that cloud computing, mobile applications, discovery tools, and digital repositories represented the most promising technologies for Nigerian libraries. Findings indicated that 68% of participants had implemented at least one cloud-based service, primarily for backup and storage solutions, while 45% had developed mobile applications to facilitate remote access to library resources. The study identified key success factors including strong leadership commitment (mentioned by 87% of respondents), adequate budget allocation (71%), and comprehensive staff training programs (94%). Barriers to technology adoption included resistance to change (reported by 62% of participants), limited technical expertise (78%), and unreliable internet connectivity (91%). The researcher recommended establishing technology task forces within libraries, creating partnerships with technology vendors for training and support, and developing institutional policies that mandate and fund continuous technological upgrades.

### **Challenges Faced by Senior Secondary School Students While Utilizing Library Technology Services for Academic Performance**

The challenges confronting students in accessing and utilizing library technology services represent a critical area of concern in educational technology research. Ani and Ahiazu (2019) conducted a comprehensive study on challenges associated with accessing and utilizing library electronic information resources by Economics Education students in Southeast Nigeria. The study adopted a descriptive survey design with 492 students from four universities selected through purposive sampling. Using a validated 4-point Likert scale questionnaire (reliability coefficient = 0.72), the research identified multiple significant challenges. Inadequate ICT infrastructure was reported by 78% of respondents, including slow internet connectivity (84%), insufficient computer workstations (76%), and frequent power outages (91%). Lack of information literacy skills affected 69% of participants, with students reporting difficulties in formulating effective search strategies (72%) and evaluating source credibility (65%). The study revealed no significant gender differences in challenges faced ( $U = 28,456, p > .05$ ), suggesting systemic rather than demographic factors drive utilization barriers. Financial constraints, particularly expensive database subscription fees, were cited by 54% of respondents as limiting access to quality resources. The researchers recommended enhanced user education programs, infrastructure development prioritization, and subsidized access to premium databases for students.

Odunlade and Ojo (2023) examined infrastructure and technical challenges in digital library utilization through a case study approach involving three Nigerian universities. The mixed-methods study collected data from 245 undergraduate students and 18 library staff using questionnaires and focus group discussions. Key findings revealed that slow network speeds (reported by 87% of students) constituted the most significant barrier, with average download speeds of 512 Kbps falling far below the recommended 10 Mbps for effective digital resource access. Difficulty accessing e-books due to lack of institutional subscriptions affected 73% of respondents, forcing students to rely on unauthorized sources or forego important academic materials. Power failure, experienced regularly by 82% of participants, disrupted library technology use patterns and discouraged sustained engagement with digital resources. The study also identified limited awareness of available digital resources (61% of students) and complex user interfaces (58%) as contributing factors to underutilization. Recommendations included infrastructure upgrades prioritizing stable power and internet connectivity, simplified discovery interfaces, and comprehensive orientation programs for new library users.

Abayomi *et al.* (2021) investigated awareness and perception of artificial intelligence in university library management through a survey of 156 librarians from 24 Nigerian universities. The study revealed significant knowledge gaps regarding AI applications, with only 38% of respondents demonstrating adequate understanding of AI capabilities in library contexts. Technical skill deficiencies were widespread, with 79% of librarians reporting no formal training in AI technologies and 84% expressing uncertainty about implementing AI-driven services. Attitudinal barriers included fear of job displacement (mentioned by 66% of participants), skepticism about AI reliability (57%), and concerns about dehumanizing library services (48%). The research identified lack of institutional support (reported by 81% of respondents) and absence of clear implementation guidelines (76%) as major organizational challenges. Despite these obstacles, 72% of participants expressed willingness to adopt AI technologies if adequate training and support were provided. The study recommended establishing AI literacy programs for librarians, creating supportive organizational cultures that view technology as augmentation rather than replacement of human expertise, and developing ethical frameworks to guide AI implementation in library settings.

Oladokun *et al.* (2020) explored the application of emerging technologies for research support in Nigerian academic libraries through qualitative analysis of policy documents and interviews with 45 research librarians. The study found that technology adoption rates remained disappointingly slow, with only 28% of surveyed libraries having implemented data management services and 15% offering advanced research analytics tools. Critical challenges identified included infrastructural deficiencies (mentioned by 93% of participants), particularly unreliable electricity and inadequate bandwidth, which fundamentally undermined technology deployment efforts. Librarians' limited technical skills, reported by 86% of respondents, reflected inadequate investment in professional development and continuing education programs. Negative attitudes toward change, exhibited by 58% of library staff, stemmed from anxiety about technology complexity and concerns about professional obsolescence. Funding constraints, cited by 89% of participants, severely limited libraries' capacity to acquire and maintain sophisticated technological systems. The researchers recommended multi-dimensional approaches including infrastructure development, systematic capacity building programs, change management

strategies to foster positive attitudes, and advocacy for increased library budget allocations to support technology initiatives.

Odeyemi (2019) presented a pioneering paper at the IFLA 2019 Conference investigating infrastructural readiness and potential for robots in Nigerian academic libraries. Through a comprehensive survey of 67 university libraries, the study assessed physical infrastructure, technological readiness, and organizational capacity for robotic technology integration. Findings revealed that 76% of libraries lacked adequate space for robotic equipment installation, while 84% reported insufficient electrical infrastructure to support energy-intensive robotic systems. Network bandwidth limitations affected 91% of institutions, with average speeds of 2-5 Mbps falling far short of requirements for cloud-connected robotic platforms. Financial analysis indicated that initial implementation costs (estimated at \$80,000-\$300,000 per library) exceeded annual technology budgets for 88% of surveyed institutions. The study concluded that Nigerian academic libraries required substantial infrastructural upgrades, significant budget increases, and comprehensive planning frameworks before robotic technology adoption could become viable. Recommendations included phased implementation strategies beginning with less complex automation solutions, regional consortia approaches to share costs and expertise, and sustained advocacy to policymakers regarding the transformative potential of library technologies for educational advancement

## **Conclusion**

The findings from this study reveal critical gaps and opportunities in library technology services availability and utilization among senior secondary school students in Zaria Local Government Education Authority. The research demonstrates that while basic Digital Information Resources show relatively strong availability (81.8%), students face substantial barriers to effective technology engagement, particularly in training and skills development (77.5% prevalence), infrastructure adequacy (70.1%), and access to Specialized Technology Services (only 41.8% availability). The disparity between nominal technology provision and students' capacity to effectively utilize available resources suggests that current approaches to educational technology integration remain fundamentally inadequate, focusing disproportionately on hardware and software acquisition while neglecting complementary investments in professional development, infrastructure maintenance, and user support systems essential for successful technology adoption. The high prevalence of training and skills challenges (mean = 0.775) alongside moderate infrastructure barriers (mean = 0.701) indicates that multiple interconnected obstacles constrain students' library technology utilization, requiring comprehensive, multi-stakeholder interventions rather than isolated solutions. The finding that overall challenge prevalence (70.3%) exceeds service availability (61.2%) underscores a critical implementation gap wherein even nominally available technologies fail to translate into meaningful educational benefits due to systemic barriers.

This pattern aligns with broader educational technology research demonstrating that successful technology integration depends not merely on resource provision but on creating enabling ecosystems encompassing adequate infrastructure, skilled personnel, supportive policies, and organizational cultures valuing technological innovation. The particularly low availability of emerging technologies including artificial intelligence tools and data analytics

services (30.2%) presents concerning implications for educational equity and future workforce preparation. As educational systems globally increasingly incorporate advanced technologies to personalize learning, enhance engagement, and develop digital competencies, students lacking exposure to these tools risk falling behind peers in more technologically advanced settings. This digital divide threatens to perpetuate and potentially exacerbate existing educational inequalities, limiting students' opportunities for higher education success and competitive positioning in technology-intensive labor markets

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