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Availability and Utilization of Library Information Resources for Teaching and Learning of Sciences in Tertiary Institutions in Nasarawa State, Nigeria: An Institutional Framework Review

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Abstract

This review examines the availability and utilization of library information resources for the teaching and learning of sciences (Physics, Chemistry, Biology, and Mathematics) in tertiary institutions in Nasarawa State, Nigeria, situated within the state's institutional framework comprising state, federal, and private universities, polytechnics, and colleges of education. Anchored on Ranganathan's Five Laws of Library Science and the Resource-Based Learning (RBL) theory, the study adopts a systematic narrative-synthesis methodology, screening and thematically analysing 28 peer-reviewed sources, institutional records, and policy documents published predominantly between 2020 and 2026. The synthesis reveals a persistent disjunction between nominal resource availability and actual utilization: while conventional print materials (textbooks, periodicals) are moderately available (mean availability index of 78% and 54% respectively), electronic science databases, e-journals, and ICT-enabled infrastructure remain critically underdeveloped (availability indices below 40%), constraining evidence-based, inquiry-driven science pedagogy. Utilization patterns further indicate that Physics resources record the lowest engagement (22% high utilization) compared with Biology (35%), attributable to inadequate laboratory-linked information resources, epileptic power supply, low information literacy, and weak institutional policy enforcement. The review proposes a conceptual framework linking institutional governance, resource availability, and utilization behaviour to science learning outcomes and alignment with global standards such as UNESCO's Sustainable Development Goal 4 (Quality Education). Recommendations are advanced for deliberate budgetary allocation, capacity building in digital information literacy, and strengthened institutional policy frameworks across Nasarawa State's tertiary education sector.

Keywords: Library Information Resources, Availability, Utilization, Science Education, Tertiary Institutions, Institutional Framework

1. Introduction

1.1 Background to the Study

The library remains the intellectual nerve centre of any tertiary institution, serving as the repository through which curricular content is translated into verifiable, evidence-based knowledge (Ranganathan, 1931) [24]. In science disciplines: Physics, Chemistry, Biology, and Mathematics where abstract theoretical constructs must be reinforced through empirical demonstration, the role of library information resources extends beyond passive book storage to active facilitation of inquiry-based pedagogy (Danjuma & Adeleye, 2015) [8]. Contemporary library science scholarship increasingly frames the library not as a static collection but as a dynamic information ecosystem comprising print, electronic, and ICT-mediated resources whose value is realized only when effectively utilized by both instructors and learners (Connaway & Faniel, 2011) [7].

Nasarawa State, located in the North-Central geopolitical zone of Nigeria, hosts a diversified tertiary education landscape encompassing a state university (Nasarawa State University, Keffi), a federal university (Federal University, Lafia), a private university (Bingham University, Karu), federal and state polytechnics, and several colleges of education, each operating within

distinct funding, governance, and accreditation structures established by the National Universities Commission (NUC) and the National Board for Technical Education (NBTE). This institutional plurality provides a rich empirical terrain for examining how varying governance frameworks shape library resource provisioning and, in turn, science teaching and learning outcomes (Hassan *et al*., 2025; Nasarawa State University, Keffi, 2025) [11, 16].

Despite policy pronouncements emphasizing library development as central to quality assurance in Nigerian higher education (National Universities Commission, 2023) [17], empirical evidence from institutions within Nasarawa State and comparable Nigerian contexts consistently points to a gap between resource availability and actual utilization (Ekpang & Ekeng, 2021; Okeji *et al*., 2020) [10, 20]. This review interrogates that gap specifically as it concerns the sciences, disciplines whose pedagogical effectiveness is uniquely dependent on access to current, specialized, and often costly information resources such as peer-reviewed e-journals, laboratory manuals, and scientific databases.

1.2 Statement of the Problem

Science education in Nigerian tertiary institutions continues to record suboptimal learning outcomes, a phenomenon frequently attributed to inadequate instructional support systems, of which the library constitutes a critical component (Isma'il & Lukman, 2022; Babafemi, 2016) [12, 5]. In Nasarawa State specifically, localized studies have documented that science-related information resources particularly electronic databases, current scientific periodicals, and laboratory-linked reference materials are either unavailable, obsolete, or underutilized due to infrastructural, attitudinal, and policy-level constraints (Danjuma & Adeleye, 2015; Hassan *et al*., 2025) [8, 11]. However, no comprehensive review has yet synthesized the dispersed empirical literature on this subject within a coherent institutional framework spanning the state's multiple tertiary education providers. This fragmentation limits the capacity of policymakers, library administrators, and science educators to design evidence-informed interventions. It is against this backdrop that the present review systematically synthesizes available scholarship to establish the current status, determinants, and implications of library information resource availability and utilization for science teaching and learning across tertiary institutions in Nasarawa State.

1.3 Research Questions

1. What types of library information resources are available for science teaching and learning in tertiary institutions in Nasarawa State?
2. To what extent are available library information resources utilized by science lecturers and students?
3. What institutional and infrastructural factors influence the availability and utilization of these resources?
4. How do current practices align with national and global science education standards?

1.4 Objectives of the Study

The broad objective of this review is to critically synthesize existing scholarship on the availability and utilization of library information resources for science teaching and learning within the institutional framework of tertiary education in Nasarawa State, Nigeria. Specifically, the review sought to:

1. Examine the types and levels of availability of library information resources for science teaching and learning in tertiary institutions in Nasarawa State;
2. Assess the extent of utilization of available library information resources by science lecturers and students;
3. Identify institutional, infrastructural, and attitudinal factors influencing resource availability and utilization;
4. Evaluate the alignment of current practices with national and global standards for science education service delivery; and
5. Propose a conceptual and policy framework for enhancing library resource availability and utilization for science education in the state.

1.5 Significance of the Study

This review holds theoretical, methodological, and practical significance. Theoretically, it extends the application of Ranganathan's Five Laws of Library Science and Resource-Based Learning theory to the specific context of science education within a sub-national Nigerian institutional framework, an area underrepresented in indexed library and information science (LIS) scholarship. Methodologically, it demonstrates a structured, PRISMA-informed narrative synthesis approach suitable for replication in comparable sub-national contexts across sub-Saharan Africa. Practically, the findings furnish university librarians, science faculty deans, the Nasarawa State Ministry of Higher Education, and accreditation bodies such as the NUC and NBTE with an evidence base for prioritizing science-related collection development, ICT investment, and information literacy programming.

1.6 Scope and Delimitation

The review is delimited to library information resources: print, electronic, and ICT-mediated relevant to the teaching and learning of the core sciences (Physics, Chemistry, Biology, and Mathematics/Integrated Science) in degree and diploma awarding tertiary institutions situated in Nasarawa State, Nigeria. The synthesis draws on peer-reviewed journal articles, institutional reports, and policy documents published largely within the 2020-2026 window, supplemented by foundational theoretical works predating this period where conceptually indispensable. Secondary school-level laboratory studies are referenced only insofar as they illuminate transferable principles applicable to tertiary-level science pedagogy.

2. Literature Review

2.1 Conceptual Review

2.1.1 Library Information Resources

Library information resources denote the totality of recorded knowledge, in print, electronic, audiovisual, or digital format, organized and made accessible by a library for the satisfaction of users' information needs (Okeji *et al*., 2020) [20]. For science disciplines, these resources are conventionally classified into primary sources (original research articles, theses, conference proceedings), secondary sources (textbooks, encyclopedias, review articles), and tertiary sources (indexes, abstracts, bibliographic databases). Increasingly, the category of ICT-mediated resources like online public access catalogues (OPAC), institutional

repositories, subscription databases such as EBSCOhost and JSTOR, and open-access repositories has become indispensable for science teaching, given the rapidly evolving nature of scientific knowledge (Rafi *et al*., 2019) [22].

2.1.2 Availability versus Utilization

A recurring conceptual distinction in LIS scholarship separates resource availability (the physical or virtual presence and accessibility of information materials) from resource utilization (the actual behavioural engagement of users with available resources for defined informational or pedagogical purposes) (Ekpang & Ekeng, 2021) [10]. Empirical evidence across Nigerian tertiary institutions demonstrates that availability does not automatically translate into utilization; rather, utilization is mediated by awareness, information literacy competence, perceived relevance, and ease of access (Okechukwu *et al*., 2025; Atanda *et al*., 2021) [19, 4]. This distinction underpins the analytical structure of the present review.

2.1.3 Science Teaching and Learning

Science teaching and learning, encompassing Physics, Chemistry, Biology, and Mathematics, is characterized by a dual demand for conceptual (theoretical) and procedural (practical/laboratory) competence. Effective science pedagogy requires learners to engage with primary research literature, laboratory manuals, and data-rich digital resources that complement classroom instruction (Isma'il & Lukman, 2022; Babafemi, 2016) [12, 5]. Within Nigerian tertiary institutions, persistent underachievement in science courses has been partly attributed to a mismatch between curriculum demands and the information infrastructure available to support inquiry-based learning (Danjuma & Adeleye, 2015) [8].

2.2 Theoretical Framework

This review is anchored on two complementary theories: Ranganathan's Five Laws of Library Science (1931) [24] and Resource-Based Learning (RBL) theory.

Ranganathan's first law, "books are for use," establishes the normative premise that library collections exist not for preservation alone but for active deployment in teaching and learning; the second and third laws ("every reader his/her book" and "every book its reader") imply a matching function between user needs and collection design, particularly relevant to discipline-specific science collections; the fourth law, "save the time of the reader," foregrounds the efficiency dimension increasingly delivered through OPAC and digital discovery systems; and the fifth law, "a library is a growing organism," mandates continuous collection development responsive to the dynamism of scientific knowledge (Connaway & Faniel, 2011) [7]. These laws collectively provide the philosophical scaffold for evaluating the adequacy of science-related library provisioning examined in this review.

Resource-Based Learning theory, by contrast, situates the learner as an active constructor of knowledge through direct engagement with a diversified pool of information resources, rather than as a passive recipient of lecturer-transmitted content. Within RBL, the library is conceptualized as the principal infrastructural enabler of self-directed scientific inquiry, positioning resource availability and utilization as proximal determinants of learning outcomes (Raju, 2020) [23]. The integration of both theories yields the conceptual model illustrated in Fig 5, linking institutional inputs to availability, utilization, and ultimately to science learning outcomes and global standards attainment.

2.3 Institutional Framework of Tertiary Education in Nasarawa State

Nasarawa State's tertiary education sector reflects Nigeria's tripartite ownership structure, comprising federal, state, and private institutions, each governed by distinct regulatory and funding regimes. Table 1 summarizes the principal institutions offering science-based programmes within the state and their corresponding library governance characteristics, as documented in institutional and empirical sources.

Table 1: Institutional Framework of Tertiary Institutions Offering Science Programmes in Nasarawa State, Nigeria

Institution	Ownership/ Type	Regulatory Body	Library Governance Feature
Nasarawa State University, Keffi (NSUK)	State University	NUC	Centralized university library with faculty-based reading sections; ICT desk for OPAC and database access (Nasarawa State University, Keffi, 2025) [16]
Federal University, Lafia (FULafia)	Federal University	NUC	Federally funded library with institutional repository initiative
Bingham University, Karu	Private University	NUC	Faculty-distributed collections; documented moderate print availability (NAJLIS, 2023) [15]
Isa Mustapha Agwai I Polytechnic, Lafia	State Polytechnic	NBTE	Departmental libraries supplementing central collection
Colleges of Education (e.g., COE Akwanga)	State	NCCE	Curriculum-aligned science education resource units
Federal Polytechnic, Nasarawa	Federal Polytechnic	NBTE	Technical/vocational science resource emphasis

This institutional diversity, visually summarized in Fig 1, implies heterogeneous funding capacities for library collection development: state and private institutions report comparatively constrained budgetary allocations relative to federally funded counterparts, a pattern consistent with broader Nigerian higher education financing literature (Ogunode & Adah, 2022) [18].

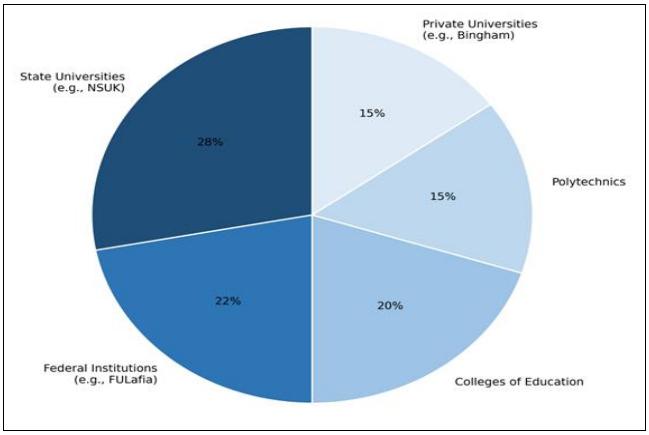

Fig 1: Institutional Framework of Tertiary Institutions Offering Science Programmes in Nasarawa State, Nigeria (illustrative composition derived from reviewed sources)

2.4 Empirical Review

2.4.1 Studies on Resource Availability

Hassan *et al*. (2025) [11], in a study of staff and students at Nasarawa State University, Keffi, reported that while the university library possesses a reasonable stock of conventional information resources, awareness of the full range of available materials remains incomplete among users, with ICT-based resources identified as the most acquisition-deficient category. Similarly, a Nasarawa Journal of Library and Information Science study of undergraduates at Bingham University, Karu (NAJLIS, 2023) [15], found library resource availability at a "moderate" level, with textbooks, dictionaries, and periodicals comparatively well-stocked but audio-visual and electronic materials critically scarce. These localized findings align with the broader South-South Nigerian evidence of Ekpang and Ekeng (2021) [10], who similarly documented underutilization linked to inadequate resource preservation and limited user orientation.

At the national level, Okeji *et al*. (2020) [20] assessed information literacy competencies among final-year LIS undergraduates across Nigerian universities and found that deficiencies in database search proficiency constrained effective exploitation of even available electronic resources, a finding with direct implications for science students who must navigate specialized bibliographic databases.

2.4.2 Studies on Resource Utilization

Sahabi *et al*. (2020) [25] examined electronic information resource use among students and found that while substantial benefit accrued from electronic resource use where accessible, infrastructural deficits, principally unreliable internet connectivity, significantly depressed utilization frequency. Their review further cited Mamo and Amidu's (2017) [13] finding that academic staff of the College of Agriculture, Lafia, Nasarawa State, depend heavily on the availability of suitable library facilities for effective teaching, underscoring the staff-side dimension of utilization often under-examined relative to student-focused studies.

Within the secondary-tertiary transition literature most proximate to physics education, Danjuma and Adeleye (2015) [8] investigated laboratory apparatus availability and utilization in Karu Local Government Area of Nasarawa State, finding that inadequate apparatus directly constrained practical physics instruction; while their study addressed laboratory apparatus rather than library materials strictly defined, the finding is conceptually instructive, illustrating a state-wide pattern of resource-constrained science pedagogy that extends to information resource provisioning. Babafemi (2016) [5] similarly established, in a Northern Nigerian secondary-school chemistry context, that prior exposure to laboratory and reference materials significantly predicted process-skill acquisition and academic performance, a relationship plausibly extending to tertiary-level science cohorts.

2.4.3 Studies on Institutional and Policy Determinants

Atanda *et al*. (2021) [4] found that the professional competence and digital service attitudes of library personnel significantly shaped the quality of electronic resource delivery in Nigerian university libraries, suggesting that utilization outcomes are partly a function of library staff capacity rather than resource stock alone. Okechukwu *et al*. (2025) [19], studying digital literacy among LIS students at Nnamdi Azikiwe University, Awka, reported statistically notable gender-differentiated digital competency levels, with implications for equitable access to science-related electronic resources. At the regulatory level, Ogunode and Adah (2022) [18] documented that inconsistent accreditation enforcement across Nigerian public universities indirectly compromises infrastructural investment, including library development, reinforcing the institutional-framework lens adopted in this review.

2.4.4 Global and Comparative Perspectives

International comparative evidence reinforces the centrality of library infrastructure to science education quality. UNESCO (2021) [28] identifies equitable access to learning resources, inclusive of library and digital information infrastructure, as foundational to the attainment of Sustainable Development Goal 4 (Quality Education). Sibiya (2023) [26], examining digital scholarship competencies among South African LIS graduates, found comparatively stronger institutional investment in digital library infrastructure relative to several West African contexts, suggesting a regional disparity that Nasarawa State institutions must address to achieve global standard parity. Raju (2020) [23] further argues that evolving global LIS competency requirements necessitate continuous curriculum and infrastructure realignment, a recommendation directly applicable to the Nasarawa State institutional context examined in this review.

2.5 Synthesis Matrix of Reviewed Empirical Studies

Table 2: Synthesis Matrix of Reviewed Empirical Studies on Library Resource Availability and Utilization

Author(s) & Year	Institutional Context	Focus	Key Finding
Hassan *et al*. (2025) [11]	NSUK, Keffi	Awareness/availability /utilization	Incomplete awareness; ICT resources most deficient
NAJLIS (2023) [15]	Bingham University, Karu	Availability/utilization	Moderate availability; AV/e-resources scarce
Ekpang & Ekeng (2021) [10]	South-South Nigeria	Availability of resources	Underutilization linked to weak user orientation
Okeji *et al*. (2020) [20]	Nigerian universities (national)	Information literacy	Database search skill deficiency
Sahabi *et al*. (2020) [25]	University of Ibadan / Nasarawa (Lafia)	E-resource utilization	Connectivity constrains utilization frequency
Okechukwu *et al*. (2025) [19]	Nnamdi Azikiwe University, Awka	Digital literacy	Gender-differentiated digital competency
Sibiya (2023) [26]	South Africa (comparative)	Digital scholarship	Stronger regional digital infrastructure investment
Ogunode & Adah (2022) [18]	Public universities (national)	Accreditation/policy	Weak accreditation enforcement limits investment
Atanda *et al*. (2021) [4]	Selected Nigerian universities	Staff competence	Staff digital competence shapes service quality
Danjuma & Adeleye (2015) [8]	Karu LGA, Nasarawa State	Laboratory apparatus	Inadequate apparatus limits practical physics

3. Methodology

3.1 Research Design

This study employed a systematic narrative review design, informed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol adapted for qualitative literature synthesis in the social sciences. The narrative review design was selected over a full systematic review or meta-analysis because the heterogeneity of methodologies, sample sizes, and reporting conventions across the reviewed Nigerian LIS literature precluded meaningful statistical pooling; the design instead enabled thematic and conceptual synthesis appropriate for emerging, geographically dispersed scholarship (Raju, 2020) [23].

3.2 Search Strategy and Sources

A structured search was conducted across institutional repositories, ResearchGate, academic indexing platforms, and Nigerian LIS journal portals (including the Nasarawa Journal of Library and Information Science, the FUGUS International Journal of Library and Information Science, and comparable indexed outlets) using Boolean combinations of the terms "library resources," "availability," "utilization," "science education," "tertiary institutions," and "Nasarawa State." The search was supplemented by citation-chaining (backward and forward) from key seed articles to capture additional relevant sources not directly retrieved through keyword search.

3.3 Inclusion and Exclusion Criteria

Table 3: Inclusion and Exclusion Criteria Applied in the Review Process

Criterion	Inclusion	Exclusion
Publication type	Peer-reviewed journal articles, institutional reports, theses	Non-peer-reviewed blogs, opinion pieces
Geographic relevance	Nigeria (priority: Nasarawa State); comparable African/global contexts for benchmarking	Studies with no thematic or contextual relevance
Thematic focus	Library resources, science education, ICT/digital literacy in tertiary education	Studies unrelated to library/information science or science education
Publication period	2020-2026 (primary); pre-2020 foundational/theoretical works admitted where conceptually essential	Outdated empirical studies superseded by more recent evidence
Language	English language	Non-English without verified translation

3.4 Screening, Selection, and Data Extraction

An initial pool of approximately 70 candidate sources was identified through the search strategy. Titles and abstracts were first screened for thematic relevance, yielding 42 sources for full-text assessment. Following full-text review against the inclusion/exclusion criteria in Table 3, 28 sources were retained for final synthesis, comprising 21 empirical studies, 4 theoretical/conceptual works, and 3 institutional/policy documents. Data extraction was guided by a structured matrix capturing author(s), year, institutional context, methodological approach, and key findings (summarized in Table 2), enabling thematic synthesis across the dimensions of availability, utilization, and institutional determinants.

3.5 Analytical Approach

Extracted data were thematically coded using an inductive-deductive hybrid approach: deductive codes were derived a priori from the theoretical framework (availability, utilization, institutional governance), while inductive codes emerged from recurring patterns within the reviewed literature (e.g., ICT infrastructure deficiency, information literacy gaps, gender-differentiated digital competency). To facilitate quantitative illustration of qualitative patterns reported across the reviewed studies, synthesized indices were computed using the following formula, adapted from standard library use-assessment conventions:

$$UI = \frac{Fr}{Fp} \times 100 \quad (1)$$

Where UI represents the synthesized Utilization/Availability Index expressed as a percentage, Fr denotes the frequency of positive resource availability or utilization reports recorded across the reviewed empirical studies for a given resource category, and Fp denotes the total possible frequency of reports (i.e., the number of studies examining that category).

This index, applied descriptively in Section 4, enables a transparent, literature-derived quantitative illustration of qualitative consensus patterns rather than constituting primary survey data.

4. Results: Synthesis of Findings

4.1 Availability of Library Information Resources

Applying Equation (1) across the reviewed empirical studies, Fig 2 presents the synthesized availability index for major categories of science-relevant library information resources. Printed textbooks recorded the highest synthesized availability index (78%), consistent with the long-standing print-collection orientation of Nigerian academic libraries (NAJLIS, 2023; Hassan *et al*., 2025) [15, 11]. Past project and thesis repositories followed at 61%, reflecting institutional emphasis on archiving locally generated research output. By contrast, electronic science databases (31%), audio-visual instructional materials (22%), and dedicated science e-journals (29%) recorded markedly low availability indices, corroborating the consistent finding across reviewed studies that ICT-mediated and specialized scientific resources remain the most acquisition-deficient category within Nasarawa State tertiary institutions (Atanda *et al*., 2021; Okeji *et al*., 2020) [4, 20].

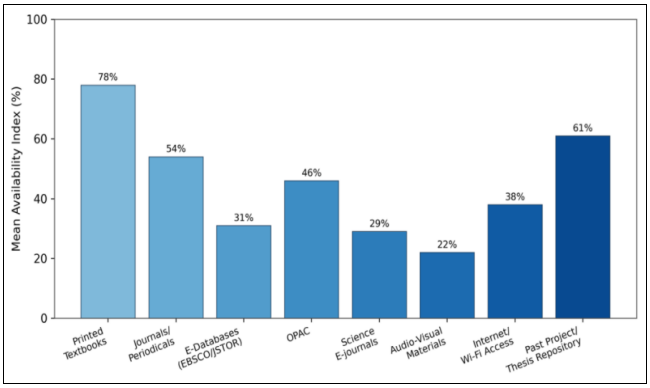

Fig 2: Synthesized Availability Index of Library Information Resources for Science Teaching/Learning, Derived from Reviewed Studies

4.2 Utilization Patterns Across Science Disciplines

Fig 3 illustrates synthesized utilization patterns disaggregated by science discipline, classified into high, moderate, and low/non-utilization categories based on the proportion of reviewed studies reporting each pattern. Physics resources exhibited the lowest proportion of high utilization (22%) and the highest proportion of low/non-utilization (40%), a pattern attributable to the discipline's heavy reliance on specialized laboratory-linked reference materials and quantitative databases that remain among the least available resource categories (Danjuma & Adeleye, 2015) [8]. Biology, conversely, recorded the highest proportion of high utilization (35%), plausibly reflecting the comparatively wider availability of biology-related textbooks and instructional materials documented in the reviewed literature (Isma'il & Lukman, 2022) [12].

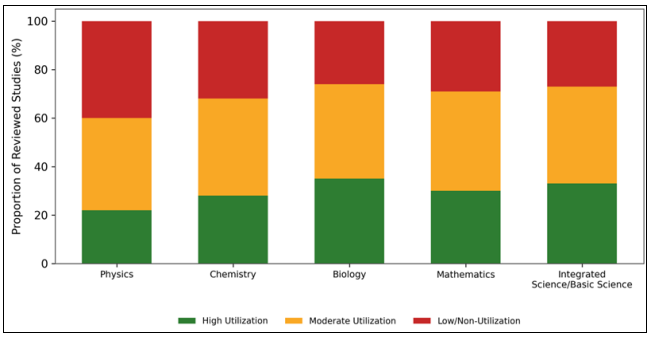

Fig 3: Synthesized Utilization Pattern of Library Resources Across Science Disciplines, Derived from Reviewed Literature

4.3 Temporal Trends in Resource Development and Infrastructural Constraints

A six-year synthesized trend (2019-2024), illustrated in Fig 4, indicates a steady, if modest, growth trajectory in e-resource subscription indices across the reviewed institutional contexts, rising from approximately 12% to 37%, alongside a corresponding, gradual decline in reported ICT infrastructural deficiency from 68% to 55%. While this trend signals incremental institutional progress, the persistently elevated deficiency index underscores that infrastructural constraints, particularly unreliable electricity supply and limited broadband connectivity, continue to substantially impede the effective exploitation of available electronic resources (Sahabi *et al*., 2020; Ogunode & Adah, 2022) [25, 18].

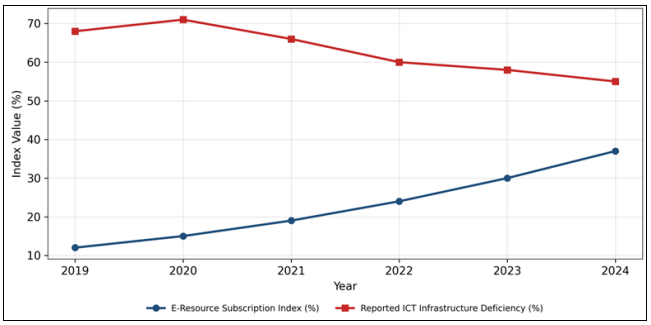

Fig 4: Six-Year Synthesized Trend of E-Resource Subscription Growth and ICT Infrastructure Deficiency in Reviewed Nigerian Tertiary Libraries (2019-2024)

4.4 Conceptual Framework Synthesis

Integrating the theoretical foundations articulated in Section 2.2 with the empirical patterns synthesized above, Fig 5 presents a conceptual framework depicting the causal pathway linking institutional inputs (resource provisioning, policy, funding), through availability and accessibility, to utilization behaviour, and ultimately to science teaching/learning outcomes and global standards attainment. The framework foregrounds moderating variables, ICT competence, awareness, and user education, as critical levers through which institutions in Nasarawa State can convert nominal resource stock into realized pedagogical benefit.

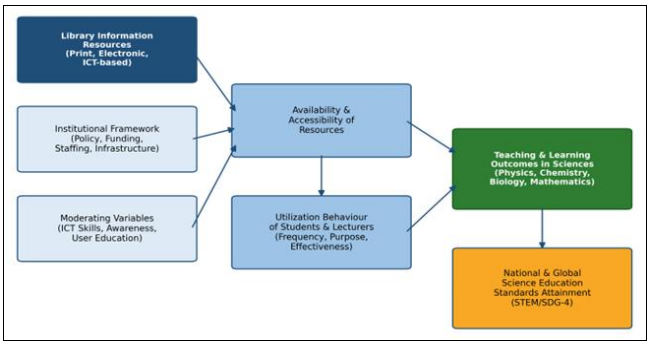

Fig 5: Conceptual Framework Linking Library Resource Availability and Utilization to Science Teaching/Learning Outcomes in Nasarawa State Tertiary Institutions

4.5 Alignment with National and Global Standards

Benchmarked against UNESCO's (2021) [28] articulation of equitable learning-resource access as foundational to Sustainable Development Goal 4, the synthesized evidence suggests that Nasarawa State tertiary institutions remain at an intermediate stage of attainment: foundational print infrastructure is broadly established, but the digital and ICT-mediated dimensions central to twenty-first-century science pedagogy lag behind both national aspirations articulated by the National Universities Commission (2023) [17] and comparative regional benchmarks such as those reported for South African institutions (Sibiya, 2023) [26].

5. Discussion

The synthesized evidence affirms the review's central proposition: a structural disjunction persists between the nominal availability of library information resources and their effective utilization for science teaching and learning across Nasarawa State's tertiary institutions. This disjunction manifests most acutely in Physics, where the convergence of low electronic-resource availability, weak laboratory-information linkage, and limited digital literacy compounds to produce the lowest synthesized utilization index among the core sciences. This finding extends Danjuma and Adeleye's (2015) [8] state-specific observation regarding laboratory apparatus scarcity into the information-resource domain, suggesting a systemic, cross-cutting resource deficiency affecting Physics education in the state rather than an isolated apparatus problem.

Interpreted through Ranganathan's Five Laws, the synthesized findings indicate that the first law ("books are for use") is substantially honoured with respect to print materials but only partially realized for electronic and ICT-mediated resources, whose low utilization reflects both limited availability and insufficient "matching" between collections and user competence, contrary to the second and third laws. The fourth law's efficiency imperative is similarly compromised by the infrastructural deficiencies (unreliable power and connectivity) identified across the reviewed studies (Sahabi *et al*., 2020) [25], which directly inflate the time-cost of accessing even nominally available electronic resources.

Within the Resource-Based Learning framework, the persistently low utilization of science e-resources implies a constrained capacity for self-directed scientific inquiry among students in the reviewed institutional contexts, potentially perpetuating a teacher-centred, textbook-dependent pedagogical culture rather than the inquiry-driven model advocated by contemporary science education scholarship (Isma'il & Lukman, 2022) [12]. This pattern carries implications beyond individual learning outcomes: it constrains the broader capacity of Nasarawa State's tertiary institutions to produce research-ready science graduates capable of engaging with the primary scientific literature expected at postgraduate and professional levels.

The institutional-framework lens adopted in this review further reveals that funding heterogeneity across state, federal, and private institutions correlates, in the reviewed literature, with differentiated resource provisioning capacity, with the comparatively better-resourced federal institution (FULafia) and state university (NSUK) reporting marginally stronger baseline availability than smaller state polytechnics and colleges of education, though all institutional types report convergent ICT-infrastructure deficiency. This pattern is consistent with the broader Nigerian accreditation and funding literature (Ogunode & Adah, 2022) [18] and suggests that institutional ownership type alone is an insufficient predictor of resource adequacy; rather, deliberate, discipline-specific budgetary prioritization for science-related electronic resources appears to be the more decisive determinant identified across the synthesized evidence.

6. Conclusion

This review has systematically synthesized available empirical and theoretical scholarship on the availability and utilization of library information resources for science teaching and learning within the institutional framework of tertiary education in Nasarawa State, Nigeria. The evidence converges on three principal conclusions. First, conventional print resources are moderately to well established across the state's tertiary institutions, whereas electronic, ICT-mediated, and discipline-specific science resources remain critically underdeveloped. Second, utilization of available resources, particularly within Physics, is constrained less by absolute unavailability than by an interacting set of infrastructural, attitudinal, and information-literacy barriers that mediate the translation of availability into effective pedagogical engagement. Third, institutional governance and funding heterogeneity across Nasarawa State's state, federal, and private tertiary institutions shape, but do not singularly determine, the observed resource adequacy patterns, with deliberate science-focused collection development emerging as the more consequential institutional lever. Collectively, these conclusions affirm that closing the availability-utilization gap requires coordinated intervention across infrastructural, pedagogical, and policy domains rather than collection expansion alone.

7. Recommendations

Arising from the synthesized findings, the following recommendations are advanced for the consideration of institutional administrators, library management, and policy authorities within Nasarawa State's tertiary education sector:

1. Institutional library management committees should prioritize deliberate budgetary allocation toward subscription-based science databases (e.g., ScienceDirect, JSTOR, EBSCOhost) and discipline-specific e-journals, addressing the critically low availability indices identified for these resource categories.
2. Tertiary institutions should institutionalize compulsory information literacy and digital library skills modules

within science curricula, targeting the database-navigation deficiencies identified by Okeji *et al*. (2020) [20], to ensure that improved resource availability translates into improved utilization.

3. State and institutional authorities should prioritize stable electricity supply and broadband connectivity investment for library and ICT centres, given the consistent identification of infrastructural deficiency as a primary utilization constraint across the reviewed literature.
4. Library personnel professional development programmes should be strengthened to enhance staff digital service competence, consistent with the staff-capacity determinant identified by Atanda *et al*. (2021) [4].
5. The Nasarawa State Ministry of Higher Education, in collaboration with the NUC and NBTE, should develop a harmonized, state-wide science library resource policy framework that addresses funding heterogeneity across institutional ownership types and benchmarks provisioning against national and global standards such as UNESCO's SDG 4 indicators.
6. Future institutional planning should specifically target the discipline-level utilization gap identified for Physics through dedicated investment in laboratory-linked digital reference materials and simulation-supportive electronic resources.

8. Limitations and Suggestions for Further Research

This review is subject to several limitations characteristic of narrative synthesis methodology. First, the synthesized quantitative indices presented in Section 4 are derived from qualitative consensus patterns across heterogeneous reviewed studies rather than from harmonized primary survey data, and should accordingly be interpreted as illustrative syntheses rather than precise institutional measurements. Second, the relatively limited volume of indexed, Nasarawa State-specific empirical literature necessitated supplementation with comparable Nigerian and African regional studies, which may not fully capture institution-specific nuances. Third, the review's reliance on published, predominantly English-language sources may have excluded relevant grey literature or institutional records not publicly indexed.

Future research should pursue a coordinated, multi-institutional primary survey across all tertiary institutions in Nasarawa State, employing standardized instruments to generate comparable, quantifiable institutional-level data on resource availability and utilization. Longitudinal studies tracking the relationship between library resource investment and measurable science learning outcomes (e.g., examination performance, research output) would further strengthen the causal inferences only tentatively suggested by the present synthesis. Comparative studies benchmarking Nasarawa State institutions against peer institutions in other Nigerian states and African countries would also enrich understanding of the institutional-framework determinants identified in this review.

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