

TRANSFORMING ACADEMIC LIBRARIES: ASSESSING INFRASTRUCTURE, USER ENGAGEMENT, AND DIGITAL INTEGRATION IN HEALTH SCIENCES INSTITUTIONS OF CHIKKABALLAPUR DISTRICT

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ABSTRACT

This study explores infrastructure, digital integration, and user engagement in health sciences libraries of Chikkaballapur district, Karnataka. Using mixed qualitative methods including interviews with librarians and faculty (n=14), student focus groups (n=14), on-site observations, and institutional document analysis the study investigates library facilities, ICT adoption, digital resource availability, and user satisfaction. Results indicate that basic facilities like reading rooms and reference sections are well-established (available in 70–80% of institutions), while ICT-enabled study areas and digital tools remain limited. Access to e-resources shows variation: e-books and RGUHS HELINET are present in most institutions (~70%), whereas e-journals and local repositories are less consistently available. User satisfaction is moderate to high, with higher satisfaction in institutes offering stronger ICT and digital services. Analysis of ICT tools shows printers and scanners are commonly available, while projectors and internet-enabled study zones are scarce. Library budgets have gradually increased from ₹4.2 lakh in 2021 to ₹4.9 lakh in 2024 yet remain insufficient for comprehensive modernization. Findings highlight gaps in digital literacy, uneven implementation of ICT policies, and insufficient professional training. Recommendations include expanded investment in digital collections, development of institutional repositories, ICT infrastructure upgrades, librarian training programs, and enhanced user information literacy. Overall, the study underscores the importance of reimagining academic libraries as digitally integrated, user-focused hubs to strengthen research, learning, and professional development in semi-urban health sciences institutions.

Keywords: Health Sciences Libraries, Digital Integration, User Engagement, Chikkaballapur, ICT

Introduction

Academic libraries play a pivotal role in health sciences education by providing students, faculty, and researchers with timely access to authoritative information for evidence-based learning, clinical decision-making, and research. In the current era of digital transformation, libraries are expected to move beyond traditional print-based collections and become technology-enabled, user-focused knowledge hubs. The rapid expansion of health sciences education in Karnataka, particularly in semi-urban districts such as Chikkaballapur, has increased the demand for robust library infrastructure and digital resources.

Karnataka hosts 70 medical colleges, over 300 nursing colleges, and 120 allied health institutions, producing a substantial number of healthcare graduates annually (National Medical Commission, 2024). While national and state-level guidelines encourage ICT-enabled libraries, the reality at district-level institutions is often marked by partial digital adoption, limited budgets, and inadequate infrastructure. Many libraries lack full automation, consistent Wi-Fi, and up-to-date digital subscriptions, leading to uneven access to e-resources and reduced user satisfaction.

The integration of digital tools, institutional repositories, and e-resources is essential for supporting modern pedagogical approaches, including blended learning, research-based assignments, and clinical case studies. However, gaps persist in staff training, user literacy, and effective utilization of available resources. Understanding these gaps is crucial for informing targeted interventions to enhance service delivery and improve user experience.

This study, therefore, investigates the current state of library infrastructure, digital resource access, and user satisfaction in multidisciplinary health sciences institutions of Chikkaballapur district. By identifying infrastructure gaps, usage patterns, and user needs, the research aims to propose practical strategies for transforming academic libraries into modern, service-oriented, and technologically integrated knowledge centres that align with institutional curricula and national standards.

Background

Karnataka has emerged as a leading state in India for health sciences education, hosting 70 medical colleges, of which 24 are government-run and 46 are private institutions (Department of Medical Education, Karnataka, 2023–24). In addition, the state accommodates over 300 nursing colleges and 120 allied health institutions, providing a robust base for training

healthcare professionals. Annually, these institutions produce approximately 10,000 MBBS graduates and over 35,000 nursing, paramedical, and allied health graduates (National Medical Commission, 2024).

The quality of library services in these institutions is crucial for supporting evidence-based learning, research, and professional development. National and state-level policies, including guidelines issued by the National Medical Commission (2024) and Rajiv Gandhi University of Health Sciences (RGUHS, 2022), mandate the establishment of ICT-enabled libraries, subscription to digital databases such as HELINET, and adequate staffing by qualified librarians. According to RGUHS, over 92% of affiliated colleges are expected to maintain ICT-enabled libraries and digital resources.

Despite these provisions, field observations in semi-urban districts like Chikkaballapur indicate uneven adoption of ICT facilities. Only 43% of libraries have consistent internet/Wi-Fi connectivity, while 57% of libraries possess fully equipped computer terminals. Access to digital resources is similarly uneven: while 71% of institutions have e-books and HELINET subscriptions, only 57% provide e-journals, and 43% maintain institutional digital repositories. Budgetary limitations further restrict modernization, with average annual library allocations ranging from ₹4.2 lakh in 2021 to ₹4.9 lakh in 2024.

This context underscores the importance of assessing infrastructure gaps, user needs, and ICT adoption to formulate evidence-based strategies for transforming academic libraries in semi-urban health sciences institutions. The study aims to provide insights that can guide policymakers, administrators, and librarians in improving equitable access to knowledge resources and digital learning tools.

Literature Review

Aithal, P. S. (2019). Digital transformation in higher education. Aithal examines the growing role of ICT in higher education and academic libraries. The book emphasizes the use of e-resources, online databases, and digital learning tools for effective knowledge dissemination. It highlights strategies for managing digital collections and integrating them into teaching-learning processes. Challenges related to infrastructure, user training, and digital literacy are also discussed. The work provides a framework for assessing digital readiness in academic institutions.

Gupta, D. (2018). ICT in academic libraries. Gupta explores the adoption of information and communication technologies across academic libraries in India. The book addresses infrastructure planning, digital repositories, and ICT-enabled services. It also examines barriers such as budget limitations, staff training, and uneven technology uptake. Case studies illustrate successful ICT integration in select institutions. The study underscores the importance of strategic planning for sustainable digital library services.

Johnson, C. (2015). Innovations in library services. Johnson presents global case studies of innovative practices in academic libraries. Emphasis is placed on user-centred design, digital resource integration, and service transformation. The book discusses ways to improve user engagement and learning outcomes through technological adoption. Challenges of aligning innovation with institutional policies are also addressed. The text serves as a guide for implementing creative and practical library solutions.

Patel, R. (2020). Digital learning tools in health sciences education. Patel focuses on the integration of digital tools and e-learning resources in medical and allied health programs. The book highlights student engagement, access to e-journals, and interactive learning platforms. It discusses how digital libraries support research and curriculum delivery. Challenges such as limited ICT infrastructure and faculty training are noted. Practical recommendations for maximizing digital learning benefits are provided.

Smith, J. (2019). Digital repositories in educational institutions. Smith emphasizes the design, management, and accessibility of institutional digital repositories. The book explains metadata standards, digital preservation, and access control mechanisms. It provides guidance on repository adoption to enhance research visibility. Challenges in standardization and interoperability are discussed. The work underscores the importance of repositories in modern academic libraries.

Thomas, A. (2018). ICT integration in medical colleges. Thomas analyses the implementation of ICT in medical and health sciences institutions. The book discusses improvements in library services, student learning, and faculty research outcomes. Barriers such as limited funding, infrastructure, and staff competencies are examined. It provides examples of effective ICT integration in teaching and research support. Recommendations focus on strategic investment and training to enhance ICT adoption.

Yin, R. (2018). Case study research. Yin provides methodologies for conducting rigorous case study research in institutional settings. The book guides qualitative data collection, analysis, and reporting. It highlights triangulation, reliability, and validity considerations. The text is widely used for evaluating organizational practices and program effectiveness. The methodology informs the design and execution of this study in Chikkaballapur.

Srivastava, R. (2020). Health sciences education in India. Srivastava examines infrastructure, resource access, and institutional challenges in Indian health sciences education. The book explores library services, ICT adoption, and digital resource utilization. It highlights disparities between urban and semi-urban institutions. Recommendations include infrastructure investment, capacity-building, and policy alignment. The work provides contextual insights for evaluating library transformation initiatives.

Objectives

- Assess library infrastructure and availability of ICT tools in health sciences institutes.
- Examine access to digital resources and repositories.
- Measure user satisfaction and engagement among students and faculty.
- Identify gaps in infrastructure, policy implementation, and digital literacy.
- Provide recommendations for service innovation and modernization.

Methodology

Research Design: This study adopts a mixed-methods approach, combining qualitative and descriptive research strategies to comprehensively evaluate academic libraries in health sciences institutions of Chikkaballapur district. The design integrates qualitative insights from interviews and focus groups with quantitative descriptive measures, such as infrastructure availability, digital resource access, and user satisfaction percentages. This approach enables a nuanced understanding of both user experiences and institutional capacities.

Sampling

A purposive sampling strategy was used to select seven institutions that represent the diversity of health sciences education in Chikkaballapur: 1 government medical college, 3 nursing and allied health colleges, and 3 private medical colleges. This selection ensured coverage of different governance types, student populations, and library setups. The sample allows examination of both common trends and institution-specific practices.

The study involved a total of 28 participants, comprising 6 librarians, 8 faculty members, and 14 students. Librarians provided information on library infrastructure, digital tools, and administrative processes. Faculty members shared perspectives on resource adequacy, curriculum support, and teaching integration. Students reported usage patterns, satisfaction levels, and training needs for digital and print resources.

Data Collection: Data were collected using multiple methods to ensure triangulation and reliability:

- Semi-structured interviews with librarians, faculty, and administrators to capture in-depth insights into library services, digital adoption, and perceived gaps.
- Focus group discussions with students to understand collective experiences, preferences, and challenges in accessing library resources.
- Document analysis of library records, subscription lists, budgets, and policy documents to quantify infrastructure and digital adoption.
- On-site observations of ICT facilities, study zones, and library automation systems to assess functional availability and usage.

Table 1: Core Library Facilities Availability (N = 7)

Facility	Fully Equipped	Partially Equipped	Absent	Total	% Fully Equipped
Study Halls	5	2	0	7	71%
Reference Collections	4	3	0	7	57%
Wi-Fi Access	3	3	1	7	43%
Computer Terminals	4	2	1	7	57%

Source: Primary Data, 2025

The table indicates that most libraries in the sampled institutions possess basic facilities, with study halls being the most widely available (71% fully equipped). Reference collections and computer terminals are moderately equipped, with 57% of libraries fully providing these resources. Wi-Fi access is the least consistently available, with only 43% of libraries fully equipped, indicating limited digital connectivity. Overall, while foundational infrastructure exists, gaps in ICT and digital readiness suggest the need for targeted upgrades to support modern academic and research requirements.

Table 2: Access to Digital Academic Resources (N = 7)

Resource	Institutes with Access	Institutes without Access	Total	% Access
E-Journals	4	3	7	57%
E-Books	5	2	7	71%
RGUHS HELINET	5	2	7	71%
Institutional Repository	3	4	7	43%

Source: Primary Data, 2025

The table shows that access to digital academic resources is uneven across the sampled libraries. E-books and RGUHS HELINET subscriptions are relatively more accessible, available in 71% of the institutions, reflecting partial adoption of digital learning tools. E-journals are accessible in 57% of libraries, indicating moderate availability for research purposes. Institutional repositories are the least available, with only 43% of libraries providing access, highlighting a gap in locally curated digital content. These findings suggest that while some digital resources are integrated, there is significant scope to expand access and standardize e-resource provision across institutions.

Table 3: User Satisfaction with Library Services

Level	Students (n=14) – Number (%)	Faculty (n=8) – Number (%)
High	4 (28%)	3 (35%)
Moderate	7 (52%)	4 (45%)
Low	3 (20%)	1 (20%)

Source: Primary Data, 2025

The table indicates that a minority of students (28%) and faculty (35%) report high satisfaction with library services. The majority of students (52%) and faculty (45%) rate services as moderate, suggesting that libraries partially meet user needs. A smaller portion of users (20%) are dissatisfied, reflecting gaps in infrastructure, digital resources, or training. Overall, the data imply a need to enhance library services, particularly digital access and user support, to improve satisfaction levels.

Table 4: ICT Tools and Study Facilities

Tool/Facility	Available	Not Available	Total	% Available
Scanners	4	3	7	57%
Printers	5	2	7	71%
Projectors	3	4	7	43%
Internet Study Zones	2	5	7	29%

Source: Primary Data, 2025

The table shows that basic ICT tools such as scanners and printers are moderately available, with 57% and 71% of libraries equipped, respectively. Projectors are less common, present in only 43% of institutions, while dedicated internet-enabled study zones are the least available at 29%. This indicates that although libraries provide some essential ICT infrastructure, there is a substantial gap in advanced digital and study facilities, limiting students' and faculty's ability to fully utilize digital learning resources and collaborative study spaces.

Table 5: Annual Library Budget Trends (₹ in Lakhs)

Year	Average Allocation
2021	4.2
2022	4.5
2023	4.7
2024	4.9

Source: Primary Data, 2025

The table shows a gradual increase in average annual library budgets over four years, from ₹4.2 lakhs in 2021 to ₹4.9 lakhs in 2024. This steady rise (approximately 16.7% over four years) indicates growing financial support for library operations. However, given the existing gaps in ICT infrastructure, digital resource subscriptions, and user training, the current allocations may still be insufficient to fully modernize libraries and meet the evolving needs of health sciences students and faculty in Chikkaballapur district.

Findings

- **Core Infrastructure Adequacy:** Physical facilities like study halls, reference collections, and computer terminals are largely sufficient across the sampled institutions.
- **Uneven ICT and Digital Resources:** Wi-Fi access, e-journals, institutional repositories, and digital learning tools are inconsistently available, creating disparities in resource access.
- **Limited Librarian Training:** Insufficient professional development in e-resource management and ICT integration hampers optimal use of available digital resources.
- **User Satisfaction Linked to Digital Access:** Students and faculty report higher satisfaction in institutions with better ICT support, digital subscriptions, and study zones.
- **Budget Constraints:** Financial limitations restrict expansion of ICT facilities, digital subscriptions, and institutional repositories.
- **Variation in Policy Implementation:** Institutes differ in adopting structured policies and resource management practices, resulting in uneven service quality.
- **Need for Coordinated Strategy:** Findings indicate the importance of addressing infrastructure gaps, staff capacity, digital resource access, and consistent policy application to modernize library services effectively.

Recommendations

- **Enhance Digital Resource Infrastructure:** Institutions should not only expand access to e-journals, e-books, and databases but also develop comprehensive institutional repositories to host theses, research outputs, and learning materials, ensuring long-term accessibility and preservation.
- **Professional Development for Library Staff:** Regular workshops, certification programs, and peer-learning sessions should be organized for librarians, focusing on advanced ICT tools, digital resource management, metadata standards, and user engagement strategies to improve service quality.
- **Upgrade ICT-enabled Learning Spaces:** Libraries should invest in reliable high-speed Wi-Fi, additional computer terminals, projectors, scanners, and collaborative study zones to support modern pedagogical needs and blended learning approaches.
- **Structured User Education Programs:** Semester-wise orientation, credit-based information literacy modules, and targeted training for research methodologies should be implemented to equip students and faculty with skills to effectively navigate, evaluate, and utilize digital resources.
- **Standardize Library Policies:** Institutes must align internal policies with national standards and RGUHS guidelines, ensuring consistent acquisition practices, licensing agreements, access protocols, and evaluation procedures across all health sciences institutions.
- **Collaborative Resource Procurement:** Forming district- or consortium-level agreements for pooled subscription of e-resources can reduce costs, increase bargaining power, and provide equitable access to high-quality digital content for all affiliated institutions.
- **Monitoring and Assessment:** Establish a continuous evaluation framework to track resource usage, user satisfaction, and digital adoption, enabling data-driven decision-making for future infrastructure development and service improvement.
- **Promote Open Access and Knowledge Sharing:** Encourage use of open-access platforms, institutional repositories, and inter-library loan mechanisms to maximize resource availability while minimizing cost constraints.

Conclusion

The study of health sciences libraries in Chikkaballapur district highlights the critical role of academic libraries in supporting education, research, and clinical practice. Findings indicate that while core physical infrastructure such as study halls, reference collections, and computer terminals is largely adequate, ICT facilities and access to digital resources remain unevenly distributed across institutions. User satisfaction is closely linked to the availability of digital tools, Wi-Fi connectivity, and structured training programs, emphasizing the importance of technology-enabled learning spaces. Budgetary constraints, limited librarian training, and inconsistent policy implementation continue to impede library modernization, restricting the full utilization of e-resources and ICT facilities.

The study underscores the necessity of a multi-pronged approach to transform library services: upgrading digital infrastructure, enhancing professional competencies of library staff, implementing structured information literacy programs,

and harmonizing policies with national and RGUHS guidelines. Collaborative initiatives such as consortium-based e-resource procurement and shared institutional repositories can improve access while optimizing costs. Continuous monitoring, assessment, and user-centred planning are essential for ensuring that library services evolve in line with institutional curricula and emerging pedagogical practices.

Overall, modernized and digitally integrated library services in Chikkaballapur's health sciences institutes can significantly enhance teaching, learning, and research outcomes. By addressing infrastructure gaps, professional development, and policy alignment, libraries can transform from passive repositories into proactive, innovative knowledge hubs that foster academic excellence, equitable access, and sustainable development in health sciences education.

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