

# **Use of ICT Application in the Housekeeping Operations of the University Libraries in West Bengal: Review and Analysis**

**Thesis submitted for the Degree of Doctor of Philosophy in Arts**

**By**

**ASHIM KUMAR DUTTA**

**Under the Supervision and Guidance**

**PROF. (DR.) SUBARNA KUMAR DAS**

**Department of Library and Information Science**

**Jadavpur University**

**Kolkata-700032**

**2024**

Certified that the Thesis entitled

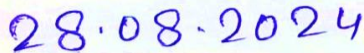
**USE OF ICT APPLICATION IN THE HOUSEKEEPING  
OPERATIONS OF THE UNIVERSITY LIBRARIES IN  
WEST BENGAL: REVIEWS AND ANALYSIS**

submitted by me for the award of the Degree of Doctor of Philosophy in Arts at Jadavpur University is based upon my work carried out under the Supervision of **PROF. (DR.) SUBARNA KUMAR DAS,**  
**DEPARTMENT OF LIBRARY AND INFORMATION**  
**SCIENCE, JU**

and that neither this thesis nor any part of it has been submitted before, for any degree or diploma anywhere/ elsewhere.

Countersigned by the

Supervisor: 

Dated: 

Candidate:

Dated:


*Dedication*

*To the loving memory of my  
mother Late Laxmi Dutta*

*(you are gone but your belief in me has made this  
journey possible)*

## **Preface**

The libraries of universities have undergone significant changes due to rapid advancements in Information and Communication Technology (ICT). As a hub for digital and physical information, libraries have evolved from mere stockrooms of knowledge into dynamic information hubs. ICT integration has revolutionized library services and operations in West Bengal's academic institutions.

An exploration of the impact of ICT on the traditional and modern functions of university libraries in West Bengal is the main objective of this study, titled "Use of ICT Application in the Housekeeping Operations of the University Libraries in West Bengal: Review and Analysis." In addition to automating routine tasks, improving the accessibility of information, and libraries' role in the global information ecosystem, it examines a wide range of aspects of digital transformation.

Several objectives are being sought in this study, including a depiction of the current library service situation in West Bengal, identification of infrastructure and automation services in university libraries, as well as evaluation of staff skills and competency. As well, it assesses the quality of online and offline library resource access as well as suggests frameworks to facilitate efficient housekeeping operations.

In this study, ICT has reshaped library operations, from automating housekeeping functions to enhancing user experience through digital platforms, which makes it significant. As part of this thesis, I identify the advantages and challenges of automation for optimizing library services and management in the digital age and make recommendations for future research.

ICT has a significant impact on academic libraries, and this study should contribute to a broader understanding of that impact and offer practical solutions for improving library operations. This research explores the opportunities and challenges posed by digital transformation of West Bengal's library services as libraries continually adapt to changing user needs.

Ashim Kumar Dutta

Date: 28.08.2024



## ACKNOWLEDGEMENTS

I express deep sense of gratitude to my supervisor and mentor, Professor (Dr.) Subarna Kumar Das, Department of Library and Information Science, Jadavpur University, Kolkata, West Bengal for his invaluable guidance, constant support, patience and encouragement without which this research work would not have seen the light of the day. It was an honour to work under his supervisions.

I express my sense of obligation and gratefulness to Professor (Dr.) Udayan Bhattacharya Head of the Department, Library and Information Science, Professor (Dr.) Goutam Maity, Department of Library and Information Science and Professor (Dr.) Sunil Kumar Chatterjee, Department of Library and Information Science, Jadavpur University, Kolkata, West Bengal, for their generous help, valuable time & excellent suggestions in the preparation of the thesis.

I remain grateful to the administration of Jadavpur University for permitting me to conduct this research work.

I would like to express my sincere gratitude and appreciation to Professor (Dr.) Biplab Chakraborty, Department of Library and Information Science and former Dean of Library and Information Science, Journalism and Education, University of Calcutta, Kolkata, West Bengal, without whose initiatives, encouragement and skilled suggestion both a theoretical and practical, it would be difficult to make my research success.

I also thank to our Chief Librarian (Acting) Dr. Shrabana Ghosh, and Dr. Sanku Bilas Roy, Librarian, Central Library (Main/ Salt Lake campus), Jadavpur University, for their support and encouragement.

My thanks also goes to my colleagues and special thanks to my brethren Supriyo Dey, Junior System Administrator of Central Library, Jadavpur University for helping me in finding the Information and completing my research work.

I have a very special word of thanks to Dr. Mriganka Mandal of N.B.U, Dr. Nimai Shit, Dr. Subal Kumar Barui and Dr. Kalyan Paik of C.U, Dr. Biswajit Adhikary, Dr. Surojit Sanyal and Associate Professor (Dr.) Nivedita Bhattacharyya of V.U, Dr. Kanchan Kamilla of B.U, Shri Abhijit Kumar of R.B.U, Dr. Dipa Roy of K.U and all Staff members of W.B.S.U for their support, encouragement and timely help of my information need.

I extend my thanks to my friends and relatives from whom I have learned more and for helping me in my research work questionnaire collection.

Lastly, I thank to all the Staff members of Jadavpur University who helped me directly or indirectly in completing of this Research Works.

---Ashim Kumar Dutta

## **Table of Contents:**

<b>Preface</b>	i
<b>Acknowledgements</b>	ii
<b>Table of Contents</b>	iii
<b>List of Tables</b>	vii
<b>List of Figures</b>	ix
<b>List of Abbreviations</b>	x

### **Chapter 1: Introduction**

1	Introduction	2
1.1	Background of the study	10
1.1.1	Definition of Housekeeping and area of housekeeping	19
1.1.2	Use of ICT applications in housekeeping areas	20
1.2	Education in India	36
1.3	Information	41
1.4	Communication	42
1.5	Technology	42
1.6	Data, Information, Knowledge, and Wisdom	43
1.7	Information Technology (IT)	45
1.8	Information Communication Technology (ICT)	47
1.9	Library Types	50
1.10	Impact of ICT in the Development of Library Services	60
1.11	Librarianship in the digital era	61
1.12	Professional Requirements in ICT Enabled Library Systems	63
1.13	Policy for Staff Development Programmes	66
1.14	Library and Information Science (LIS) Education	67
1.15	University Libraries' Role in Indian Higher Education	71
1.16	ICT application in the housekeeping operations of the University Libraries: Scenario in West Bengal	72
1.17	Importance of Professional Development and Continuing Education	73
1.18	Need of the Study	77
1.19	Statement of the Problem	77
1.20	Research Questions	78
1.21	Objectives of the Study	78
1.22	Scope and Limitation of the Study	79
1.23	Chapterization	79

### **Chapter 2: Review of Literature**

2	Review of Literature	82
2.1	Definition of Literature Review	82
2.2	Need for Literature review and its functions	83
2.3	Literature review search	85
2.4	Reviews on ICT usage in Libraries	86

2.5	Review on Housekeeping operations of the library systems	94
2.6	Review on Housekeeping operations of the library systems in West Bengal	96
2.7	Challenges and Issues in Housekeeping Operations in libraries	97
2.8	User Satisfaction with Housekeeping Operations in Libraries	99
2.9	Technology and Automation in Housekeeping Operations in libraries	100
2.10	Research gap	102
<b>Chapter 3: Research Methodology</b>		
3	Research Methodology	105
3.1	Meaning of Research Methodology	105
3.2	Importance of Research Methodology	106
3.3	Types of Methodology	108
3.3.1	Quantitative Research	108
3.3.2	Qualitative Research	109
3.3.2.1	Mixed-Methods Research	110
3.3.3	Descriptive Research	111
3.3.4	Experimental Research	112
3.3.5	Case Study Research	114
3.3.6	Survey Research	115
3.3.7	Action Research	116
3.3.8	Ethnographic Research	117
3.3.9	Historical Research	118
3.3.10	Grounded Theory	120
3.3.11	Content Analysis	121
3.4	Research Design	122
3.5	Data Collection	123
3.6	Definition of Hypothesis	124
3.7	Types of Hypotheses	125
3.8	Hypothesis	126
3.9	Research Population	126
3.10	Sampling Method	127
3.11	Questionnaire preparation	128
3.12	Data Analysis Techniques	129
3.13	Statistical Package for Social Sciences (SPSS)	129
<b>Chapter 4: University Libraries in West Bengal: An Overview</b>		
4	University Libraries in West Bengal: An Overview	134
4.1	University of Calcutta	134
4.2	Jadavpur University	145
4.3	University of Kalyani	155
4.4	Rabindra Bharati University	162
4.5	University of North Bengal	165
4.6	Vidyasagar University	169
4.7	The University of Burdwan	176

4.8	West Bengal State University	180
<b>Chapter 5: Data Analysis and Interpretation</b>		
5	Data Analysis and Interpretation	190
5.1	Introduction	190
5.2	Sample size	190
5.3	Year of Establishment	191
5.4	Status of Collections Surveyed from Libraries	192
5.5	Journal Collections	194
5.6	Other Collections	195
5.7	ICT Infrastructure	198
5.8	ICT Infrastructure (for users services)	200
5.9	ICT Infrastructural Service	201
5.10	Status of Library Automation/ Software	203
5.11	E-Resources Available in the Library	204
5.12	Library Membership	205
5.13	Library Staff	207
5.14	Plagiarism Software Used by the Library	209
5.15	Location Wise Distribution	210
5.16	Distance from Affiliated Colleges	211
5.17	Staff having professional and ICT skill excluding librarian	212
5.18	Number of librarians	213
5.19	Work Status of librarian staffs	215
5.20	Qualification of Librarian	216
5.21	Work Experience of Librarian	217
5.22	Collection of Books	218
5.23	Collection of printed journals	219
5.24	Total Number of students	221
5.25	Opportunity for professional development by library	222
5.26	Access system used in Library as per librarian	224
5.27	Mode of access to bibliographic databases	225
5.28	Usage of bibliographic services	226
5.29	Current awareness platform	227
5.30	Type of approach followed in library catalogue	229
5.31	Software used for digital preservation work for library under ICT application	230
5.32	Standards uses in digital preservation work under ICT application	231
5.33	Analysis of data collected from the response of university students	233
5.34	Gender wise categorization	234
5.35	Age wise categorization	235
5.36	Subject wise categorization	236
5.37	Location of residence for students	237
5.38	Students Visiting University Library	238
5.39	Member Registration in Library	239
5.40	Frequency of library visit	240

5.41	Time spent in the library	241
5.42	Level of satisfaction about the services provided by the library	242
5.43	Level of satisfaction about library amenities	247
5.44	Attitude and skill of library staff towards users	250
5.45	Purpose of visiting the library	252
5.46	Opinion regarding satisfaction with following library collection in respective library	253
5.47	Catalogue facility	256
5.48	Library Catalogue Assistance	257
5.49	University wise Student Distribution	258
5.50	Descriptive Statistics	259
5.51	Opinion about the attitude and skill of library staff towards users	262
5.52	One sample t-test for Amenities, Services and Attitude	263
5.53	t-test: Gender and frequency of Library document use between online and offline modes	264
5.54	Chi-square: Location and time spend in the library	265
<b>Chapter 6: Findings</b>		
6	Findings of the Study	268
6.1	General Overview	268
6.2	General information related to the University Librarians	268
6.3	Universities libraries infrastructure based on ICT Application	268
6.4	University library depend on E-resources	270
6.5	ICT related information use by the librarian	271
6.6	ICT related information use by the students	273
<b>Chapter 7: Suggestions/ Recommendations and Conclusion</b>		
7	Suggestions/ Recommendations and Conclusion	277
7.1	Suggestions/ Recommendations	277
7.2	Conclusion	278
7.3	Scope for the further research	279
<b>References</b>		281
<b>Appendices</b>		
Questionnaire I		Appendix I
Questionnaire II		Appendix II
House Keeping Pictures		Appendix III

## List of Tables:

<b>Table 1</b>	Housekeeping Operations Related to Handling of Monographic Materials in a Library	21
<b>Table 2</b>	Current Practices in Cataloguing Resources	24
<b>Table 3</b>	Current Practices in Cataloguing Resources	31
<b>Table 4</b>	Knowledge	44
<b>Table 5</b>	Year of establishment	191
<b>Table 6</b>	Status of Collections Surveyed from Libraries	193
<b>Table 7</b>	Journal Collections	195
<b>Table 8</b>	Other Collections	196
<b>Table 9</b>	ICT Infrastructure	198
<b>Table 10</b>	ICT INFRASTRUCTURE (FOR USERS SERVICES)	200
<b>Table 11</b>	ICT INFRASTRUCTURAL SERVICE	202
<b>Table 12</b>	Status of Library Automation/ Software	203
<b>Table 13</b>	E-Resources Available in the Library	204
<b>Table 14</b>	Library Membership	205
<b>Table 15</b>	Library Staff	207
<b>Table 16</b>	Plagiarism Software Used by the Libraries	210
<b>Table 17</b>	Location of the colleges	210
<b>Table 18</b>	Distance from affiliated colleges	211
<b>Table 19</b>	Staff having professional and ICT skill	213
<b>Table 20</b>	Number of librarians	214
<b>Table 21</b>	Work Status of librarian staffs	215
<b>Table 22</b>	Qualification of the librarians	216
<b>Table 23</b>	Work Experience of Librarian	217
<b>Table 24</b>	Collection of Books	218
<b>Table 25</b>	Collection of Printed Journals	219
<b>Table 26</b>	Total Number of Students	221
<b>Table 27</b>	Opportunity for professional development by library	223
<b>Table 28</b>	Access system used in Library	224
<b>Table 29</b>	Mode of access to bibliographic databases as per librarian	225
<b>Table 30</b>	Usage of bibliographic services as per librarian	226
<b>Table 31</b>	Current awareness platform	227
<b>Table 32</b>	Type of approach followed in library catalogue as per librarian	229
<b>Table 33</b>	Software used for digital preservation work for library	230
<b>Table 34</b>	Standards used in digital preservation work under ICT application	231
<b>Table 35</b>	Gender of the participants	234
<b>Table 36</b>	Age of the participants	235
<b>Table 37</b>	Subject wise distribution of students	236
<b>Table 38</b>	Location of residence	237
<b>Table 39</b>	Students Visiting university library	238
<b>Table 40</b>	Library Membership registration	239
<b>Table 41</b>	Frequency of library visit	240

<b>Table 42</b>	Time spent in the library by students	241
<b>Table 43</b>	Level of satisfaction about the services provided by the library	242
<b>Table 44</b>	Satisfaction about library amenities	247
<b>Table 45</b>	Attitude and skill of library staffs	250
<b>Table 46</b>	Purpose of visiting the library	252
<b>Table 47</b>	Opinions regarding satisfaction of library collections	253
<b>Table 48</b>	Catalogue Facility	256
<b>Table 49</b>	Library Catalogue Assistance	257
<b>Table 50</b>	University wise Student Distribution	258
<b>Table 51</b>	Descriptive Statistics - Level of satisfaction about the services provided by the library	259
<b>Table 52</b>	Descriptive statistics - Level of satisfaction about the library amenities	260
<b>Table 53</b>	Descriptive statistics - Opinion about the attitude and skill of library staff towards users	262
<b>Table 54</b>	One-Sample Statistics	263
<b>Table 55</b>	Group statistics - Gender and frequency of resource documents used between online and offline modes	264
<b>Table 56</b>	Independent sample t-test for Gender and frequency of resource documents used between online and offline modes	265
<b>Table 57</b>	Crosstabs	265
<b>Table 58</b>	Chi-square tests	266

## List of Figures:

<b>Figure 1</b>	Parameters of Competent Professional	18
<b>Figure 2</b>	A library's operational subsystem	20
<b>Figure 3</b>	Main Interface of SOUL	34
<b>Figure 4</b>	Main Interface of KOHA	34
<b>Figure 5</b>	Data to Wisdom	45
<b>Figure 6</b>	Hierarchy of LIS Professionals in University Libraries	66
<b>Figure 7</b>	Number of affiliated colleges for studies	192
<b>Figure 8</b>	Status of Collections Surveyed from Libraries	194
<b>Figure 9</b>	Journal Collections	195
<b>Figure 10</b>	Other Collections	197
<b>Figure 11</b>	Location of Universities	211
<b>Figure 12</b>	Distance from affiliated university	212
<b>Figure 13</b>	Staff having professional and ICT skill	213
<b>Figure 14</b>	Number of librarians	214
<b>Figure 15</b>	Work Status of the Librarian	215
<b>Figure 16</b>	Qualification of the Librarians	216
<b>Figure 17</b>	Work experience of Librarians	217
<b>Figure 18</b>	Collection of Books	219
<b>Figure 19</b>	Collection of Printed Journals	221
<b>Figure 20</b>	Total number of students	222
<b>Figure 21</b>	Opportunity for professional development	223
<b>Figure 22</b>	Access system used in Library	224
<b>Figure 23</b>	Mode of access to bibliographic databases	226
<b>Figure 24</b>	Usage of bibliographic services	227
<b>Figure 25</b>	Current awareness platform	228
<b>Figure 26</b>	Type of approach followed in library catalogue	230
<b>Figure 27</b>	Software used for digital preservation work for library under ICT application	231
<b>Figure 28</b>	Standards in library usage for digital preservation	232
<b>Figure 29</b>	Sample size calculator	234
<b>Figure 30</b>	Gender of the participant	235
<b>Figure 31</b>	Age of the respondents	236
<b>Figure 32</b>	Subject-wise categorization	237
<b>Figure 33</b>	Location of residence	238
<b>Figure 34</b>	Students Visiting Library	239
<b>Figure 35</b>	Library Membership among students	240
<b>Figure 36</b>	Frequency of Library visit	241
<b>Figure 37</b>	Time spent in library	242
<b>Figure 38</b>	Purpose of visiting the library	253
<b>Figure 39</b>	Catalogue facility	257
<b>Figure 40</b>	Library Catalogue Assistance	258



## **List of Abbreviations:**

<b>RFID</b>	Radio Frequency Identification
<b>IT</b>	Information Technology
<b>ICT</b>	Information Communication Technology
<b>CU</b>	University of Calcutta
<b>JU</b>	Jadavpur University
<b>KU</b>	University of Kalyani
<b>RBV</b>	Rabindra Bharati University
<b>NBU</b>	University of North Bengal
<b>VU</b>	Vidyasagar University
<b>BU</b>	The University of Burdwan
<b>WBSU</b>	West Bengal State University

# **Chapter 1: Introduction**

# **Chapter 1: Introduction**

## **1. Introduction**

The traditional perception of libraries as stockrooms of knowledge has transformed with the integration of ICT, revolutionizing routine tasks and enhancing access to information for library patrons.

- **Digital Transformation:** ICT has reorganized library routines, replacing manual processes with automated systems. Tasks such as acquisition, technical processing, and circulation activities are now efficiently managed with the help of technology.
- **Accessibility to Information:** The adoption of ICT in libraries has improved information access for patrons. Computers and the internet have become essential tools for providing sufficient information to library users in the age of technology.
- **Global Village:** ICT has played a crucial role in transforming the world into a global village. Libraries have embraced electronic librarianship, offering a range of amenities and services to cater to the needs of their clientele.

It is clear that ICT has brought significant changes to the library landscape, reshaping the way libraries function and serve their users. The integration of technology has enabled libraries to embrace new opportunities and enhance their role in providing access to information in the digital age.

ICT has revolutionized library and information services in several ways. Here are some key impacts of ICT on libraries:

- **Online Public Access Catalog (OPAC):** OPAC is a computerized database that enables users to search for and access library materials, such as books, journals, and multimedia resources. It provides a user-friendly interface and allows users to check availability, reserve items, and renew loans remotely.
- **Hypertext:** Hypertext allows users to navigate through interconnected information resources by following hyperlinks. In libraries, hypertext facilitates cross-referencing and linking related materials, making it easier for users to access additional information and explore different topics of interest.
- **Teleconferences:** ICT enables libraries to conduct teleconferences or virtual meetings, eliminating the need for physical presence. This facilitates collaboration among library

professionals, remote training sessions, and guest lectures by experts from different locations.

- **Access to Unlimited Information:** The World Wide Web and Internet connectivity have opened up vast repositories of information to library users. They can access online databases, e-books, scholarly articles, and other digital resources from anywhere, at any time, expanding their access beyond the physical collection of a single library.
- **Personalized Learning:** With ICT, users can customize their learning experiences and access information according to their individual needs and preferences. Online tutorials, video lectures, and interactive learning modules provide opportunities for self-paced learning and cater to diverse learning styles.
- **Automation and Efficiency:** ICT automates various library tasks, such as cataloging, circulation, and inventory management. Barcode machines, scanners, and integrated library systems streamline processes, reduce human error, and enhance efficiency in day-to-day operations.
- **Communication and Collaboration:** ICT facilitates communication and collaboration among library staff and users. Electronic mail, instant messaging, and online forums enable efficient information exchange, reference queries, and resource sharing among libraries and their patrons.
- **Preservation and Storage:** ICT provides digital preservation and storage solutions for library collections. CD-ROMs, external hard drives, and cloud storage enable libraries to store and protect valuable digital resources, ensuring their long-term accessibility and usability.

Overall, ICT has transformed libraries into dynamic and user-centered information hubs. It has expanded access to information, improved efficiency, and facilitated collaboration, empowering individuals to explore, learn, and interact with knowledge in innovative ways.

Information knowledge in a library refers to the processes and systems involved in acquiring, organizing, storing, and distributing information. This information can be in various forms such as textual or statistical (books, papers), vocal and instructive (audio recordings), or audio-visual (multimedia). According to Oni (2004), information equipment in libraries includes electronic infrastructures and facilities used by librarians to provide efficient services to their clientele. This encompasses hardware, software, and connectivity within a library, as well as connections to other libraries or similar outlets. Information knowledge also encompasses the range of computer and telecommunication technologies involved in the transfer and processing of

information. Information knowledge in libraries involves the management of information resources, utilizing electronic infrastructure, and employing various technologies to ensure effective acquisition, organization, storage, and distribution of information to library users.

In today's world, virtually every aspect of society relies on information technology. Information has become a vital component of our lives and should be readily accessible when needed. As a result, information services have evolved using new techniques to facilitate people's right to access information. The advent of the internet has revolutionized the way information is disseminated and accessed. It has opened up vast opportunities for individuals to access a wide range of information from various sources, regardless of geographical boundaries. The internet has facilitated the democratization of information, enabling people to acquire knowledge and stay informed about a wide array of topics.

Information services have adapted to this changing landscape by utilizing new techniques and technologies. Libraries and other information organizations have embraced digital platforms and online databases to provide easy access to information resources. Online catalogs, digital libraries, and electronic databases have made it possible to search, retrieve, and access information conveniently. Moreover, advancements in search engines, data mining, and information retrieval systems have enhanced the efficiency of finding and retrieving relevant information from the vast amount of data available. Information professionals play a crucial role in organizing and curating information, ensuring its quality and accessibility. Overall, the development of new techniques and technologies has facilitated the provision of information services and ensured that information is readily available to individuals when they need it. The right to access information is now more important than ever, and efforts continue to be made to improve information access and promote information literacy in society.

The introduction of IT in libraries and information centers has given rise to electronic library services. This integration of information technology has significantly changed the nature of information services provided by libraries. Over the past two decades, there has been a remarkable transformation in libraries due to information and communication technology (ICT). The advancements in technology have had a profound impact on the growth of knowledge and the unlocking of human talent. In libraries, this impact is evident in various aspects, including information resources, services, and the people involved.

Information technology has revolutionized the way information is stored, accessed, and disseminated in libraries. Digital resources, such as e-books, e-journals, and online databases,

have expanded the availability and accessibility of information. Libraries have adapted to these changes by incorporating digital technologies into their collections and providing online access to resources. Moreover, information technology has enabled libraries to enhance their services. Automation systems, integrated library management software, and online cataloging systems have streamlined library operations, making it easier for users to search for and retrieve information. The use of ICT has also facilitated efficient communication between libraries and their users, enabling online reference services and virtual assistance.

Regarding the definition of ICT, Nwachukwu (2005) describes it as a device or tool that allows for the collection, storage, processing, or communication of information. It encompasses the equipment and technologies used for capturing, processing, storing, and accessing information. This definition highlights the role of ICT as an essential tool for managing and utilizing information effectively. Overall, the integration of information technology in libraries has brought about significant changes and improvements in the way information is managed, accessed, and delivered. It has expanded the possibilities for knowledge acquisition and utilization, benefiting both library professionals and users.

The range of ICT devices is indeed vast and includes calculators, photocopiers, computer-related devices, barcode machines, networks, internet connectivity, email, scanners, printers, CD-ROMs, facsimile machines, and storage devices. The benefits of ICT in libraries, including university libraries, are numerous. The establishment of the National Virtual (Digital) Library Project by the Federal Ministry of Education is aimed at improving access to national and international library and information centers and facilitating the distribution of locally accessible resources with libraries around the world through digital technology. In this project, the National Universities Commission (NUC) serves as the laboratory for the university-based libraries' model of the Virtual (Digital) Library. This initiative recognizes the continuous expansion of computing machinery, communication technology, and mass storage technology. These advancements are reshaping the way libraries access, retrieve, store, manage, and distribute information to their users.

ICT devices, especially computer-related ones, have revolutionized library services. They enable libraries to digitize and store vast amounts of information in digital formats, making it easily accessible to users. Libraries can provide remote access to resources, allowing users to retrieve information from anywhere at any time. ICT devices also facilitate efficient information retrieval through search engines and online catalogs. Furthermore, the integration

of ICT devices in libraries improves information management processes. Digitized collections can be easily organized, updated, and preserved. Communication technology enables effective collaboration among library professionals and facilitates online reference services. Mass storage technology ensures that large amounts of data can be stored and retrieved efficiently. The benefits of ICT in libraries, including university libraries, are far-reaching. They enhance access to information, streamline library operations, foster collaboration, and expand the scope of resources available to users. The continuous advancement of ICT devices contributes to the ongoing transformation of libraries in their efforts to meet the evolving needs of users in the digital age.

Indeed, ICT has had a profound impact on all aspects of library operations, including the library's structure, acquisition methods, library building design, and consortia. The integration of ICT provides libraries with opportunities to offer value-added information services and access a wide range of digital-based information materials for their clients. Libraries have embraced ICT to automate core functions, implement efficient library collaboration and resource sharing networks, develop management information systems, establish institutional repositories of digital content, and create digital libraries. These initiatives aim to enhance the efficiency and effectiveness of library services while catering to the evolving needs of library users.

ICT has brought about extraordinary transformations and changes in university library and information services. Researchers and scholars have explored various aspects of information technology and its impact on libraries. Information technology, in this context, encompasses the acquisition, processing, storage, and distribution of information in textual, numerical, symbolic, and vocal forms. It is a broad term that encompasses the acquisition, organization, storage, and retrieval of information, which can take the form of text, numbers, audio-visual content, or multimedia. The utilization of computer and telecommunications devices plays a crucial role in facilitating these processes. By leveraging ICT, libraries are able to provide enhanced services, improve access to information, and offer a diverse range of resources to their users. The digital transformation facilitated by ICT has significantly expanded the possibilities and capabilities of libraries, enabling them to adapt to the changing information landscape and meet the information needs of their clients more effectively.

The management of knowledge is a fundamental aspect of the library profession, serving as the intellectual foundation on which it is built. Knowledge management forms the systematic

basis for librarians to claim professionalism in their field. The integration of information communication technology (ICT) in library activities, particularly in academic libraries, raises questions about the depth of information management. The availability of ICT infrastructure and peripherals has had a significant impact on reducing barriers, increasing the volume and scope of information that can be handled within a given timeframe, and enhancing the ease of access for library users. Technology has transformed library and information services delivery, leading to various advancements. Automated cataloging, circulation, and acquisition systems have greatly improved the management of library activities and enhanced the quality of services provided.

Currently, ICT offers libraries powerful new tools to fulfill the information needs of their patrons beyond traditional printed resources. Libraries can leverage technology to expand their offerings and provide access to digital resources, including electronic books, online journals, databases, and multimedia materials. This enables libraries to cater to diverse information needs and preferences while adapting to the digital age. By incorporating ICT into their operations, libraries can enhance their services, improve efficiency, and optimize resource management. ICT facilitates effective cataloging, efficient circulation of materials, seamless acquisition processes, and streamlined information retrieval. It enables libraries to provide personalized services, such as virtual reference assistance and online collaboration platforms. The integration of ICT in library activities has transformed the profession, empowering librarians to effectively manage information resources, deliver a wide range of services, and meet the evolving needs of library users. It has expanded the scope of information available, improved access, and allowed libraries to embrace new technological tools while upholding their traditional role as custodians of knowledge.

Edoka (2000) summarized some functions of the university libraries where the application of ICTs is imperative for better accomplishment. They are as follows:

- To provide information materials required for the academic programme of the parent institution
- To provide research information resources in consonance with the needs of faculty and research students
- To provide information resources for recreation and for personal self-development of users.
- To cooperate with other libraries at appropriate level for improved information services.



- To provide specialized information services to appropriate segments of the wide community.

Indeed, internet connectivity has opened up new possibilities for university libraries to extend their reach beyond their physical boundaries and provide access to resources available within their collections. Social media, exemplified by the library 2.0 model, has become an increasingly important tool for libraries to enhance their facilities and disseminate knowledge. Libraries are leveraging social media platforms such as Twitter to communicate important information to their patrons, including opening times and updates on new arrivals. Some libraries have even developed applications that allow users to search library catalogs directly within platforms like Facebook. These initiatives demonstrate the integration of ICTs and social media tools into library services, making information more accessible and engaging for users.

The application of ICTs in libraries has undoubtedly brought about significant innovations, transforming the shape of libraries and redefining the roles of librarians. Computer technology, communication technology, and storage technology have revolutionized the way libraries access, retrieve, store, manage, and distribute information to their patrons. The use of computer technology enables libraries to automate processes such as cataloging, circulation, and acquisitions, resulting in improved efficiency and better management of resources. Communication technology facilitates seamless collaboration between libraries and their users, enabling virtual reference services, online discussions, and information sharing. Storage technology allows libraries to store vast amounts of digital content and make it easily accessible to patrons, expanding the range of resources available.

Overall, the application of ICTs in libraries has brought about transformative changes, enhancing information access, improving library services, and reshaping the role of librarians. It is an ongoing process that continues to evolve as new technologies emerge. By embracing these advancements, libraries can better serve their patrons and adapt to the changing information landscape.

ICT has had a significant impact on every aspect of academic library services, including library structure and consortiums. The introduction of ICT has brought about unprecedented changes and transformations in academic library and information services. With the help of ICT, traditional library services such as the Online Public Access Catalog (OPAC), user services, reference services, bibliographic services, current awareness services, document delivery,

interlibrary loan, audiovisual services, and customer relations can be provided more efficiently and professionally. ICT enables libraries to offer services that are convenient in terms of time, location, cost-effectiveness, and provide quicker access to the most up-to-date information. Users are actively involved in the library and information process, benefiting from the advancements in ICT.

One of the key benefits of ICT in libraries, as pointed out by Nwalo (2000), is the automation of technical services. This includes tasks such as cataloging, authority control, interlibrary loans, and participation in international bibliographic projects. Automation streamlines these processes, making them more efficient and reducing manual labor. Furthermore, ICT enables libraries to deliver efficient reference and information services. Online databases, digital resources, and electronic journals provide users with quick and easy access to a wealth of information. Libraries can network their operations, facilitating collaboration and resource sharing among libraries. This enhances cataloging, authority control, and interlibrary loan services, improving the overall efficiency and effectiveness of the library system. ICT has revolutionized academic library services, empowering libraries to provide enhanced and streamlined services to their users. It has improved access to information, increased operational efficiency, and transformed the way libraries interact with their patrons. The benefits of ICT in libraries are numerous and continue to shape the future of academic library services.

The functions performed by libraries have become faster and less cumbersome with the implementation of ICT facilities. Ajayi (2001) describes how libraries have transformed into new information service units, providing electronic cataloging, Online Public Access Catalogue (OPAC), electronic acquisition and serials control, electronic inter-library loan, and electronic circulation functions. These technological advancements have significantly improved the efficiency and effectiveness of library operations. The university library, in particular, benefits greatly from ICT. As the intellectual hub of the academic institution, it plays a crucial role in ensuring the availability of adequate information materials and providing assistance to meet the information needs of staff, students, and researchers. Modern ICT facilities, such as the internet, have revolutionized information dissemination in university libraries. Electronic theses and dissertations, for example, enable students and researchers to access millions of pages of relevant information from the web. This expands the range of resources available and enhances the research capabilities of library users.

The impact of ICT on information services is profound, transforming the organization, content, and delivery methods of information products. Libraries are able to adapt to changing information landscapes and deliver information more efficiently through digital platforms. They can provide a diverse range of electronic resources, including e-books, online journals, databases, and multimedia materials. This ensures that library users have access to up-to-date and relevant information to support their academic and research endeavors. ICT has also revolutionized the way libraries interact with their users. Online platforms, virtual reference services, and digital collaboration tools enable libraries to engage with their patrons remotely and provide assistance regardless of physical location. This enhances user experience and extends the reach of library services beyond the physical library space. The impact of ICT on libraries, particularly university libraries, has been transformative. It has redefined the arrangement, content, and delivery of information services, enabling libraries to meet the evolving information needs of their users effectively.

### **1.1 Background of the study**

Handling information has become increasingly important in everyday activities, especially in libraries, due to the development of electronic resources and the application of information and communication technology (ICT). Library personnel play a crucial role in leading libraries from their traditional duties to more complex roles in the digital dissemination of information. This transition presents challenges in defining the capabilities of library and information science (LIS) professionals in an ICT environment.

ICT applications have impacted all aspects of library management. Computers, printers, modems, RFID technology, V-SAT, and other communication equipment have revolutionized library functions and services. These technologies have enabled efficient cataloging, circulation, acquisition, interlibrary loan, and resource sharing, among other activities. Libraries have also adopted digital platforms and systems for managing electronic resources, providing access to online databases, and offering virtual reference services. In order to effectively cope with this changing landscape, LIS professionals need to be ICT competent. They should possess the necessary knowledge and skills to utilize ICT resources effectively, ensuring efficient utilization of library resources, user satisfaction, and staff motivation. ICT competence includes proficiency in using library management systems, digital repositories, online search tools, and other technologies relevant to library operations. LIS professionals

should also be adept at information retrieval, digital curation, and data management to effectively serve the information needs of library users.

Continual professional development and training programs are essential for LIS professionals to stay updated with emerging technologies and advancements in ICT. This enables them to adapt to new tools and techniques, implement best practices, and provide innovative services that meet the changing needs of library users. ICT has transformed library functions and services, requiring LIS professionals to be competent in utilizing ICT resources and embracing digital information dissemination. By acquiring and honing their ICT skills, LIS professionals can contribute to the effective management of resources, the satisfaction of library users, and the overall success of library services in the digital age.

Indeed, libraries in India, like in other parts of the world, are facing challenges as a result of the changing landscape of information generation, transmission, dissemination, and archiving, largely driven by the increasing presence of electronic formats. These challenges necessitate libraries to adapt and address various aspects, such as storage and provision of information in different digital formats (e.g., PDF, JPG, HTML) to cater to diverse users across the globe through various media (e.g., phone, email, social networking sites) simultaneously. Additionally, managing online learning communities and functioning in virtual environments pose further challenges. In the context of a globally connected and networked society, it becomes apparent that university libraries, lacking ICT competent professionals, may run the risk of becoming outdated. ICT competence among library professionals is crucial to staying abreast of technological advancements, meeting the evolving needs of users, and effectively leveraging ICT tools and platforms for information management and dissemination.

ICT competent professionals in libraries are equipped with the necessary knowledge and skills to navigate digital resources, utilize information management systems, engage with online learning communities, and adapt to virtual environments. They can effectively address the challenges posed by the changing information landscape and contribute to the modernization and relevance of university libraries. By leveraging ICT, these professionals can ensure the seamless provision of information services, facilitate global access to resources, foster collaboration and knowledge sharing, and enhance user experiences in a digital era. It is essential for libraries to invest in ongoing professional development and training programs to equip their staff with the necessary ICT competencies. By doing so, libraries can stay up-to-

date with emerging technologies, harness the potential of digital platforms, and remain integral and indispensable in the information ecosystem.

The challenges faced by libraries in India and elsewhere due to the proliferation of electronic formats emphasize the importance of ICT competence among library professionals. Adopting and leveraging ICT tools and platforms enable libraries to stay relevant, effectively manage information resources, and meet the diverse needs of users in today's digitally connected world. The Association of College and Research Libraries (ACRL, 2008) correctly highlights the importance of technology skills for information literate individuals. In today's digital age, library professionals need to acquire ICT competencies that go beyond traditional library skills. The future roadmap for ICT competency framework for LIS professionals is indeed varied and multi-faceted.

To ensure that library services are available to users on demand and in convenient locations worldwide, it is essential to have appropriate ICT infrastructure and tools in place. This includes workflow processes, networked computers, and peripherals such as printers, scanners, and modems. The empowerment of library users is facilitated by employing personnel who possess both technical and academic qualifications. These personnel serve as the initial point of contact with users, and their competencies are crucial in meeting user needs effectively. Therefore, placing proper emphasis on acquiring ICT competencies is critically important for libraries to adapt to the paradigmatic changes brought about by digital advancements. Defining and measuring competencies, especially in the context of ICT-based library services, is essential for assessing the effectiveness and proficiency of library professionals.

Developing a comprehensive framework for ICT competencies involves identifying the specific skills and knowledge required for different roles within the library. This includes proficiency in using library management systems, digital resource platforms, information retrieval tools, data management techniques, and online communication and collaboration platforms. Additionally, competencies related to information literacy instruction, digital preservation, copyright and intellectual property, privacy and security, and emerging technologies should also be considered. Regular assessment and continuous professional development programs can help ensure that library professionals stay up-to-date with evolving ICT trends and acquire the necessary competencies to provide high-quality services in the digital age. Collaboration among professional organizations, academic institutions, and library consortia can contribute to the development and implementation of standardized ICT

competency frameworks, enabling consistent evaluation and enhancement of ICT skills among library professionals.

In conclusion, defining and measuring ICT competencies is crucial for library professionals to effectively navigate the digital landscape and provide modern and relevant services to users. Acquiring and maintaining ICT competencies should be a priority for library professionals, supported by appropriate training, resources, and collaboration within the library community. The emerging immediate questions are:

How to impart ICT competencies to LIS professionals,

- How to ascertain that LIS professionals are equipped with ICT skills sufficiently towards attainment of competency and perform their roles effectively and
- How to ascertain the level of acquired competencies towards meeting the requirements of the job.

The housekeeping operations of a library system are indeed crucial for the effective provision of library services. In the context of a university library, it is important to monitor the application of online and offline services based on the infrastructure facilities provided by the university authorities and the nature of use by the library users. Evaluating the fulfillment of user needs through library services is essential for assessing the overall functioning of the library system.

Infrastructure refers to the various types of equipment and facilities provided by the university authorities to support housekeeping operations in the library. This can include computer systems, servers, networking equipment, software applications, security systems, and other resources necessary for the smooth functioning of library services. Adequate and up-to-date infrastructure is vital for supporting library automation and ensuring efficient operations.

Library automation involves the implementation of information and communications technologies (ICT) in libraries and information centers to replace manual library operations. It enables libraries to optimize resource utilization, enhance operational efficiencies, provide network access to systems and resources on the web, facilitate resource sharing, deliver high-quality library services, and improve the overall user experience.

Library automation covers various areas of library work, including cataloging and classification of materials, circulation and lending operations, acquisitions and procurement processes, serials management, interlibrary loan services, digital repository management, and more. By

automating these tasks, libraries can streamline their workflows, reduce manual labor, enhance accuracy and accessibility of information, and provide faster and more efficient services to library users.

The implementation of library automation systems also facilitates integration with other information systems and platforms, such as online databases, digital libraries, institutional repositories, and discovery tools. This integration enables users to access a wide range of resources and services through a unified interface, promoting seamless navigation and discovery of library materials. Overall, library automation through ICT enables libraries to leverage technology to its fullest potential, improving resource management, service delivery, and user satisfaction. It enhances the efficiency and effectiveness of library operations, allowing libraries to keep pace with the evolving information landscape and meet the changing needs of their users. These include

- Housekeeping operations,
- Information retrieval,
- Digital asset management,
- Networking libraries,
- Internet and Web based services,
- Electronic library resources on CD-ROM and on the Web,
- Digitization operations,
- Remote access to libraries and library resources and
- Office automation.

These functions, including acquisitions, cataloguing, circulation, and maintenance, are essential for the smooth functioning of any library. Traditionally, these housekeeping functions were performed manually, requiring significant human effort and time. However, with the emergence of Information and Communication Technologies (ICT), libraries have prioritized the automation of these operations. The automation of housekeeping functions offers numerous benefits to libraries.

Firstly, automation reduces the reliance on manual labor and minimizes repetitive tasks. By implementing automated systems and software, libraries can streamline processes, such as

acquisitions, cataloguing, and circulation, leading to increased efficiency and productivity. This allows library staff to focus on more specialized and value-added tasks, such as user assistance and collection development.

Furthermore, automation enables libraries to redefine their workflows and optimize resource allocation. With automated systems, libraries can track and manage acquisitions, catalog records, and circulation activities more effectively. This results in improved inventory control, faster cataloguing and processing times, and enhanced circulation services for library users. Automation also facilitates staff multitasking, as library personnel can handle multiple tasks simultaneously through the use of automated systems. This flexibility empowers staff members to handle diverse responsibilities and respond to user needs more efficiently.

Moreover, automation enhances the overall productivity of library staff. By reducing manual data entry and repetitive tasks, staff members can allocate their time and efforts towards more strategic activities, such as user engagement, information literacy instruction, and collection development. In addition to immediate operational benefits, automation of library housekeeping operations holds long-term potential. As libraries accumulate digital resources and engage in digitization initiatives, automation becomes crucial for effectively managing and providing access to digital collections. Automated systems enable efficient handling, storage, and retrieval of digital materials, contributing to the growth of digital libraries and facilitating access to a wider range of resources for library users.

Overall, automation of library housekeeping operations through ICT has become a critical area for libraries. It improves efficiency, productivity, and resource management, freeing up staff time for more valuable tasks. By embracing automation, libraries can adapt to the evolving information landscape and provide better services to their users.

The housekeeping functions of a library include acquisitions, processing, use, and maintenance. These functions are integral to the smooth operation of a library, regardless of its type or size. Acquisitions involve the process of acquiring new materials for the library's collection. This includes activities such as selecting and purchasing materials, receiving and cataloguing them, and updating the library's inventory. Automation can greatly streamline these tasks by facilitating online ordering, electronic cataloguing, and automated updates to the library's collection management system.

Processing refers to the activities involved in preparing materials for use by library patrons. This includes tasks such as cataloguing, classifying, and labeling items, as well as creating



records in the library's database. Automation can speed up these processes through the use of cataloguing software, integrated library systems, and barcode technology for item identification. Use encompasses the activities related to providing access to library materials and assisting users in locating and retrieving resources. This includes circulation services, reference assistance, interlibrary loan, and other user support services. Automation can improve user experience by enabling self-checkout systems, online request and renewal options, and virtual reference services.

Maintenance involves the ongoing management and preservation of the library's collection and physical facilities. This includes tasks such as shelving and shelf-reading, weeding outdated materials, repairing damaged items, and maintaining the library's physical space. Automation can assist in inventory management, monitoring circulation patterns, and implementing preventive maintenance systems for library infrastructure. Within the operational subsystem, these housekeeping functions work together to ensure the effective management of the library's resources and services. By implementing computerization and automation, libraries can enhance efficiency, accuracy, and accessibility in these operations.

Libraries can be viewed as complex systems comprising various subsystems and components. The administrative subsystem, which includes functions such as financial management, human resources, and strategic planning, supports the operational subsystem in achieving the library's goals and objectives. Analyzing and optimizing the housekeeping operations within the operational subsystem is essential for improving library services. By identifying procedures and activities within each division, libraries can streamline workflows, eliminate redundancies, and allocate resources effectively. Computerization and automation play a crucial role in enhancing the efficiency and effectiveness of library housekeeping operations. By leveraging technology, libraries can improve acquisition processes, streamline material processing, enhance user services, and ensure proper maintenance of resources. This, in turn, contributes to the overall success and value of the library as a complex information system.

Sharma (2004), Ikoja (2006), and Kumar (2010) regarding the gaps in acquiring ICT skills among library and information science (LIS) professionals. The rapid advancements in technology often outpace the inclusion of these developments in LIS curricula, resulting in a knowledge gap among professionals. To address this issue, on-the-job training becomes crucial for LIS professionals to acquire the necessary ICT skills and keep up with the latest

technological trends. This training can help bridge the gap between formal education and the practical application of ICT in library settings.

However, acquiring technical skills alone does not guarantee ideal performance or meet organizational standards. LIS professionals also need to possess a set of behavioral traits that enable them to effectively carry out their duties. These traits may include adaptability, problem-solving abilities, effective communication, teamwork, and a customer-oriented mindset. Moreover, the challenge for LIS professionals goes beyond acquiring technical skills and behavioral traits. They must also possess the ability to envision and implement the necessary steps to enhance their performance and contribute to the effectiveness of their organizations. This may involve staying updated with emerging technologies, embracing continuous learning and professional development, and actively seeking opportunities to improve their skills and knowledge. While on-the-job training can help address the gaps in ICT skills among LIS professionals, it is essential to recognize the importance of behavioral traits and the ability to adapt and implement effective practices. Continuous learning and a proactive approach to professional growth are vital for LIS professionals to meet the challenges posed by the evolving information landscape and effectively serve their users and organizations.

Creating an environment that supports continuous learning and provides opportunities for professionals to acquire and enhance their ICT skills while on the job is indeed beneficial. By implementing such a framework, university libraries can ensure that their LIS professionals are updated with the latest technological advancements in the field. This, in turn, enhances the accessibility of library services for all users. The framework can provide a standardized approach to assess, maintain, and monitor the ICT competencies of personnel within the organization.

Transparency in outlining specific job descriptions and competencies for each LIS professional within the ICT competency framework is crucial. This clarity helps professionals understand their roles, responsibilities, and the specific ICT skills they need to acquire and demonstrate. It also provides a guideline for professional development and performance evaluation, enabling professionals to align their competencies with organizational goals and user needs. Regular maintenance and monitoring of competencies within the framework can help identify gaps and areas for improvement. It allows for targeted training programs and ensures that professionals have the necessary skills to effectively utilize ICT tools and technologies in their roles.

Overall, the ICT competency framework you described provides a systematic approach to foster continuous learning, standardize competencies, and enhance the accessibility of library services. It promotes the professional growth of LIS personnel and aligns their skills with the evolving needs of the organization and its users.



*Figure 1: Parameters of Competent Professional*

The framework provides a means to measure the current levels of ICT competencies among personnel, allowing the organization to assess the existing skillset and identify any gaps or areas of improvement. This enables the organization to address those shortcomings and enhance the expertise of its personnel. By identifying specific behavioural skills required for each work area and job, the framework helps the higher authorities make informed decisions regarding recruitment, retention, and succession planning. It provides valuable insights into the skills and competencies needed for various positions, allowing the organization to strategically plan for training and development programs. This ensures that the necessary budget and resources are allocated to improve the competencies of the staff in line with the organization's goals.

Furthermore, the framework helps to identify problematic areas and enables improvements in various aspects, such as the LIS curriculum, professional requirements, and policies for staff

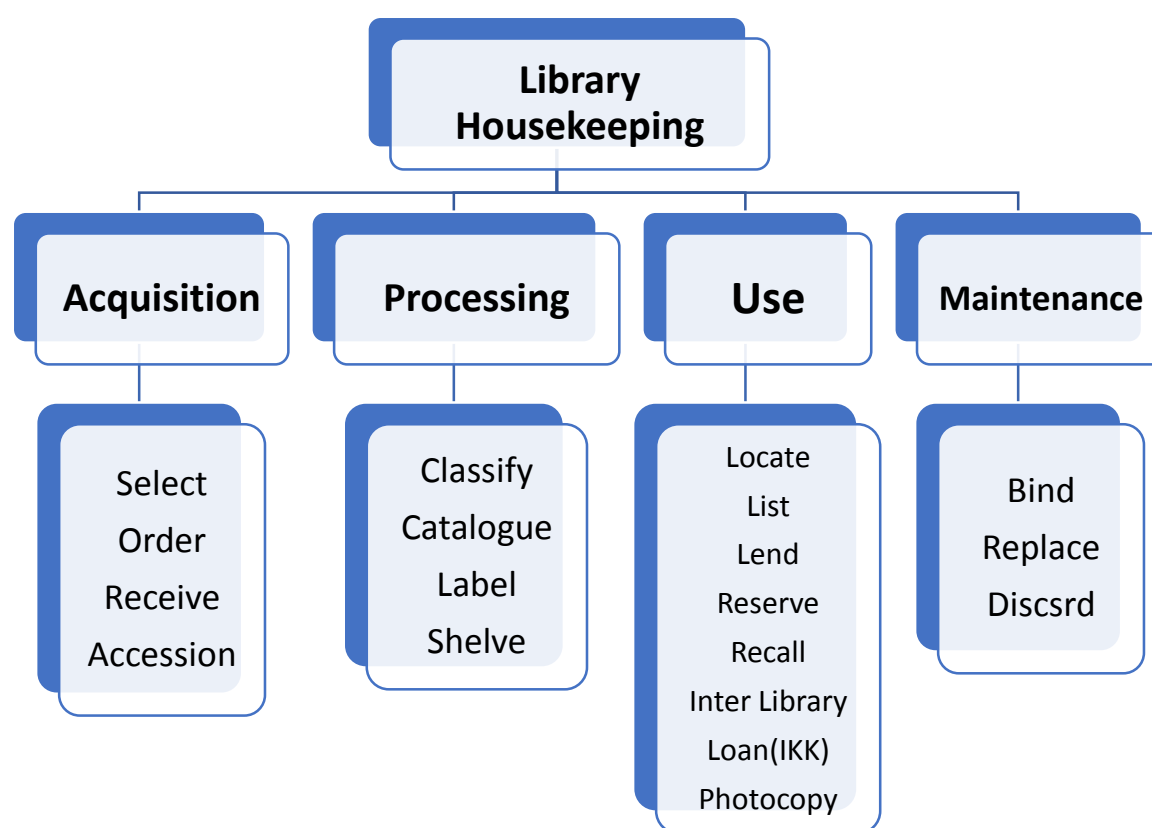
development programs. It ensures that the curriculum and professional requirements are aligned with the demands of the ICT environment, allowing LIS professionals to stay updated with the latest technological advancements and trends. Continuing education and professional development programs can be designed based on the identified competencies and areas of improvement, providing opportunities for LIS professionals to enhance their skills and knowledge in the ICT field. This continuous improvement helps add value to their work profile and the overall profession. Overall, the ICT competency framework not only benefits individual professionals by enhancing their skills and expertise but also supports the organization in making informed decisions, allocating resources effectively, and improving the overall effectiveness and efficiency of library services in the ICT environment.

### **1.1.1 Definition of Housekeeping and area of housekeeping**

Housekeeping in the context of library systems refers to the set of routine operations that are essential for the daily functioning and maintenance of the library. These operations are crucial for managing the library's collection and ensuring efficient service delivery to users. The implementation of Information and Communication Technologies (ICT) in housekeeping operations is aimed at automating these tasks, thereby enhancing efficiency, reducing manual labor, and improving overall user experience.

#### **Areas of Housekeeping Operations**

The performance of a library largely depends on the organisation of its housekeeping operations. Most of the activities related to library housekeeping follow some definite routines and obviously amenable to computerisation. It means a computer or a group of computers can perform routine clerical chores quickly and cheaply. In a library, regardless of size or type, there are four main elements of housekeeping:



*Figure 2: A library's operational subsystem*

A library's operational subsystem is made up of these functions. Using ICT can improve efficiency, resource management, and library service quality through automation.

### **1.1.2 Use of ICT applications in housekeeping areas**

Using ICT (Information and Communication Technologies) applications in the housekeeping areas of library operations can significantly enhance efficiency, accuracy, and user satisfaction. Here are the ways ICT can be integrated into each area of housekeeping operations:

#### **Acquisitions**

Acquisition of documents is one of the basic functions associated with any library. A library must acquire and provide all the relevant documents to its users within its budgetary limitations. An acquisition subsystem performs four basic operations. They are selection, ordering, receiving and accessioning of documents. Let us try and understand as to how these operations are performed in a library.

## Selection

Selection of documents for library users is a very responsible job and should be based on definite principles and accepted norms. For a given library the book budget is limited and it should be spent judiciously to provide services to an optimum number of library users. Therefore, book selection becomes necessary. There are a number of tools (such as bibliographies, publisher's catalogues, etc.) which will be useful to library staff in the selection process. Requests from library users and suggestions from library authority are also considered for selection purposes. Such selections of documents need the approval of the competent authority, before they are ordered for purchase in the library.

*Table 1: Housekeeping Operations Related to Handling of Monographic Materials in a Library*

<b>Systems</b>	<b>Subsystems</b>	<b>Operational Subsystems</b>	<b>Procedures</b>	<b>Activities (Common to all Procedures)</b>
Library System	Operational Subsystem	Acquisition	Select Order Receive Accession	Initiate (Commence a procedure)
		Processing	Classify Catalogue Label Shelve	Authorise (To approve a procedure)
		Use	Locate List Lend/Issue/Reserve Recall/ Return ILL (Inter Library Loan) Photocopy	Activate (To implement a procedure through appropriate action)
		Maintenance	Bind Replace Discard	Record (To record what action has been taken)  Report

				(To notify staff or user about the action)
				Cancel (To stop a procedure or undoing an action)
	Administrative Subsystem			

### Ordering

This procedure starts with pre-order searching, especially to avoid duplicate orders. In the next stage, purchase orders are generated and placed either directly to the respective publishers or to the list of vendors duly approved by the competent authority. Additionally, generation of reminders for overdue items and cancellation of orders also comes under the purview of ordering procedure.

### Receiving

Documents and invoices or bills usually arrive together. Bills are checked with the order list before processing for payment. Newly arrived books are tallied with the bills and the order list to check whether the books received are as per the order and the author, title, edition, imprints and price are correct before accessioning. It is essential to ensure that books are not defective in any way before accessioning.

### Accessioning

A stock register is maintained by libraries in which all the documents purchased or received in exchange or as gift are recorded. Each document is provided with a consecutive serial number. The register is called Accession Register and the serial number to each document is referred to as Accession Number of the document. Accession register is one of the important records of the library. All the above-mentioned procedures and related activities of the acquisition subsystem can be mechanised through 'library management software'. In such a system these basic activities are linked with the files of publishers, suppliers, budget and fund accounting, currency, etc. These files are maintained in computer-readable form and are utilised appropriately.

### **Integrated Library Systems (ILS)**

ICT applications like ILS can automate the process of selecting, ordering, receiving, and accessioning library materials. These systems maintain databases of vendors, manage purchase orders, track budgets, and facilitate the electronic invoicing and payment processes.

### **Electronic Data Interchange (EDI)**

EDI allows libraries to exchange purchase orders and invoices electronically with suppliers, streamlining the procurement process.

### **Online Catalogs and Databases**

Use of online databases and publisher websites for selecting materials based on reviews, availability, and user demand.

### **Processing**

The processing procedure is the pivot around which all the housekeeping operations revolve in a library. Processing helps in the transformation of a library collection into serviceable resources. The procedures under this subdivision are classification, cataloguing, labelling and shelving.

### **Classification of Documents**

Classification is grouping similar objects together. This principle is used to organise documents in libraries according to their subject content. It forms the foundation of librarianship. The following are the important classification schemes (aka systems), which are used in different libraries of the world: Dewey Decimal Classification (DDC), Universal Decimal Classification (UDC), Library of Congress Classification (LC), Colon Classification (CC) and Subject Classification (SC), etc. The purposes for classifying of documents are:

- to help a user to find a document whose call number (i.e., class number + book number) s/he knows. The class number represents the subject of a book while the book number individualises it among books on the same subject.
- to find out all the documents on a given subject.

Classification is a mental process and demands intellectual exercises from a classifier. As a result, automatic synthesis of class numbers requires the application of Artificial Intelligence (AI) techniques in the development of software. In India, some research work on this topic has



already been carried out at DRTC, Bangalore for building class numbers (based on Colon Classification) automatically through a software (called Vasya), written in PROLOG (PROgramming in LOGic) – a non-procedural programming language. The electronic version of Dewey (Electronic Dewey) is available on CDROM.

### Cataloguing

A library's first task is to assemble a collection of documents and then it must catalogue that collection. Cataloguing is the prime method of providing access to the collection of a library. The current practices for cataloguing resources in Indian libraries may be tabulated as shown in Table

*Table 2: Current Practices in Cataloguing Resources*

Group	Cataloguing Procedure	Product
1	Manual Cataloguing	Card Catalogue
2	Computerised Cataloguing	Machine readable catalogue OPAC (Online Public Access Catalogue)
3	Hybrid Model (Use of computer to produce printed catalogue cards and manual filing)	Printed Catalogue Card Machine readable catalogue OPAC (Online Public Access Catalogue)

All these cataloguing procedures start with technical reading of the document to be catalogued by studying title, sub-title, alternate title, author, editor, edition, reprint, imprint, dedication, preface, table of contents, collation, series, bibliographies, etc. In case of manual cataloguing, the cataloguer makes separate cards for author, title, subject, cross references and analytical entries by following any standard catalogue code (such as AACR-2, CCC, etc.) and file them as per the rules laid down by the library. Computerised cataloguing begins with entering bibliographical data of a book in a predesigned worksheet. The worksheet or datasheet is very similar to a data entry form and is based on any standard bibliographic record format (such as MARC 21, CCF, UNIMARC, etc.). Finally bibliographical data recorded in the worksheets are entered into the computer to produce a machine-readable catalogue file and OPAC. Computer based cataloguing supports importing of bibliographical records for the library resources either from centralised cataloguing service agency or from other libraries. Computer based

cataloguing also supports exporting of bibliographical data of its own collection to other library systems. This facility reduces unit cost of cataloguing and ensures standardisation in cataloguing. The recent trend of cataloguing is to utilise Z39.50 protocol to download bibliographical data from other libraries and to provide global access to its own collection through Web OPAC.

### **Labelling**

It is the work of pasting various labels on different parts of a document. The following labels are generally pasted in books:

**Spine label:** This is done to make call number (a combination of class number and book number) properly visible to the users when the book is shelved. The size of the label is in the range of 1.25"×1.25".

**Ownership slip/mark:** These are generally pasted on the inner side of the front cover at left hand top most corner. Ownership marks are put at various parts of a document by rubber stamps. The size of slip is 3"×2.5".

**Date slip:** It is pasted on the top most portion of the front or back flyleaf of each book. The size of date slip is 5"×3".

**Book pocket:** On the bottom of the inner right side of the front or back cardboard cover a book pocket is pasted.

**Book card:** One printed/hand-written book card of size 5"×3" is put in the book pocket of each book.

In a computerised environment, various labels are printed by using library management software. In case of barcode based computerised circulation, accession numbers of documents are converted into barcodes and printouts of barcodes are pasted on the inner back cover of the documents.

### **Shelving**

Shelving is the arrangement of documents on the shelves to fulfil the fourth law of library science – Save time of the reader. Generally, books are arranged on the shelves in a classified order as per the call number. Bound volumes of periodicals are generally shelved alphabetically by title and then by volume numbers.

## **Cataloging Software**

ICT tools can automate the cataloging process, including creating and editing metadata for library materials. Systems like MARC (Machine-Readable Cataloging) and RDA (Resource Description and Access) are commonly used for standardized data entry.

## **Barcode/RFID Systems**

These technologies facilitate the physical processing of materials by tagging items with barcodes or RFID chips for easy tracking, circulation, and inventory management.

## **Label Printing Systems**

Automated systems for printing spine labels and other identifying markers for materials.

## **Circulation**

Most libraries lend books and other library materials to be read elsewhere by users. This is convenient for the users; this increases the use made of library collections and reduces the demand on reading space within library building. This function requires some sort of record keeping of what has been lent and to whom. The reasons for keeping loan records are:

- to minimise the loss of library materials; and
- to help library staff to answer users' queries about the location of items not on the shelves.

A variety of systems for record keeping of loans have come into being based on needs. These are known as circulation systems. These involve some common jobs for successful implementation such as enrolment of members, issue and return of library documents, reservation of documents, renewal of documents, maintenance of documents and records, maintenance of statistics, inter-library loan, issuing of gate pass, etc.

In a computer- based circulation system, the machine-readable file consists of records for all items on loan from the library updated periodically with new records. This file is called “transaction file” and it takes required data from other two files – “document file” and “borrower file”.

Modern library management software support barcode-based circulation system. In such a system, a barcode reader scans barcode for accession number of a document and the barcode in turn acts as a pointer to the document file. It helps to minimise labour and error in data entry

operation. The concept of RFID (Radio Frequency Identification) based circulation system is emerging rapidly in developed countries. It comprises three components: a tag, a reader and an antenna. The tag contains important bibliographical data. The reader decodes the information stored on the chip after receiving it through the antenna and sends data to the central server to communicate library automation system. RFID technology supports patron self-checkout machines and has the ability to conduct inventory counts without removing a single book from the shelves. As a whole, RFID improves library workflow, staff productivity and customer service.

### **Serials Control**

Serials in general and periodicals in particular are essential for research and development (R&D) activities. These are the primary means of communication for the exchange of scientific information. The periodicals or journals subscribed by libraries can be grouped into the following categories:

- Indexing/Abstracting periodicals
- Periodicals containing news items
- Periodicals containing full-text research articles and technical papers

Acquisition of serials/periodicals in a library is different from book ordering system. In contrast to books, the libraries regularly subscribe periodicals against advance payment. The modes of subscription of periodicals in a library are as follows:

- through local vendors/subscription agents
- through foreign vendors/subscription agents
- direct from the publishers
- as gift or complementary
- through membership
- in exchange

The fundamental tasks of any serials control system, manual or mechanised, can be listed as below:

- 1) Selection of serials
- 2) Selection of subscription mode
- 3) Formulation of terms of procurement

- 4) Selection of vendors
- 5) Order
- 6) Advance payment
- 7) Receiving and registration of serials issues in kardex
- 8) Sending reminders in case of issues not received
- 9) Adjustment of advance payment for missing issues
- 10) Preparation of list of subscribed journals, new arrivals and serials holdings for consultation by users
- 11) Binding and accessioning of back volumes of serials.

In an automated system all these tasks are performed by library management software efficiently. It reduces workload of library staff. Computer based serials control systems may be predictive or non-predictive. Predictive systems predict the arrival of individual journal issues and can generate reminders in case of non-receipted issues. Prediction means the ability to inform that a named issue of a named journal will arrive in the library within a stated time interval. Modern library management software supports predictive mode of serials control with the facilities of online acquisition and access of journals through World Wide Web (WWW).

### **Automated Circulation Systems**

ICT applications manage the checkout and check-in processes, track user accounts, and handle reservations and recalls. They also manage overdue items and fines.

### **Self-Check Machines**

These kiosks allow users to check out and return materials independently, reducing the need for staff intervention and enhancing user convenience.

### **Online Public Access Catalogs (OPAC)**

Users can search the library's holdings, place holds on items, and check their account status online.

## **Maintenance**

If we don't take proper care to organise and administer the library documents regularly, these documents would become unserviceable resources immediately. The workflow of the maintenance division/section includes following tasks:

Shelf Rectification : It is to shelve misplaced documents in proper locations

Bind : It is to preserve library resources for future and present use

Replace : It is to replace a lost document by the library

Discard / Withdrawn : It is to weed out out-dated and torn and soiled documents from the library for making enough space for usable stock

The integrated library automation environment requires information on lost, damaged, missing and withdrawn documents as well as documents sent for binding. These datasets are to be entered to generate and display appropriate messages for the library users and staff against specific tasks in different modules. This is also required to generate reports on lost books, missing books, books sent for binding, etc. for the library administration.

## **Inventory Management Systems**

These systems help track the physical location and condition of materials, manage repairs, binding, and replacements, and keep the collection up to date.

## **Automated Weeding Tools**

ICT can assist in identifying items for removal based on criteria like age, condition, circulation statistics, and relevance.

## **Digital Preservation Systems**

For libraries with digital collections, ICT applications can manage the storage, backup, and long-term preservation of digital assets.

## **Task analysis of housekeeping operations**

In considering libraries from the general organisational perspective, the analysis of housekeeping system is useful for planning automation of a library. It is a prerequisite to the design and use of any library management software and to communicate with software vendors

and programmers. A close analysis of the operations involved in library housekeeping provides us three hierarchical levels – procedures, activities and tasks.

### **Procedures and Activities**

The design and use of an automated library housekeeping system requires the analysis of all these procedures into their atomic structure. It will help to understand and implement mechanised housekeeping operations in an automated environment. The procedures under each and every operational subsystem have been analysed by P.A. Thomas (1975) in terms of six possible activities – initiate, authorise, activate, record, report and cancel. All of these activities may not be involved in every procedure. There are one or more of six possible activities against each procedure. The six common activities are defined as:

Initiate	That which makes it apparent that a procedure should be commenced.
Authorise	In some cases, the decision to carry out a certain procedure must be approved before any further action is taken.
Activate	When a procedure is known to be necessary and in some cases approved, it is usually implemented by taking appropriate actions.
Record	The function that states or records what action has been taken.
Report	To notify library staff or users that action has been taken.
Cancel	To stop a procedure, in particular the aspect of revoking or undoing an action.

### **Tasks**

The third level in the hierarchy is concerned with ‘tasks’ within an activity under each procedure. Task means a related group of operations carried out to perform a particular kind of job. In an automated library system a task is the collective functions of the elements for the accomplishment of the module at the next higher level. Tasks within each activity, just as the activities themselves, may not all be necessary to each procedure. Most of the works in the operational subsystems of a library include making or using discrete records with bibliographic and administrative information referring to one particular document. In this context, ASLIB defined a set of fifteen tasks for the basic procedures. These are – pass, receive, discard, place, remove, search, duplicate, attach, separate, move, sort. Such tasks are supported by other four element tasks namely read, verify, enter and decide.

The analysis of tasks to perform activities within procedures may be done through a set of five primary questions:

- What information is needed for the activity?
- Where from is the information obtained?
- When is it required?
- Who requires it?
- How is it used?

These five questions should be asked to carry out possible activities under each procedure. It provides depth to the framework provided by the procedural model. An example of this approach may be shown in the context of five possible activities of book order procedure in acquisition subsystem.

*Table 3: Current Practices in Cataloguing Resources*

<b>SYSTEM</b>	<b>LIBRARY SYSTEM</b>				
<b>SUB SYSTEM</b>	<b>ACQUISITION SUBSYSTEM</b>				
<b>PROCEDURES</b>	<b>ORDER</b>				
<b>ACTIVITIES</b>	<b>INITIATE</b>	<b>AUTHORISE</b>	<b>ACTIVATE</b>	<b>RECORD</b>	<b>CANCEL</b>
What Information?	Author, Title, Subtitle, Edition, Place, Publishers, Date, ISBN, etc.	Signature of approval	Library/Branch Library, Date of order, Order number, Name of vendor and bibliographical details, etc.	Administrative data, Bibliographic data	Order number, and date. Vendor, Book details
Where from?	Bibliographies, Index,	Competent authority	Book selection tools, MIS	Order form/ Order letter	Order file/ Computer database



	Requisition, Suggestions				
When?	After select procedures	Before activation	After authorisation	After activation	After activation
Who?	Library Asst./ Technical Asst.	Librarian/Secti on-in-Charge	Library Asst./ Technical Asst.	Library Asst./ Library clerk	Library Asst.
How?	Receiving copy of bibliographie s, Suggestion slip	Enter signature	Enter dta/ Information on order form/ Computer database and generate order	Filling the copy of order form/ Saving in computer	Deletion from Database

The human society is undergoing a sea change due to phenomenal growth of information and its management through the application of high degree of ICT for computerisation along with electronic transformation of information. The development and convergence of computer and communication technologies, which are jointly termed as Information and Communication Technologies (ICT) has affected almost all aspects of human life. Libraries are no exceptions. ICT is meant for better information management and communication, which is also the prime objective of a library.

ICT encompasses any combination of hardware and software that facilitates the acquisition, creation, modification, retrieval, storage and transmission of information using electronic media. ICT includes both computing and communication technology that combines hardware, software, connectivity, telecommunications and human computer interface. The features of ICT are very helpful for automating a library system in general and housekeeping operations in particular. The advantages of the ICT application in libraries may be enumerated as:

- a tool to solve the problem of information explosion and growing user demands;
- quicker, cheaper and accurate data processing;
- sharing and transferring data between different systems and media;

- availability of Distributed Information System (Internet);
- increased capacity of data storage and data transmission;
- decreased cost and size of equipment;
- increased reliability of hardware and software to perform repetitive jobs; and
- introduction of GUI based user friendly software with online help.

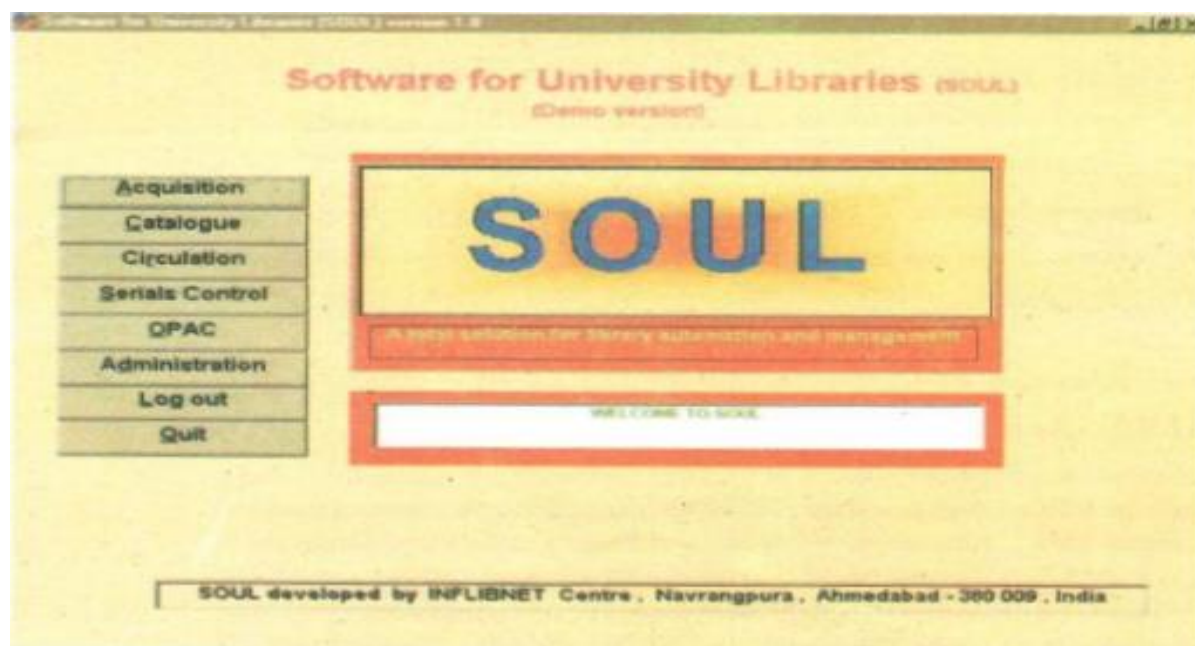
The rapid development in utility of hardware, software and connectivity along with the reduced costs paved the path for integrated library automation systems. Current library automation software (also known as Library Management Software (LMSs)) are integrated systems of a set of related modules responsible for the management of different operational subsystems. These LMSs are based on relational database architecture. In such systems files are interlinked so that deletion, addition and other changes in one file automatically activate changes in related files. Library management software supports two broad groups of library works – housekeeping operations and information retrieval. These are accessible through Local Area Network (LAN) or Wide Area Network (WAN) and also over Internet. Modern library automation systems are WWW compatible and accessible through Internet, Intranet and Extranet for information retrieval as well as data entry activities.

The LMSs presently follow a modular approach for the housekeeping operations. Generally, the whole package is divided into modules for each operational subsystem. Modules are divided into sub-modules and each sub-module supports various facilities to carry out tasks related to the procedures.

Library Automation Package	➤ Modules	➤ Sub-Modules	➤ Facilities
-------------------------------	-----------	---------------	--------------

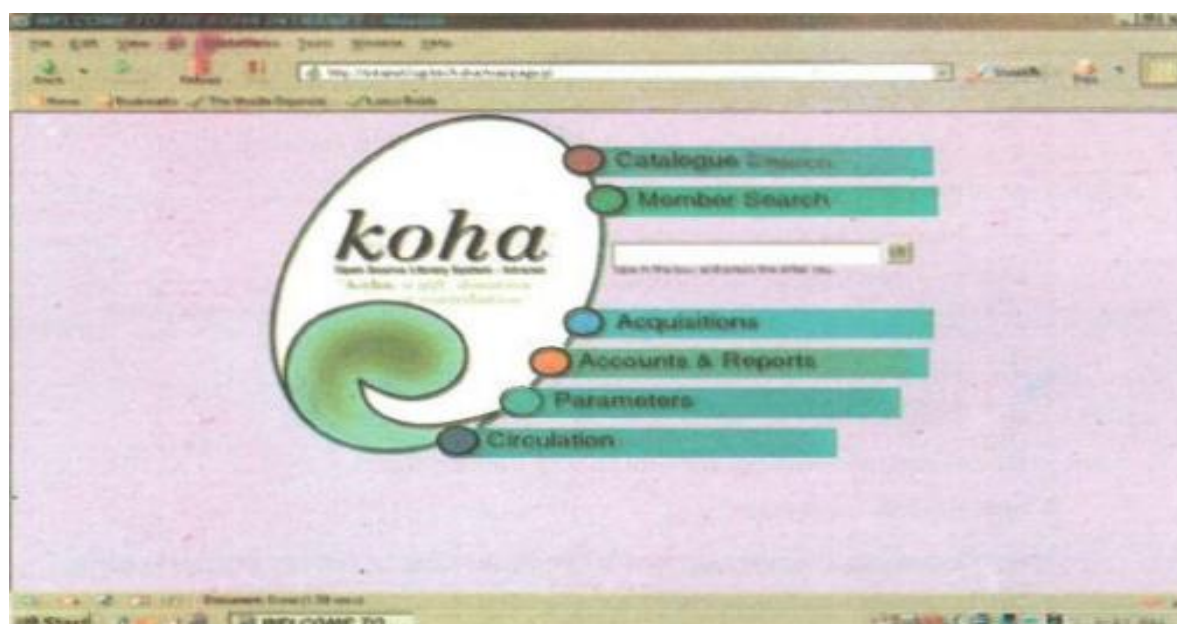
For example, the SOUL package (a library automation software developed by INFLIBNET, Ahmedabad) includes six modules of which four are for operational subsystems. The other two, namely administration and OPAC are meant for setting up various administrative parameters and searching and retrieving the library resources respectively. Another example may be cited from KOHA – an open-source library management software, developed by Horowhenua Library Trust (Katipo team), New Zealand and running at the trust's sites in Levin, Foxton and Shannon. It includes one common module for acquisition and cataloguing and other five modules are related with circulation, OPAC, administration, etc. The main menu of SOUL (Software for University Libraries) and KOHA are given in the form of screen snapshots.

Almost all the library management software available in India and abroad follow the modular approach. This modular arrangement of the library automation package is user friendly and acts as an integrated solution tool for the library management.



*Figure 3: Main Interface of SOUL*

Source: <http://www.inflibnet.ac.in/soul/download.php>



*Figure 4: Main Interface of KOHA*

Source: <http://sourceforge.net/projects/kohalived-lite/>

## **Prerequisites of ICT Application in Housekeeping**

Library automation is a complex process and should be planned astutely. The complete process of library automation may be divided into following steps:

- Software selection
- Hardware selection
- Site preparation
- General training
- Customisation
- Defining procedures for
  - Bibliographical data entry
  - Administrative data entry
  - Financial data entry
- Commissioning

It is quite obvious that implementation of the above steps in library automation requires background study or analysis of the library system. It is a precondition to utilise library automation package for effective results. A library will not be able to take full advantage of automation until and unless its manual functions are perfect and justified. Therefore, the procedures and tasks followed in different sections should be analysed in terms of:

- Special features of the library system
- Local variations (their validity and usefulness)
- Limitations of the existing system
- Nature and objective of library
- Total number of collections
- Per year acquisition and procedures followed for acquisition
- Per year subscription of serials
- Number of users and their categories
- Per day transactions (issue/return/reservation)
- Availability of multilingual documents
- Need of information services (CAS/SDI, etc.)

- Future plan (in terms of networking and consortia)
- Available manpower (computer literate staff)

### **Additional Applications Across Housekeeping Areas**

#### **Library Management Software (LMS)**

An all-in-one solution that integrates various functions like cataloging, acquisitions, circulation, and user services.

#### **Electronic Resource Management (ERM) Systems**

For managing electronic subscriptions, licenses, and access rights for digital resources.

#### **Analytics and Reporting Tools**

These tools provide insights into library usage patterns, user preferences, and operational efficiency, helping in strategic planning and decision-making.

The use of ICT applications can help libraries restructure their housekeeping operations, reduce manual workload, improve accuracy, maximize resource availability, and improve user services.

## **1.2 Education in India**

Ancient academic institutions such as Takshashila, Nalanda, and Vikramshila were renowned centers of higher learning and knowledge accumulation. These institutions had libraries that were known for their vast collections and attracted scholars and students from various parts of the world. Nalanda University, believed to be one of the oldest universities in the world, was established in the 4th century CE in present-day Bihar, India. It served as a prominent center for Buddhist studies and attracted scholars from regions such as Sri Lanka, Nepal, Tibet, Myanmar, China, and Korea. Students would come to Nalanda to study a wide range of subjects, including texts, literature, grammar, logic, astrology, astronomy, and medicine.

Historical records suggest that Nalanda had an impressive library complex consisting of three large multi-storeyed buildings named Ratnaranjka, Ratnodadhi (a nine-story building), and Ratnasagara. These libraries housed a wealth of knowledge and were a significant part of the educational ecosystem at Nalanda. Tragically, Nalanda University faced destruction during the

12th century at the hands of Turkish invader Bakhtiyar Khilji. The exact circumstances of the library's demise are not entirely clear, but it is believed that fire played a role in damaging the libraries.

In the post-independence era, India has continued to witness academic growth and development. Numerous universities and educational institutions have been established, and libraries remain an integral part of the academic landscape. The emphasis on education and knowledge preservation continues to shape the country's intellectual heritage.

The British colonial period had a significant impact on education in India, introducing a Western and English influence. After India gained independence, the government established various education commissions to shape the country's educational system. These commissions played a crucial role in bringing about significant changes and reforms in the education sector. Since independence, the number of educational institutions in India has grown exponentially. Currently, India has the largest education system in the world, with a wide range of universities and institutions. As of December 2018, there were 892 universities in the country, including 48 central universities, 394 state universities, 125 deemed universities, and 325 private universities.

In addition to universities, India is home to prestigious institutions such as the Indian Institutes of Technology (IITs), Indian Institutes of Management (IIMs), Indian Institute of Science (IISc), Indian Institutes of Science Education and Research (IISERs), Indian Institutes of Information Technology (IIITs), and National Institutes of Technology (NITs). These institutions are renowned for their excellence in specific fields of study. The education system in India also encompasses a vast network of schools and colleges. As per the 2011 census of India, there were 15,22,346 schools and 38,498 colleges spread across the country. These institutions cater to the diverse educational needs of India's vast population, which was recorded as 1,21,01,93,422 in the same census. The growth and development of the education system in India since independence have been remarkable, expanding access to education and contributing to the country's intellectual and human resource development.

The Government of India has established the Ministry of Human Resource Development (MHRD) to oversee and govern the academic institutions in the country. The MHRD plays a key role in formulating policies and implementing initiatives related to education and human resource development. Several apex-level bodies have been set up under the MHRD to regulate and oversee different aspects of education. These bodies include:

- University Grants Commission (UGC): The UGC is responsible for the coordination, determination, and maintenance of standards of university education in India. It provides grants to universities and colleges, promotes research, and monitors the quality of higher education.
- All India Council of Technical Education (AICTE): The AICTE is responsible for the regulation and maintenance of standards in technical education, including engineering, management, pharmacy, and architecture. It ensures the quality of technical institutions and promotes technical education across the country.
- Indian Council of Social Science Research (ICSSR): The ICSSR promotes and funds research in the field of social sciences. It provides grants to researchers, supports research institutes, and promotes interdisciplinary research in social sciences.
- Council of Architecture (COA): The COA regulates the education and practice of architecture in India. It sets standards for architectural education, accredits architecture programs, and ensures the competency of architects.
- Indian Council of Philosophical Research (ICPR): The ICPR promotes and supports research in philosophy. It grants fellowships to scholars, organizes seminars and conferences, and publishes philosophical works.
- Indian Council of Historical Research (ICHR): The ICHR promotes research in history and provides financial assistance to historians. It supports research projects, publishes historical works, and organizes seminars and workshops.

For school education and literacy, various organizations have been set up, including:

- National Council for Teacher Education (NCTE): The NCTE sets norms and standards for teacher education programs and regulates teacher education institutions in India.
- Central Board of Secondary Education (CBSE): The CBSE is a national-level board of education for public and private schools. It conducts examinations, prescribes the curriculum, and grants affiliations to schools.
- Kendriya Vidyalaya Sangathan (KVS): The KVS manages the Kendriya Vidyalayas, which are central government schools spread across the country. It provides quality education to the children of government employees.
- National Institute of Open Schooling (NIOS): The NIOS provides open and distance learning opportunities at the secondary and senior secondary levels. It caters to learners who are unable to attend regular schools.

- National Council for Educational Research and Training (NCERT): The NCERT develops and prescribes the national curriculum frameworks, textbooks, and teaching materials for schools across India. It also conducts research and provides training to teachers.

These are just a few examples of the organizations working under the Ministry of Human Resource Development in India. These bodies play crucial roles in regulating, promoting, and improving the quality of education in the country.

The University Grants Commission (UGC) is a statutory body established by the Government of India under the Ministry of Human Resource Development. It was created by an Act of Parliament in 1956. The UGC is responsible for maintaining the standards of teaching, research, and examination in universities across India. The objectives of the UGC include promoting and coordinating university education, formulating regulations regarding the standards of education, monitoring the development of higher education, serving as a bridge between the government and higher education institutions, and advising the central and state governments on matters related to higher education.

The UGC is headquartered in New Delhi and operates through its regional centers located in Bangalore, Bhopal, Guwahati, Hyderabad, Kolkata, and Pune. These regional centers help facilitate the smooth functioning of higher education institutions in their respective regions. One of the primary roles of the UGC is to provide grants to universities and colleges, making it the main funding agency for higher educational institutions in the country. The UGC plays a crucial role in promoting and improving the quality of higher education in India.

The National Education Policy (NEP) is an important policy framework in India that has evolved over the years to shape the education system in the country. The NEP reflects the critical, cultural, economic, moral, social, and spiritual aspects of the nation and aims to contribute to its overall growth and development. The first NEP was formulated in 1968 by the Ministry of Human Resource Development (MHRD), Government of India. It provided guidelines and objectives for education in the country. Subsequent revisions were made in 1992 and 2005 to address changing needs and challenges.

In 2016, another revision of the NEP took place under the chairmanship of Mr. TSR Subramanian. This revision focused on strengthening the higher education system through policy interventions. It recognized education as a transformative tool for economic, social, and political progress. The NEP emphasizes the importance of education in driving economic



growth, fostering social cohesion, and promoting democratic values. It seeks to address various aspects of education, including access, equity, quality, and relevance. The policy framework aims to provide a comprehensive vision and roadmap for the development of education in India.

It is important to note that the NEP underwent a significant revision in 2020 under the leadership of the Government of India, with a focus on transforming the entire education system. The new NEP 2020 aims to bring about major reforms in school education, higher education, teacher training, vocational education, and other areas to make the education system more holistic, flexible, and aligned with the needs of the 21st century.

Education plays a vital role in instilling values and providing skills to individuals, contributing to the strength of the nation as a cohesive force in society. It aims to establish equality and quality in order to actively participate in the knowledge economy. Education is a powerful tool in our knowledge society, and the National Education Policy 2016 (NEP 2016) encompasses several important features and reforms. Some key features of NEP 2016 include:

- Establishment of the Central Educational Statistics Agency (CESA) as a central data collection agency for predictive analysis in education.
- Curriculum renewal and examination reforms to ensure a more holistic and skill-oriented approach to education.
- Emphasis on faculty development in higher education to enhance the quality of teaching and research.
- Focus on financing education to ensure adequate resources for educational institutions and programs.
- Integration of skill development programs into the higher education system to enhance employability and entrepreneurship.
- Integration of Information and Communication Technology (ICT) across all levels of education, domains of learning, and educational processes.
- Use of IT reporting systems for better performance and management in education.
- Encouragement of internationalization of education to promote global perspectives and collaboration.
- Setting minimum standards for education and teachers' qualifications, with recruitment based on merit.
- Promotion of open, distance learning, and Massive Open Online Courses (MOOCs) for self-learning and flexible education options.

- Focus on preschool education for children aged 4-5 years to provide a strong foundation.
- Restructuring of the National Assessment and Accreditation Council (NAAC) and the National Accreditation Board (NAB) for quality assurance in higher education.
- Encouragement of research and innovations in education.
- Integration of skill development, financial literacy, legal literacy, and digital literacy into adult literacy programs.
- Inclusion of social justice, legal measures, and harmony in the curriculum to prevent social discrimination.

These features of NEP 2016 aim to enhance the overall quality, relevance, and inclusivity of education in India and prepare individuals for the challenges and opportunities of the 21st century.

### **1.3 Information**

Information indeed plays a crucial role in the development of society, and libraries serve as important information centers that preserve and provide knowledge to future generations for research and development purposes. The definition of information can be derived from various sources, including the Oxford English Dictionary.

According to the Oxford English Dictionary, information can be defined as:

1. "The action of informing; formation or molding of the mind or character training, instruction, teaching; communication of instructive knowledge." This definition emphasizes the role of information in shaping and educating individuals, imparting knowledge, and providing instruction.
2. "The action of informing, communication of the knowledge or 'news' of some fact or occurrence; the action of telling or fact of being told of something." This definition highlights the communicative aspect of information, involving the transmission of knowledge or news about specific facts or events.

These definitions highlight the multidimensional nature of information, encompassing both the process of conveying knowledge and the content or facts being communicated. Libraries play a vital role in facilitating the dissemination of information and ensuring its accessibility to individuals, thereby contributing to the intellectual and societal development of communities.

Indeed, information can be described as knowledge, news, or facts communicated to individuals. It encompasses data that is relevant and purposeful, serving to broaden one's understanding and enabling them to combat ignorance and superstition. Information is considered a fundamental human need, ranking alongside essentials like air, water, food, clothing, and shelter. The advancements in modern transportation, computer technology, and telecommunications have transformed the world into a global village. With just a simple connection, individuals can access information from around the globe. As aptly stated by Blumenthal, information is data that is recorded, organized, related, or interpreted within a context to convey meaning. In recent times, information has gained recognition as a valuable commodity. It is conceivable that information may eventually function as a currency, exchanged for goods and services worldwide. Therefore, it becomes crucial for everyone to acknowledge the importance of information and have convenient access to it. Accessible information empowers individuals and enables them to participate actively in the modern world.

#### **1.4 Communication**

The term "communication" derives from the Latin root "communis," meaning common. The Oxford English Dictionary defines communication as the action of conveying or exchanging ideas, knowledge, or information through speech, writing, or signs. It can also refer to the information or observations that are conveyed through written papers or documents. According to the Webster Encyclopedic Unabridged Dictionary, communication is the act or process of conveying information and encompasses the fact of being communicated. It can also refer to a document or message that imparts news, views, or information. In essence, communication is the process of imparting information to meet the needs of the general public for personal and societal development. It involves the exchange of ideas, knowledge, and information among individuals or groups, allowing for the sharing of insights and the growth of both individuals and society as a whole.

#### **1.5 Technology**

The term "technology" is derived from the Greek root "Tecnologia," which refers to treatment, and "Tech," which means art or craft. It can be understood as a discourse or treatise on an art or arts, specifically the scientific study of practical or industrial arts. According to the Webster Encyclopedic Unabridged Dictionary, technology is the branch of knowledge that deals with the creation and use of technical means and their interrelation with life, society, and the

environment. It draws upon subjects such as industrial arts, engineering, applied science, and pure science. Modern technology is utilized for the advancement and improvement of human society. It has profoundly transformed our way of life and lifestyle. Today, we heavily rely on technological assistance in various aspects of our lives, and it has become an integral part of our daily existence.

## **1.6 Data, Information, Knowledge, and Wisdom**

Data is the plural form of the term "datum." It refers to raw facts, observations, assumptions, occurrences, names, nouns, defined time, roll numbers, sex, scored marks, a person's height, academic percentiles, and so on. Data represents the description of attributes related to living or non-living things. On the other hand, the word "Information" is derived from "informare," which means "to inform." It refers to the act of telling someone about specific facts or a collection of facts and data organized to describe a particular situation. Information is the output obtained after processing data, presenting it in a useful and organized form. It encompasses facts about a situation, person, event, etc., based on data and knowledge.

Information can take various forms, including text (digits, letters, special characters), images, animations, audio, visuals, and more. It can be classified and stored in a defined database, allowing for retrieval on-demand when needed. Information is considered a crucial aspect of life and knowledge that contributes to success and economic development. According to Thomas A. Stewart, the emergence of the information age and the widespread use of information technology are significant developments. The integration of information in society gives rise to the concept of the "information society." Information is essential for adding value to existing information, making informed decisions for future perspectives, predicting trends, and engaging in knowledge management activities. It provides descriptions, definitions, and perspectives on various aspects such as what, who, when, and where. Information leads to knowledge, and knowledge leads to wisdom. Throughout history, great achievements have been made based on information.

In today's business environment, there has been a significant shift from production-based economies to economies based on information and knowledge. Knowledge encompasses various aspects such as truth, beliefs, perspectives, concepts, judgments, expectations, methodologies, and know-how. It is a collection of articulated, organized, integrated information that is retained over long periods.

Creating a knowledge culture within an organization is a matter of change management. All forms of knowledge possessed by individuals are automatically transferred and shared within the organizational pool. Knowledge is often seen as a source of power, as expressed by Francis Bacon's famous quote, "knowledge is power." In the Upanishads, there is a dictum that states "Prajnanam Brahma," which translates to "Knowledge is God." In the business context, knowledge can be understood as actionable information. It is information that can be applied to make informed decisions and drive actions. Knowledge can be organized in a hierarchical manner, with different levels of knowledge building upon one another. In today's scenario, knowledge plays a crucial role in various domains such as research, innovation, problem-solving, and decision-making. It is considered a valuable asset for individuals, organizations, and societies as a whole.

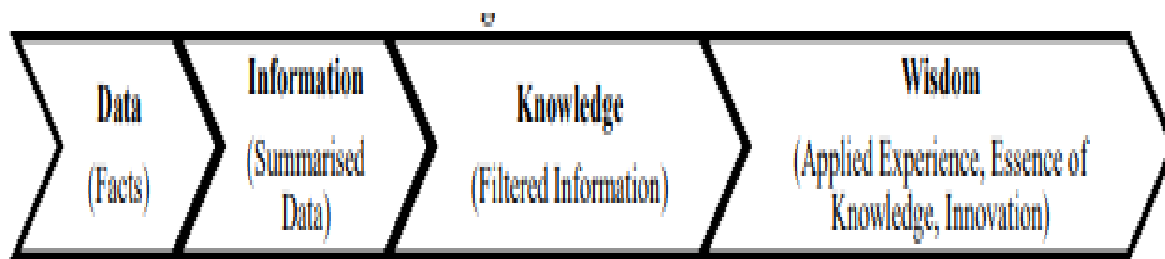
*Table 4: Knowledge*

Implicit Knowledge	Explicit Knowledge
Analogue (Card Catalogue, Manual Ledgers)	Digital (Institutional Repositories, OPAC, Databases)

Wisdom is often seen as the culmination of experience, knowledge, understanding, common sense, and insights. It goes beyond mere information and knowledge and involves the judicious application of that knowledge in practical situations. Wisdom emerges from the process of knowledge management (KM) where knowledge is collected, shared, and utilized effectively.

Wisdom can be considered as the unbiased and objective output of sound judgment and decision-making based on real-time analysis. It is the ability to apply knowledge and understanding to effectively address specific problems or challenges. Wisdom is not something innate or acquired instantly but is developed through lifelong learning and continuous growth. In the context of knowledge management, wisdom is a valuable outcome as it enables individuals and organizations to make well-informed and wise decisions. It involves drawing on past experiences, understanding the nuances of a situation, and applying insights gained over time to navigate complex problems.

Ultimately, wisdom is about utilizing knowledge in a way that brings about meaningful and positive outcomes. It helps individuals and organizations to make sound judgments, exercise discernment, and contribute to the betterment of society.



*Figure 5: Data to Wisdom*

## **1.7 Information Technology (IT)**

Information Technology (IT) has revolutionized human lifestyle and become an indispensable tool and backbone for knowledge-based institutions in today's competitive world. It plays a crucial role in enabling quick decision-making, enhancing communication, and improving overall efficiency. The term "Information Technology" was first introduced in an article by Harold J Leavitt and Thomas L Whisler in the Harvard Business Review in 1958. IT refers to the use of computers and computer-based systems to store, retrieve, transmit, and manipulate data. It encompasses various technologies and processes involved in handling and processing information. IT not only focuses on improving the flow of information but also emphasizes fostering relationships among people. It recognizes the importance of technology in facilitating effective communication, collaboration, and connectivity among individuals and organizations.

In the context of knowledge-based institutions, IT plays a vital role in supporting their operations and enabling them to compete in the modern world. It helps in efficient data management, knowledge sharing, research, analysis, and decision-making processes. IT systems and tools provide the necessary infrastructure for storing, accessing, and utilizing vast amounts of information. Overall, IT has transformed the way we interact, work, and access information. It has become an essential component of modern society, driving advancements and facilitating progress in various fields.

IT indeed serves as the backbone of knowledge-based academic institutions, facilitating their research and development activities and contributing to the development of intellectual wealth. It plays a crucial role in overcoming barriers of time and geography, enabling seamless collaboration and knowledge sharing among researchers and scholars. In knowledge-based organizations, IT plays a central role in facilitating knowledge management (KM) processes. It provides the necessary infrastructure and tools for capturing, storing, organizing, and

disseminating knowledge across the organization. IT systems and platforms support objective processes for managing knowledge, including knowledge creation, acquisition, sharing, and utilization.

Technology has also transformed the economics of information. It has blurred the boundaries between different types of knowledge and has led to the emergence of high-tech, high-touch work environments. The term "high touch" refers to situations where people interact directly with each other in physical environments rather than solely relying on virtual interactions in cyberspace. By leveraging technology, analysts and knowledge workers can analyze information more efficiently and effectively. IT expedites the analysis process, allowing analysts to spend more time on interpreting data and extracting valuable insights. Additionally, technology facilitates access to the knowledge needed by knowledge workers, ensuring that they have the right information at the right time to support their work. Overall, IT plays a transformative role in knowledge-based organizations, enabling them to leverage information and technology to drive innovation, enhance collaboration, and achieve competitive advantage in the knowledge economy.

Society is rapidly moving towards becoming a Networked Electronic Information Society (NEIS). The academic sector has also experienced a significant information explosion, with a shift towards the convergence of Information and Communication Technology (ICT) in academia. Traditional books and documents are increasingly being preserved in electronic forms, leading to the evolution of NEIS. The advent of the internet has played a pivotal role in this transformation. It has facilitated the exponential growth of interconnections between computers, starting from a few computers in the 1980s to billions of computers worldwide by 2018. This increased connectivity has given rise to various activities conducted in electronic domains, often denoted with the prefix "e." For instance, online activities are referred to as "eActivities."

The development of cloud storage, internet services, intranets, and the World Wide Web (www) has provided a significant boost to knowledge management (KM) practices. It has enabled the rapid dissemination and delivery of information through the use of high-speed channels such as 3G, 4G, and 5G networks. The convergence of traditional libraries into eLibraries represents a significant advancement in academia. ELibraries provide digital access to a vast array of resources, including scholarly articles, e-books, research papers, and

multimedia content. This shift to digital platforms has revolutionized the accessibility and availability of information for researchers, scholars, and students.

Overall, the rise of NEIS and the integration of ICT in academia have transformed the way information is stored, accessed, and disseminated. The internet and digital technologies have revolutionized knowledge management, enabling rapid information sharing, collaboration, and innovation on a global scale.

## **1.8 Information Communication Technology (ICT)**

ICT refers to the combination of computer technology and telecommunications technologies, which brings together various capabilities, flexibilities, challenges, and confidence. It represents the integration of electronic communication technology, network technology, and network topology into the field of information technology. ICT integration into knowledge management (KM) has opened up new avenues and opportunities for excellence. It enables dynamic electronic communication, allowing for the processing, transmission, storage, and retrieval of information anytime and anywhere. ICT encompasses the fields of information technology and communication technology, working together to facilitate effective decision making, scientific forecasting, and smart choices.

Information is static in nature, while communication is dynamic and involves feedback. ICT plays a crucial role in disseminating information to a wide audience in minimal time. The use of computers, mobile devices, televisions, and other electronic devices enhances communication capabilities. Software systems have been developed to automate responses and provide targeted information to specific users. With the advancement of technology, ICT has become accessible to not only experts but also the general public. ICT is transforming libraries into skilled and technologically advanced institutions. It combines information, communication, and technology to facilitate efficient and effective knowledge management. Information refers to facts or details, communication encompasses various methods of transmitting information, and technology represents the application of scientific knowledge in practical ways, particularly in industries and sectors.

Indeed, the story of Thomas Edison's perseverance and determination is a great example of how failure can be reframed as an opportunity for discovery and innovation. Similarly, ICT (Information Communication Technology) provides us with the freedom and tools to enhance knowledge management in various ways, enabling us to explore and discover the best practices.



Technological advancements have extended the reach of library and information science across the globe. Initiatives like the National Digital Library of India, guided by the government, have created virtual repositories that facilitate access to a vast amount of knowledge and resources. The integration of ICT in libraries is crucial for their success and relevance in the modern era. ICT has become deeply rooted in library practices and services. It plays a pivotal role in transforming libraries into dynamic information hubs, enabling efficient knowledge management. Embracing ICT is not just a choice but a necessity for fostering a culture of knowledge management and keeping up with the demands of the hour.

Indeed, in economics, the factors of production include land, labor, capital, and entrepreneurship. Among these factors, capital can be viewed as knowledge in the context of academic capital. Knowledge management (KM) workers in academic institutions benefit from various techniques such as data mining, search tools, text analysis, web crawlers, and document management systems to effectively find and utilize the desired knowledge from vast information reservoirs. The term "System" originates from the Greek word "Systema," which refers to an organized relationship among interdependent functioning components linked together. It represents a set of interconnected elements that work together to achieve a specific objective. The revolution in ICT (Information and Communication Technology) has transformed knowledge into a new competitive weapon. With curated library experiences and the advancements of the 21st century, the expectations of the world have rapidly changed.

ICT has greatly benefited users by providing efficient access to information and services. Technology has played a vital role in overcoming hurdles and has had a significant impact on the field of knowledge management in academic libraries. The introduction of Learning Management Systems (LMS) in the 21st century has completely transformed the way knowledge is managed. Library professionals and users are now familiar with various KM platforms like Koha, Libsys, etc. These Integrated Library Management Systems (ILMS) have become essential tools for networking and resource sharing among library professionals, allowing them to reach a global audience across different devices. Overall, libraries have embraced these KM platforms and utilized ICT to effectively disseminate information and connect with users worldwide.

Information Communication Technology (ICT) has been successful due to its economical, time-saving, and marketing-oriented features. The rapid growth of high-speed networks, from 1G to 5G, has created opportunities for generating and managing vast amounts of information,

tailored to the preferences of users and targeted goals. Information professionals need to update their technical skills to effectively benefit from ICT advancements.

ICT has played a significant role in knowledge management, enabling academic institutions to capture, create, share, and leverage knowledge to improve performance. Libraries have evolved and adapted their systems of information retrieval, preservation, and dissemination in response to the changing landscape. With the emergence of electronic forms of information and increased usage of electronic devices, library staff have acquired the necessary skills to navigate these new forms effectively. The availability of information in electronic form has led to a shift in user behavior, with users now habitually accessing eDocuments in their daily lives. ICT has transformed libraries into eLibraries without physical boundaries, providing 24/7 access to eCollections across different time zones and geographical areas, facilitated by local area networks (LAN) or wide area networks (WAN) depending on the library's policies.

ICT has played a transformative role in the integration of digital libraries in India, exemplified by the National Digital Library of India available at [www.ndl.iitkgp.ac.in](http://www.ndl.iitkgp.ac.in). This project, under the Ministry of Human Resources and Development and coordinated by the Indian Institute of Technology, Kharagpur, brings together a vast collection of digital resources, with 16,191,332 items as of January 26, 2019. Users have the ability to access eDocuments for their specific needs and share them with others who require the same information. University libraries, leveraging ICT, create an academic environment that positively impacts the learning output of the user community. The emphasis on library computerization and the adoption of ICT in the modern age allows for real-time services and brings libraries to a level on par with other technological advancements.

In the context of ICT, libraries employ various technologies such as digital technology, barcoding, RFID, databases, networking, and multimedia to facilitate the acquisition, processing, storage, retrieval, dissemination, reporting, and organization of information. Libraries have harnessed ICT to enhance knowledge creation and management by establishing repositories and leveraging digital resources. The National Digital Library of India serves as a testament to the power of ICT in revolutionizing access to information and promoting knowledge dissemination on a national scale.

The evolution of libraries over time reflects the impact of ICT on society. From traditional libraries with chained books to closed access systems, libraries have now transformed into

hybrid libraries that embrace digital technologies. This transition highlights the transformative power of ICT in shaping society.

ICT has facilitated the shift from traditional libraries to digital libraries, where printed materials are replaced by electronic and digital collections. At the core of ICT is the computer, an electronic device capable of processing data and converting it into meaningful information. Computers are programmable machines that interpret and execute stored programs, process input data, perform operations, and produce output results. The design of most computers today is based on the Von Neumann architecture, pioneered by John Von Neumann. Computers have become essential tools for storing, processing, and retrieving data efficiently.

The integration of ICT in libraries has revolutionized the way information is managed and accessed. Libraries have embraced digital technologies to enhance their services, provide remote access to resources, and facilitate efficient information retrieval. The hybrid library model combines traditional and digital resources, offering users a seamless experience in accessing a wide range of information.

Overall, ICT has played a pivotal role in shaping the modern library landscape and has greatly enhanced the storage, processing, and dissemination of information. The utilization of computers and digital technologies has opened up new possibilities for knowledge creation, sharing, and access, making information more readily available and accessible to users.

## **1.9 Library Types**

Libraries can be broadly classified into two categories: reference libraries and general libraries. In a reference library, study materials are not lent out to users but are available for consultation within the library premises. On the other hand, a general library contains a collection of materials that can be borrowed by users for circulation purposes. Modern libraries often combine elements of both reference and general libraries, offering a range of materials for borrowing as well as resources for on-site consultation.

Libraries have evolved to become important societal institutions, contributing to societal development and transformation. They serve as centers for intellectual growth and play a crucial role in disseminating knowledge. Libraries have witnessed significant changes throughout history, particularly during the intellectual renaissance of the 15th and 16th centuries, which brought about advancements in technology, inventions, and discoveries. In

the modern age, libraries have incorporated digital collections to provide broader access to study materials and resources.

Libraries have transitioned from private to public and special domains, reflecting their growth and adaptation to the changing needs of society. Today's libraries are well-organized by library professionals and offer facilities for accessing e-resources through the internet, ensuring round-the-clock availability. Different types of libraries cater to specific audiences and serve distinct functions. Libraries hold immense value for society, contributing to cultural history, recreational development, entertainment, and most importantly, research and academic pursuits.

A physical library is a traditional type of library that primarily consists of physical materials such as books, newspapers, magazines, journals, maps, and globes. These libraries vary in size, ranging from small single-room libraries to large multi-room facilities. Physical libraries provide a tangible space for users to access and borrow print media for their informational and recreational needs. They often have designated areas for reading, studying, and conducting research.

A national library is an institution that is specifically associated with the preservation of a country's national heritage. It serves as a repository for literature, documents, and other cultural artifacts that represent the intellectual, scientific, literary, and cultural activities of the nation. National libraries are responsible for collecting, cataloging, and archiving materials of national significance, and they may also acquire materials from other countries to broaden their collections. These libraries play a crucial role in safeguarding a nation's literary and intellectual treasures, ensuring their preservation for future generations.

National libraries can be further categorized based on their specific focus or domain. Some examples include:

- **General National Libraries:** These are national libraries that serve as repositories for a wide range of materials across various subjects and disciplines. Examples include the National Library of India in Kolkata, the British Library in the UK, the Library of Congress in Washington DC, the State Lenin Library in Moscow, and the Bibliotheque Nationale of France.
- **National Medical Library:** These libraries focus specifically on medical literature and serve as the national repository for medical and healthcare-related information. They cater to the needs of medical professionals, researchers, and students in the country.

- National Agriculture Library: These libraries specialize in agricultural and related sciences and serve as the central repository for agricultural information. They collect and preserve publications, research papers, and other materials related to agriculture and support the agricultural community.
- National Science Library: These libraries focus on scientific literature and provide access to a wide range of scientific resources. They cater to the needs of researchers, scientists, and students in various scientific disciplines.
- These national libraries, regardless of their specific focus, play a crucial role in collecting, preserving, and providing access to valuable publications and information resources of national importance. They are authorized to receive copies of publications from publishers under the respective acts or regulations of their countries, ensuring the availability and preservation of the nation's publications.

Academic libraries are an integral part of educational institutions such as schools, colleges, and universities. They serve the students, faculty, and staff members of the institution and are primarily accessible to the academic community. The main purpose of academic libraries is to support the teaching, learning, and research activities within the academic institution. They provide resources and materials that are relevant to the academic curriculum and the specific courses offered. These resources can include academic textbooks, research journals, articles, magazines, reference materials, and digital resources.

Academic libraries play a crucial role in supporting research and development (R&D) activities for faculty, staff, and students. They provide access to scholarly resources and information needed for research projects, assignments, and academic pursuits. Academic libraries also offer a quiet and conducive study environment on campus, allowing students to focus and engage in their academic work.

To ensure efficient access and retrieval of information, academic libraries organize their collections using library classification schemes. These schemes help in arranging materials in a systematic and logical order, making it easier for library users to locate and access the resources they need. Overall, academic libraries are essential institutions within educational settings, providing valuable resources, support, and a dedicated space for academic activities and learning.

Libraries are often organized into different sections to facilitate dedicated services and ensure smooth functioning. These sections can include acquisition, cataloging, serials control,

circulation, stack management, online public access catalog (OPAC), and reporting, among others. Each section has its specific responsibilities and contributes to the overall management and operation of the library.

Library collections, which can consist of books, CDs, DVDs, journals, magazines, and other materials, are typically managed using standard classification systems such as the Dewey Decimal Classification (DDC), Universal Decimal Classification (UDC), or Library of Congress Classification (LCC). These systems provide a systematic way to organize and arrange materials based on subject areas. International Organization for Standardization (ISO) periodically publishes standards related to information and documentation, including standards specifically for managing library collections. These standards cover various aspects such as document storage, library performance indicators for eLibrary services, and more.

With the advancement of information and communication technology (ICT), academic libraries are increasingly focusing on digital content and providing access to a wide range of electronic resources. This includes eJournals, eDatabases, research writings, plagiarism software, and computer labs for accessing digital resources. Many academic institutions also maintain institutional repositories that store and provide access to theses, dissertations, and other scholarly works.

In the pre-computer era, libraries relied on multiple card catalogue cabinets containing index cards for organizing and accessing the library collection. However, with the emergence of the internet, libraries adopted online cataloging systems known as Online Public Access Catalogs (OPAC) or WebCats. These systems allow library users to search and access information about the library's collection, including the location and availability of specific items.

Overall, the integration of ICT and the digitization of library resources have significantly transformed the way libraries manage and provide access to information, enhancing the user experience and expanding the range of resources available to library users.

- Indeed, school libraries play a crucial role in supporting the educational journey of students from kindergarten to senior secondary levels. The resources and materials available in school libraries are tailored to the specific needs and developmental stages of students at different grade levels.
- In a school library for kindergarten (play) level, the focus is on cultivating the reading habit and providing age-appropriate materials. This can include toys, pictorial books,

posters, and other interactive resources that engage young children and foster their interest in reading and learning.

- As students' progress to primary school (1st to 5th grade), the library resources expand to include supporting syllabus books that align with the curriculum. These resources help students with their studies and provide supplementary materials to enhance their understanding of various subjects.
- In middle school (6th to 8th grade), the library collection further expands to include a wider range of reference books, including encyclopedias, dictionaries, atlases, and maps. These resources support students in conducting research, exploring different topics, and developing their knowledge base.
- In higher secondary school (11th to 12th grade), the library resources become more specialized and tailored to the specific subjects and courses offered at that level. Reference books related to various disciplines, literature, project reports, and other academic materials are available to support students in their studies and research projects.

Overall, school libraries serve as valuable learning spaces for students, providing access to resources that supplement the curriculum, promote independent learning, and foster a love for reading. The resources available in school libraries are designed to cater to the specific educational needs and developmental stages of students at different grade levels.

College libraries play a vital role in supporting the education and research needs of students pursuing graduation and post-graduation degrees, including diploma programs, polytechnics, undergraduate, postgraduate, and professional courses. These libraries provide a conducive self-study environment and offer a wide range of resources to support the academic pursuits of students.

In a college library, students have access to separate reading rooms where they can study and concentrate on their coursework. The library collection includes textbooks, scientific data sources, technical manuals, standards, reference materials, handbooks, and books covering various domains of study. These resources support students in their coursework, research projects, and overall academic growth.

University libraries, on the other hand, cater to a broader academic community, including students pursuing undergraduate, postgraduate, and doctoral degrees. They may also serve diverse institutions such as conventional universities, agricultural universities, IIMs (Indian

Institutes of Management), IITs (Indian Institutes of Technology), medical universities, science and technology universities, distance education institutions, research institutions, and professional institutions.

University libraries house a comprehensive collection of reading materials relevant to the academic programs offered by the university. This includes textbooks, research papers, scholarly journals, periodicals, reports, and other publications. University libraries often produce their own publications such as newsletters, research works, reports, and periodicals to disseminate valuable information and showcase the research output of the institution. Many university libraries have embraced automation and integrated information and communication technology (ICT) solutions to streamline their operations and provide efficient services to their users. Automation facilitates tasks such as cataloging, circulation, and retrieval of library materials, making it easier for students and researchers to access the resources they need.

Overall, college and university libraries play a crucial role in supporting the academic journey of students by providing them with access to a wide range of resources and creating an environment conducive to self-study and research. These libraries contribute to the overall educational experience and promote a culture of lifelong learning within the academic community.

Public libraries serve as local gateways to knowledge and play a crucial role in facilitating lifelong learning, independent decision making, and cultural development for individuals and social groups. These libraries are established by the government and are accessible to the general public. They are found at various levels, including mobile libraries, village libraries, town libraries, city libraries, district libraries, and state libraries. Public libraries provide a range of services and resources to meet the diverse needs of their communities. They serve as a hub for accessing books, magazines, newspapers, audiovisual materials, and digital resources. Users can become members of the library by following defined guidelines, which usually involve registering and obtaining a library card. Central libraries and branch libraries are set up to ensure wider access to library services within the community.

Special libraries, on the other hand, cater to specific groups or institutions and provide specialized and personalized services. These libraries emerged as a result of technological and scientific advancements and the need for specialized literature in particular domains. Unlike public libraries, special libraries may not be accessible to the general public. They are designed



to serve the unique information needs of specific institutions, industries, businesses, or groups of people.

Examples of special libraries include Braille libraries that cater to individuals with visual impairments, law libraries that provide legal resources for legal professionals, parliament libraries that support legislative activities, medical libraries that serve healthcare professionals, military base libraries that cater to military personnel, and music libraries that focus on music-related resources.

Special libraries may be organized based on activities, such as arts, trade, or industry, or they may be focused on specific types of documents, such as film libraries, music libraries, video cassette libraries, or manuscript libraries. These libraries curate collections and provide specialized services to support research, decision making, and the unique information needs of their respective domains. Public libraries and special libraries play vital roles in providing access to information, promoting literacy, supporting research, and serving the diverse information needs of individuals and communities.

Special libraries cater to specific user groups and serve their unique information needs. Some examples of special libraries include Braille libraries, which provide materials in Braille format for individuals with visual impairments, libraries for children that focus on developing early literacy skills and fostering a love for books, libraries in prisons that serve inmates, and libraries in hospitals that provide reading materials for patients.

Children's libraries are dedicated to creating a nurturing and engaging environment for young readers. They curate special collections of books that are age-appropriate and designed to develop early literacy skills. These libraries play a crucial role in promoting reading habits, imagination, and learning in children.

Research libraries, on the other hand, focus on supporting the research community and maintaining collections relevant to one or more subjects. These libraries serve as national or academic libraries and often have extensive collections of scholarly materials, including books, journals, research papers, and other resources. They provide access to specialized information and resources that support research and academic pursuits.

Government libraries are established to support the functioning of government institutions and policy-making processes. These libraries collect and maintain publications and documents from various government departments and ministries. They serve as repositories of government

reports, policy documents, legislative materials, and other publications related to public administration. Government libraries play a vital role in tracking national growth, monitoring policy implementation, and providing information for decision-making within the government.

Examples of government libraries include those associated with specific ministries such as the Ministry of Finance or the Ministry of Foreign Affairs. These libraries ensure that government officials have access to the necessary information to formulate policies, make informed decisions, and address the needs of the public welfare. Each of these special libraries serves a specific user group or addresses a particular domain, contributing to the diverse information needs and societal development in their respective areas.

A Green Library, also known as an Electronic Library or eLibrary, primarily focuses on digital collections rather than traditional print media. It provides access to eResources, which are resources stored in digital formats such as CDs, DVDs, and magnetic tapes. These resources are originally created and stored in digital form. One important component of an eLibrary is the Online Public Access Catalogue (OPAC), which contains digitally born online content stored in various digital formats. The OPAC allows users to search and access the digital collection remotely.

A Digital Library, on the other hand, refers to a library that exclusively houses digital resources. It provides 24/7 access to digital collections through various networking technologies, software, and standards. Digital libraries are curated by digitally savvy librarians who ensure the integrity and trustworthiness of the digital objects. They consider long-term access and preservation of digital resources, as well as the use of appropriate formats and storage methods to prevent content loss or corruption.

For example, if a CD or DVD is scratched and damaged, its contents may not be readable. However, if the contents are stored in a compressed zip format, they can be easily saved, stored, and read without loss of information. Both Green Libraries and Digital Libraries leverage digital technologies to provide users with convenient and flexible access to a wide range of digital resources. These libraries play a crucial role in facilitating information retrieval and dissemination in the digital age.

Digital preservation plays a crucial role in maintaining the flexibility and integrity of digital collections within a digital preservation architecture. It involves the process of digitizing physical format collections to create digital versions that can be stored and accessed

electronically. This allows libraries to expand their collections to include digital formats alongside physical formats.

In today's digital age, print media is also being made available in digital formats, and libraries are actively accumulating these digital resources in their collections. Digital libraries encompass both digitized materials and physical collections. Examples of digital library initiatives include online platforms like the National Digital Library (NDL) and Institutional Repositories (IR), which store digitized collections virtually rather than in physical space.

Virtual libraries, on the other hand, exist entirely in the virtual space using computer networks. They do not rely on physical formats such as CDs or DVDs to share information. Subject gateways are examples of virtual libraries that provide access to resources through online interfaces.

Hybrid libraries combine various types of resources and provide a unified user interface for accessing all the resources. This includes print resources, eResources, and other formats. Modern libraries often adopt a hybrid approach, incorporating both physical and digital collections to provide information through a single user interface. The transition from traditional libraries to digital libraries represents a significant shift in the evolution of libraries. It reflects the journey of libraries adapting to the current stage of technology and embracing digital formats to meet the changing needs of users.

ICT (Information and Communication Technology) has played a significant role in reshaping libraries and transforming them into digital entities. The internet, network technology, software, and other digital tools have revolutionized the way libraries operate. This shift has had a massive impact on libraries, both in terms of their existing form and their migration to the digital realm.

Libraries are now striving to keep up with the fast-paced digital world, as users increasingly expect information to be just a click away. Today, libraries can be vast in scope or size, and they can be maintained by organizations or individuals. The content they store can be accessed locally or remotely via the internet. With the emphasis on digital resources, libraries have shifted their focus from print materials to eResources accessible through the internet. However, this transition also poses challenges related to information literacy skills, as users need to navigate and evaluate digital information effectively.

Various studies indicate a growing availability of eResources in libraries. Libraries can leverage internet services for a range of facilities, such as making their bibliographical catalog searchable online. Platforms like OCLC provide access to the world's largest online repository through databases like WorldCat. Digitization projects, such as Google Books, Project Gutenberg, National Digital Library of India, HathiTrust, and Librivox, offer remote access to digitized versions of print books while considering intellectual property rights. Some librarians also act as academic partners in these projects.

For academic research and profiles, platforms like Google Scholar and ResearchGate allow users to access abstracts, book recommendations, and reviews. Platforms like Google Books, Amazon, and LibraryThing are useful for accessing and exploring books. As libraries continue to evolve in the digital age, terms like eLibrary, digital library, virtual library, green library, and cyber library have emerged to describe different aspects of their transformation and digital focus.

A digital library, also known as a digital collection or digital repository, serves as a reservoir of online databases that contain digital objects in various formats such as audio, still images, texts, videos, and more. These objects can include content that was originally produced in a digital format or digitized versions of print or still materials, such as word processor files or PDFs.

Digital libraries provide a structured system for organizing, storing, searching, and retrieving the contents of their collections. The accessibility of online information offered by digital libraries is particularly appealing to younger users compared to middle-aged or older users. Library professionals recognize the importance of marketing library services and promoting information literacy skills within the field of librarianship.

Professional associations like IFLA (International Federation of Library Associations and Institutions), ILA (International Library Association), CILIP (Chartered Institute of Library and Information Professionals), and others play a pivotal role in the library and information science (LIS) profession. They organize conferences, annual general meetings, and other events where library professionals can share their insights, learn from one another, and advocate for the role of libraries and librarians in the modern internet environment, particularly in teaching information literacy skills.

### **1.10 Impact of ICT in the Development of Library Services**

Information technology has had a significant impact on library services, transforming the way information is acquired, organized, stored, and circulated. Communication technologies, which encompass information technologies, serve as the nervous system of modern society by facilitating the transmission, distribution, and control of information among interconnected units in a library system. The convergence of telecommunications and computing has given rise to what is now known as new information and communication technology (ICT). ICT encompasses the use of microelectronic-based equipment, such as computers and telephones (hardware), in conjunction with software to acquire, organize, store, and circulate information.

The integration of ICT into library services has brought about numerous benefits and advancements. Users now have a wider range of choices in terms of equipping themselves with the necessary tools to access information. The processes involved in information technology and library services are rapidly evolving, with ongoing developments and innovations shaping the way libraries operate. In addition to computers, other related information technologies, such as CD-ROMs, fax machines, the internet, and various audio-visual tools, are also used in library services. These technologies enhance the efficiency and effectiveness of library operations, allowing for faster access to information and improved dissemination of knowledge.

The impact and significance of information technology on library services cannot be overstated. It has facilitated the growth and development of organizations and nations by providing enhanced access to information resources. Libraries have embraced information technology as a means to better serve their users, expand their collections, and adapt to the changing needs and preferences of information seekers.

Indeed, information technology has had a profound impact on library services, with the advancement of technology leading to new ways of accessing and interacting with information. The availability of advanced technology has paved the way for users to access library resources without physically visiting the library. Users in advanced countries can now access library materials through terminals in their own homes or offices, thanks to the integration of information technology into library services.

In the United States, schools of library and information science have well-equipped computer laboratories, supported by loyal alumni and government funding. Faculty members have personal computers on their desks, and incoming students already possess basic knowledge of

microcomputer use. They are proficient in manipulating databases and can use their own terminologies, bringing a new approach to learning and interacting with information.

Information and communication technology, as an electronic means of capturing, processing, storing, and disseminating information, has revolutionized various aspects of human life. One notable revolution is the significant enhancement in the speed and scope of information production, sharing, and recycling. The concept of proprietorship has transformed into a culture of sharing, and preservation has shifted towards easy access and retrieval.

Library science, as a field, has been greatly influenced by this revolution in information technology. Libraries have adapted to the changing landscape by embracing new technologies and integrating digital resources into their collections. The emphasis is now on providing access to information rather than solely preserving physical materials. Libraries have become hubs of digital information, facilitating efficient and widespread access to knowledge. Information technology has brought about a transformative change in library services, expanding access to information and revolutionizing the way users interact with knowledge.

### **1.11 Librarianship in the digital era**

The emergence of technology has brought about a significant shift in the roles and functions of librarians in the digital world. Librarians now assume multiple roles, including that of a guardian of information, a consultant to users, an information broker, and a lifelong learner.

The advent of the Internet and the World Wide Web has revolutionized the way information is accessed and located, thereby reshaping the functions of academic librarians and libraries in the modern information society. Academic librarians now play a crucial role in guiding users through the vast sea of digital information, helping them navigate and evaluate the reliability and relevance of online resources.

Despite these changes, the underlying principles of library science, as articulated by Dr. S.R. Ranganathan in his Five Laws of Library Science, continue to form the basis of the librarian's role and the importance of libraries in the digital era. These laws are as follows:

- Books are for use: The primary purpose of books and other library resources is to be utilized by readers, emphasizing the importance of accessibility and user-centered services.

- Every reader his book: Libraries strive to provide resources that cater to the diverse needs and interests of their users, recognizing that different individuals have different information requirements.
- Every book its reader: Every book in the library has its intended audience, and librarians play a crucial role in connecting the right readers with the right resources.
- Save the time of the reader: Librarians facilitate efficient access to information, helping users save time by providing organized and user-friendly systems for locating resources.
- Library is a growing organism: Libraries evolve and adapt to meet the changing needs of users and technological advancements, ensuring their relevance and vitality in the information age.

These five laws, originally proposed by Ranganathan in 1931, provide a comprehensive framework that captures the essence of library and information science. While there have been attempts by others to reinterpret these laws, they still serve as a fundamental and interpretive explanation of the principles and practices of library services, taking into account the advancements in technology and the evolving information landscape.

Academic library professionals are increasingly expected to serve as information service consultants with expertise in information technology. Given that technology permeates various aspects of library operations and services, professionals in academic institutions must anticipate and adapt to changing user expectations. This requires them to be flexible and open to acquiring new skills and staying updated on the latest advancements in information technology.

While it is essential to receive training in IT skills, it is also crucial for library professionals to not overlook the management aspect of their work. In addition to technical and professional competencies, library professionals need to possess a commitment to user-centered services and effective oral and written communication skills. They should also cultivate other skills such as business and management acumen, teaching abilities, leadership qualities, and more.

Having a well-rounded skill set allows library professionals to effectively meet the diverse needs of their users, navigate organizational challenges, and contribute to the overall success of the library. It is important for library professionals to continuously enhance their expertise, adapt to evolving technologies, and embrace a multidisciplinary approach to their work.

## 1.12 Professional Requirements in ICT Enabled Library Systems

Indeed, the development of professionals is crucial for the success of any organization, including libraries. Here are some points to consider regarding human resource development in the LIS field:

- **Human resource planning:** This involves strategic planning for the recruitment and selection of individuals who possess the required skills and competencies. It also includes determining the appropriate number of personnel needed and effectively deploying them within the organization.
- **Human resource development (HRD):** HRD focuses on actively encouraging employees to reach their full potential and develop a wide range of competencies. This can be achieved through training programs, workshops, professional development opportunities, and continuous learning initiatives. HRD also aims to create a culture within the organization that values and utilizes these competencies to contribute to organizational growth.
- **Updating the LIS curriculum:** The LIS curriculum should be regularly reviewed and updated to incorporate the latest technologies, trends, and developments in the field. By integrating relevant and up-to-date content into the curriculum, professionals can acquire the necessary knowledge and skills to adapt to the changing landscape of the LIS field.
- **Upgrading competencies:** It is essential to provide opportunities for professionals at all levels to upgrade their competencies. This can be achieved through various means, such as workshops, seminars, conferences, online courses, and professional certifications. By investing in the professional growth of employees, organizations can ensure that they possess the skills and knowledge needed to deliver quality services.
- **Proper staffing pattern:** Organizations should establish appropriate staffing patterns that take into account the technological advancements and changes in the LIS field. This ensures that professionals are equipped to handle new technologies and can effectively meet the evolving needs of users.

Overall, the development of professionals in the LIS field requires a comprehensive approach that includes updating the curriculum, providing training and development opportunities, and ensuring proper staffing patterns. By investing in human resource development, libraries can



enhance their capacity to deliver high-quality services and adapt to the changing demands of the digital age.

These challenges include lack of technical competency, resistance from staff, lack of conviction from authorities, delays in decision-making, and the need to revise policies. To address these challenges and create an efficient and effective library environment, the following factors are important:

- **Convinced authorities:** It is crucial for library authorities, such as government bodies and university authorities, to understand the importance of adapting to the changing information landscape. Their conviction and support are essential in implementing necessary changes and providing the required resources for technological advancements.
- **Technically competent professionals:** Libraries need professionals who possess the technical skills and competencies to navigate and utilize emerging technologies effectively. Continuous professional development and training programs can help build the technical expertise of library professionals.
- **Motivated and supported staff:** The motivation and morale of library staff play a significant role in their willingness to embrace change and adopt new technologies. Adequate support, training opportunities, and recognition for their efforts can contribute to a positive and proactive staff culture.
- **Educated users and publicity:** Educating library users about the available technology-oriented services and creating awareness through effective publicity can help increase their usage and engagement. Promoting the benefits and convenience of technology-driven library services can encourage user participation and satisfaction.
- **Government and UGC support:** Strict orders and guidelines from government bodies and the University Grants Commission can provide a framework and support for the development of library services. Uniform recruitment and career advancement schemes, comparable to other sectors, can attract capable individuals to the LIS service sector.
- **National-level developmental plan and policy:** A coordinated national-level plan and policy for the growth of the library workforce can provide a strategic framework for libraries to follow. This ensures proper leadership, continuity, and the adoption of ICT and modernization projects in university libraries.

- Revising standards and staff formulae: As technology evolves, it is important to review and revise existing standards and staff formulas to align with the changing technological environment. This ensures that libraries have the appropriate resources and staffing levels to effectively implement new initiatives.

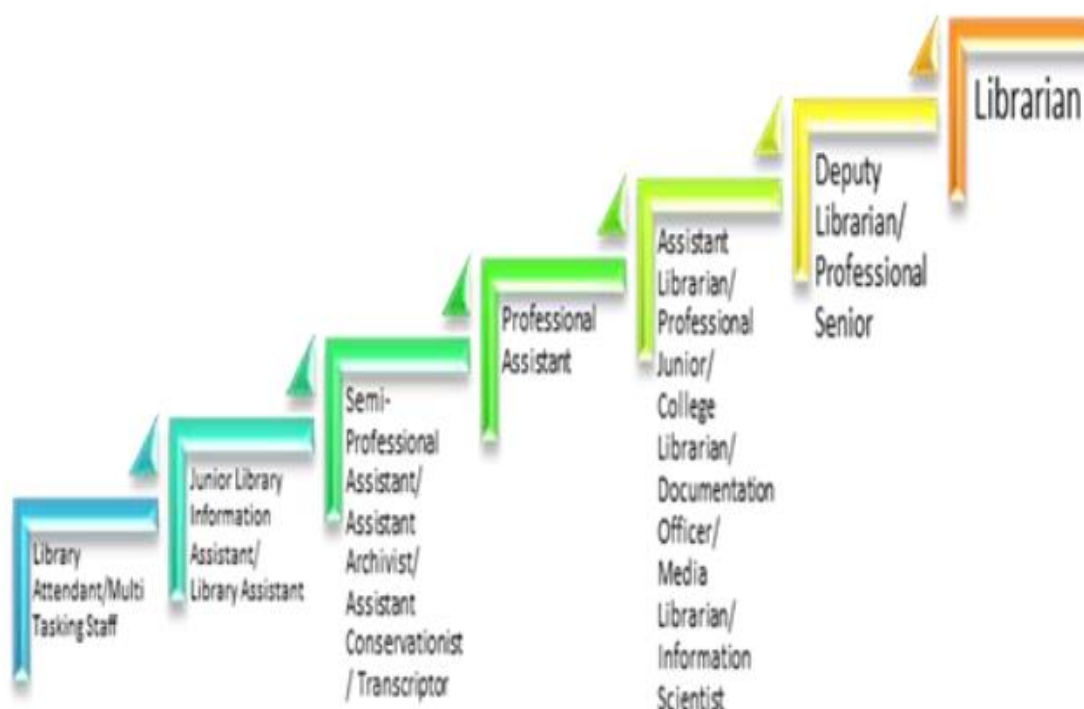
By addressing these factors, libraries can overcome challenges and create an environment that embraces technological advancements and enhances service delivery in line with the changing information landscape.

In the modern knowledge era, the field of Library and Information Science (LIS) has undergone significant changes, and traditional libraries have evolved into hybrid libraries equipped with modern technology. Computers and networks have replaced manpower, and readers now seek quick access to the right information. E-books and e-journals have become popular among library users, and library consortia have been formed to enhance resource sharing. Libraries now provide reprographic services and are connected through the internet and intranets.

However, the lack of a proper staff formula has resulted in some organizations being understaffed or overstaffed. Insufficient staffing poses challenges for libraries in undertaking new functions that have become essential in the changing landscape of learning and research. To address this issue, it is necessary to devise a new staff formula that considers the components of users, documents, and budget to determine the appropriate number of professional staff in a university library.

Systematic development of LIS professionals is crucial in university libraries, as they serve as gateways to knowledge. The hierarchy of LIS professionals in university libraries should be established to ensure the effective management and delivery of library services. This hierarchy typically includes positions such as library directors, department heads, subject specialists, reference librarians, catalogers, and support staff, each playing a specific role in the library's operations.

By addressing staffing issues and promoting the systematic development of LIS professionals, university libraries can adapt to the changing needs of users and effectively fulfill their role as providers of knowledge and information resources.



*Figure 6: Hierarchy of LIS Professionals in University Libraries*

### **1.13 Policy for Staff Development Programmes**

The emphasis on Staff Development Programs (SDP) is crucial for the training and professional growth of LIS professionals. Continuous and regular framing of SDPs is necessary to incorporate new and emerging technologies and methods into the training. Participation in refresher courses, seminars, symposia, workshops, and other similar events can provide further exposure and enhance technical competency and efficiency.

In the higher education sector, there should be a scientific Human Resource Development (HRD) policy to create an environment of regular technical training. Given the rapid changes occurring in the field of LIS due to the emergence of new technologies, such a policy can greatly enhance the effectiveness of information services.

A scientific personnel policy is essential for LIS professionals working in universities. It should facilitate the recruitment, induction, and promotion of staff, as well as ensure an adequate number of professionals. Implementing a continuous and effective training scheme is crucial to keep the technical knowledge and competency of the staff up to date. Regular evaluation of staff by superiors, through annual confidential reports and assessment interviews or tests, can help maintain a smooth flow of work and increase productivity.

Obsolete staffing policies in universities need to be revised to enable sustainable development in the field of LIS. By implementing scientific HRD policies, providing continuous training opportunities, and evaluating staff performance, universities can ensure that their LIS professionals are equipped with the necessary skills and knowledge to meet the evolving demands of the profession.

### **1.14 Library and Information Science (LIS) Education**

As technology becomes more integrated into library operations and services, librarians need to possess specific information technology skills to serve as effective information service consultants. In addition to technical and professional skills, it is important for library professionals to understand the management aspect of a library. This includes skills in business and management, teaching, leadership, and effective oral and written communication. Librarians must be able to anticipate and adapt to changing user expectations and be flexible in acquiring new skills and levels of awareness.

Commitment to user-centered services is crucial in providing high-quality library services. Library professionals need to understand the needs and preferences of their users and tailor their services accordingly. This requires a focus on customer service, effective communication, and the ability to create a positive user experience. While technology skills are important, library professionals should also develop a range of other skills, including management, teaching, leadership, and user-centered service, to effectively meet the evolving needs of library users in the digital age.

There are 118 universities and institutions in India that offer LIS education. Among them, 105 universities offer Bachelor of Library and Information Science (BLIS) courses, 78 universities offer Master of Library and Information Science (MLIS) courses, and 21 universities offer two-year integrated courses.

Additionally, there are 17 universities that provide M.Phil in Library and Information Science, 53 universities that offer Ph.D. programs in Library and Information Science, and 2 universities that provide D.Litt degrees in the field. It's noteworthy that some universities offer LIS programs through distance education, providing opportunities for individuals who may not be able to attend regular classes.

Dr. B.R. Ambedkar Open University in Hyderabad and the University of Madras were pioneers in offering LIS programs through correspondence, starting in 1985 and 1998, respectively. The

Indira Gandhi National Open University (IGNOU) also began offering BLISC, MLISc, and Ph.D. programs in LIS in 1989. These institutions play a crucial role in educating and training professionals in the field of Library and Information Science, contributing to the development of the library profession in India.

IGNOU, in particular, has played a significant role in promoting distance education in India. With its wide network of study centers spread across the country, IGNOU provides educational opportunities in various disciplines, including Library and Information Science. The university utilizes multimedia support, including audio, video, radio, television, interactive radio and video counseling, and tele-conferencing, to enhance the learning experience of students.

Additionally, IGNOU serves as the nodal agency for operating Gyan Darshan, a 24-hour educational TV channel, in collaboration with other higher learning institutions. It also contributes to the development of Gyan Vani, a cooperative network of FM radio stations dedicated to education.

Apart from IGNOU, other open universities in India, such as Annamalai University, Alagappa University, S.V. University Tirupati, University of Madras, and Madurai Kamaraj University, also offer library science courses through distance mode. The availability of LIS programs through distance education in multiple universities and institutions in India has widened access to education in the field and provided flexibility for individuals who cannot pursue traditional on-campus education.

Information and Communication Technology (ICT) has brought about a significant transformation in the traditional teaching and learning methods across all levels of higher education, including Library and Information Science (LIS) education. With the integration of ICT into the education sector, LIS curricula have had to adapt and enhance their programs to ensure that students acquire the necessary knowledge, skills, and proficiency in ICT. It is crucial for LIS schools to consolidate ICT concepts and competencies into their core curricula, providing both theoretical and practical training that enables professionals to effectively utilize ICTs in their work.

In the Indian context, there have been some notable trends in LIS programs. The academic administration of LIS schools has been relocated, such as the case of Information Science at the University of Madras and NISCAIR in New Delhi. This demonstrates the recognition of the evolving nature of LIS education and the need for effective management and coordination of these programs.

Furthermore, there has been an expansion of LIS departments, indicating the growing demand and recognition of the importance of LIS education in the country. This expansion provides more opportunities for individuals interested in pursuing a career in the LIS field and contributes to the overall development of the profession. The incorporation of ICT into LIS curricula and the ongoing changes in the administration and expansion of LIS departments reflect the efforts to align LIS education with the changing landscape of information and technology. These developments aim to equip LIS professionals with the necessary competencies to thrive in the digital age and effectively meet the information needs of the society.

There is a wide range of LIS courses available in India, catering to different levels of education and specialization. These courses are offered through various institutions, both in regular and distance education modes. Some of the major LIS courses in India include:

- Certificate course in Library and Information Science (C.Lib.Sc)
- Diploma in Library and Information Science
- Bachelor of Library and Information Science (B.Lib.Sc. / BLIS)
- Master of Library and Information Science (M.Lib.Sc. / MLIS)
- Master of Science in Library and Information Science (MS-LIS)
- Associateship in Information Science (AIS)
- Post Graduate Diploma in Library Automation and Networking (PGDLAN)
- Master of Philosophy (M.Phil) in Library and Information Science
- Doctor of Philosophy (Ph.D.) in Library and Information Science
- D.Litt in Library and Information Science

These courses cater to individuals at different stages of their academic and professional journey in the field of Library and Information Science, providing them with the necessary knowledge, skills, and research opportunities. Additionally, the emergence of digital learning environments and e-learning has had a significant impact on continuing education. With the application of ICT, learners of all ages now have access to online resources, courses, and interactive platforms that enable them to enhance their knowledge and skills in LIS and other fields. This trend has expanded the reach and flexibility of education, allowing individuals to engage in lifelong learning and stay updated with the latest developments in their respective domains. The diverse range of LIS courses and the integration of ICT in the form of e-learning platforms have

contributed to the growth and accessibility of LIS education in India, enabling individuals to pursue their educational and professional goals in the field of Library and Information Science.

There are several initiatives across the world that focus on providing open learning opportunities for LIS professionals. These initiatives aim to enhance the knowledge and skills of professionals in the field through online platforms and e-learning modules. Some prominent examples include:

- **ALA Online Continuing Education (American Library Association):** The ALA offers a range of online continuing education courses and webinars for library professionals. These courses cover various topics and provide opportunities for professional development and learning.
- **ACRL e-Learning Series (Association of College and Research Libraries):** ACRL offers an e-learning series that includes webcasts, online courses, and virtual conferences. These resources cover topics related to academic librarianship and research.
- **Special Library Association e-Learning Series:** The Special Library Association (SLA) provides an e-learning series that offers webinars and online courses on topics relevant to special librarianship and information management.
- **FlexiLearn (IGNOU):** IGNOU's FlexiLearn is an initiative that offers flexible and online learning options for various courses, including Library and Information Science. It provides open learning spaces for professionals to enhance their knowledge and skills through self-paced online modules.
- **MIT OpenCourseWare (Massachusetts Institute of Technology):** MIT's OpenCourseWare initiative provides free and open access to a wide range of educational resources, including lecture notes, assignments, and videos. These resources cover various subjects, including library and information science.
- **NPTEL (National Programme on Technology Enhanced Learning):** NPTEL is an initiative by the Indian government to provide high-quality educational content in engineering, science, and other disciplines. It offers free e-learning modules on different subjects, including library and information science.

These initiatives promote open learning spaces, allowing LIS professionals to access educational resources, engage in self-paced learning, and stay updated with the latest

developments in the field. They contribute to the continuous professional development and lifelong learning of LIS professionals worldwide.

### **1.15 University Libraries' Role in Indian Higher Education**

India has a rich intellectual heritage with a long history of being a center for knowledge and learning. The country has been known for its contributions to various fields such as medicine, astronomy, yoga, meditation, and spirituality. Ancient institutions like Nalanda, Takshashila, and Vikramshila are evidence of India's strong educational tradition dating back to the 4th century.

In the colonial era, the establishment of universities in major cities like Bombay, Calcutta, Madras, Punjab, Banaras Hindu, and Delhi played a crucial role in shaping the university library system in India. These universities served as centers of learning and research, and their libraries became vital resources for faculty, research scholars, and students.

University libraries have traditionally been regarded as the heart of the learning community, providing a physical space and resources for individuals to conduct research and enhance their knowledge. They have played a pivotal role in supporting academic pursuits, fostering intellectual growth, and facilitating scholarly activities.

With the emergence of information and communication technologies (ICT), university libraries in India have also evolved to incorporate digital resources, online databases, and electronic journals. The integration of ICT has transformed the way information is accessed, organized, and disseminated, making research and learning more efficient and convenient.

Today, university libraries continue to hold immense value in higher education. They provide a wide range of services, including access to academic resources, assistance in research and information retrieval, and support for digital literacy. They serve as important hubs for intellectual exchange, collaboration, and knowledge creation within the academic community. The university library system in India has a rich history and continues to play a significant role in supporting the educational and research needs of faculty, scholars, and students. The integration of ICT has further enhanced their capabilities, ensuring that they remain relevant and valuable in the ever-evolving landscape of higher education.

University libraries play a vital role in the intellectual development and research activities of a university. They are not only repositories of knowledge but also serve as intellectual laboratories and treasure troves for students and researchers.



The strength and reputation of a university are often measured by its research output and intellectual property. In this regard, the rich collection and services provided by the university library play a crucial role. The library's collection, including books, journals, research papers, and other resources, contribute to the research work conducted within the university. Access to a wide range of scholarly materials enables students and faculty members to explore diverse perspectives, engage in critical thinking, and produce high-quality research.

In today's technologically-enabled environment, university libraries have expanded their responsibilities in higher education. They are actively involved in promoting reading habits, supporting research endeavors, and facilitating teaching and learning activities. They have become more than just physical spaces; they have transformed into hubs of information and knowledge that are accessible 24/7 across the globe.

The emergence of information and communication technologies (ICT) has revolutionized university libraries. Automation and the adoption of library 2.0 concepts have enabled libraries to provide real-time access to information, enhance retrieval capabilities, and offer a wide range of digital resources. Integrated library management systems and institutional repositories have made it easier for users to access and utilize scholarly materials.

Moreover, university libraries have embraced services marketing through social media platforms, expanding their reach and engaging with users in innovative ways. They strive to ensure that the information provided is not only abundant but also of high quality and authenticity, addressing the evolving needs of users in higher education. University libraries are dynamic and essential components of higher education. They contribute to the intellectual growth of students and faculty, support research endeavors, and provide access to a wealth of information and resources. By embracing technological advancements and evolving into information hubs, university libraries continue to play a critical role in facilitating academic excellence.

### **1.16 ICT application in the housekeeping operations of the University Libraries: Scenario in West Bengal**

The advent of information and communication technology (ICT) has brought significant changes to the traditional activities of university libraries. In order to adapt to this evolving information landscape, it has become imperative for university libraries to embrace ICT and become active participants in the digital world.

ICT offers numerous opportunities for library automation, efficient resource sharing networks, institutional repositories, value-added information services, and capacity building programs for library staff and users. However, implementing ICT in university libraries requires a diverse range of technological tools and infrastructure.

In West Bengal, the computerization of libraries began with the Indian Statistical Institution (ISI) library, followed by some special libraries in the region. However, it took some time for computerization to be introduced in the state university libraries, starting in the early 1990s. Initially, the lack of proper ICT infrastructure posed challenges, but the situation has since changed significantly.

Today, most university libraries in West Bengal have established a minimum ICT infrastructure and are ready to leverage ICT applications. They have recognized the importance of embracing technology to meet the changing information needs of users and to enhance their services. These libraries have made efforts to develop the necessary infrastructure to utilize ICT effectively and efficiently.

The assessment of university libraries in West Bengal's response to the changing information environment and their development of ICT infrastructure is an important step in understanding their progress in integrating technology into their operations. It highlights the shift towards a more technologically advanced and digitally enabled library environment that is better equipped to serve the information needs of the academic community.

By Leveraging ICT, university libraries in West Bengal can enhance their information management capabilities, improve access to resources, and provide innovative services that cater to the evolving needs of users in the digital age.

### **1.17 Importance of Professional Development and Continuing Education**

In the rapidly changing information environment, the role of professional librarians has evolved to become that of information handlers and managers. To effectively navigate these changes, librarians need to be flexible, adaptable, and equipped with the necessary skills to manage change. This calls for well-educated professionals who are committed to continuous professional and personal development.

One of the challenges in the field of library education is to raise awareness about the importance of librarianship and establish a distinct identity for the library profession. To address this challenge, there is a need for a restructuring of library and information science (LIS) education

programs. This restructuring should aim to maintain uniformity in course contents, incorporate changes in traditional subjects to reflect the evolving information landscape, and place greater emphasis on the practical aspects of the profession.

LIS departments bear the responsibility of nurturing professionals with the requisite competence to effectively manage libraries and information centers of various sizes and types. This includes preparing professionals to handle diverse environments, from small rural libraries to well-established digital libraries. By providing comprehensive and updated education and training, LIS departments can equip future librarians with the skills and knowledge necessary to meet the challenges of librarianship in the modern era.

Continuous collaboration between LIS departments and the professional community is also crucial in shaping the curriculum and ensuring its relevance to the evolving needs of the field. By working together, LIS educators and professionals can contribute to the development of competent and capable librarians who are equipped to effectively manage information resources and serve their user communities. The development and integration of ICT in library and information studies curriculum have been influenced by various factors. While efforts have been made to revise syllabi and introduce more IT components in line with modular curriculum guidelines, the LIS profession still faces challenges in this regard.

One of the challenges is the lack of sufficient equipment for teaching ICT-oriented practical work. Adequate resources and infrastructure are essential to provide hands-on training and practical experience with ICT tools and technologies. Furthermore, there is a shortage of ICT-trained manpower, which can affect the quality and effectiveness of ICT education in LIS programs. Another challenge is the lack of uniformity in course contents across different institutions offering library science programs. This can lead to variations in the depth and breadth of ICT knowledge and skills acquired by graduates, making it difficult to establish a standardized level of competency. The proliferation of courses and the increasing number of institutions offering library science programs also contribute to the challenges. This can lead to a dilution of quality and a lack of accreditation for many programs, making it harder for employers and professionals to assess the skills and knowledge acquired through these courses.

Additionally, budgetary constraints pose a challenge for library science schools in implementing and maintaining up-to-date ICT infrastructure and resources. To address these challenges, it is important to make continuing education and training programs in ICT applications mandatory for library professionals, regardless of their experience or category.

This will help bridge the gap between fresh graduates, who have been exposed to the latest developments in ICT, and experienced professionals who may have limited practical exposure. By providing ongoing training opportunities, library professionals can develop and enhance their basic competencies in ICT, thereby improving the overall quality of library services. Collaboration between LIS institutions, professional bodies, and industry experts is also crucial in developing comprehensive and standardized ICT curriculum, sharing resources, and ensuring the relevance and effectiveness of ICT education in library science programs.

The UGC (University Grants Commission) has indeed played a significant role in promoting career development and continuing education for academic librarians in India. The establishment of Academic Staff Colleges at various universities and the initiation of training programs for library personnel through refresher courses and professional developmental activities are notable steps taken by the UGC.

One important development was the recommendation of the Mehrotra Committee in 1986, which suggested the National Eligibility Test (NET) as a requirement for lecturers, assistant librarians, documentation officers, and college librarians. This move aimed to enhance the professional standards of the library profession and ensure that individuals entering academic librarian roles possess the necessary qualifications and competencies.

In line with the recommendations, UGC has supported and sponsored conferences, symposia, seminars, workshops, refresher courses, and special lectures, which provide valuable platforms for professional development and knowledge sharing in the library and information science field. These events offer opportunities for professionals to attend and participate in continuing education programs, enabling them to stay updated with the latest developments, trends, and best practices.

Moreover, UGC has emphasized the identification of areas appropriate for refresher courses and has provided support for organizing such courses through competent implementing agencies. This approach ensures that specific areas of expertise or emerging topics receive focused attention and dedicated training opportunities for library professionals.

UGC's efforts in promoting continuing education and professional development have played a crucial role in enabling librarians to enhance their skills, acquire new knowledge, and stay abreast of the changing demands and challenges in the field of library and information science. The Indian National Scientific Documentation Centre (INSDOC), now known as the National Institute of Science Communication and Information Resources (NISCAIR), initiated short-

term training programs in the field of library and information science. These programs aimed to provide professionals with specialized knowledge and skills in areas such as computerization. The National Information System for Science and Technology (NISSAT), in collaboration with INSDOC, conducted several short-term courses focused on computerization, including training on CDS/ISIS and WINISIS software. These courses aimed to enhance the participants' understanding and proficiency in using these software tools for library and information management.

In addition, organizations such as DELNET (Developing Library Network), Documentation Research and Training Centre (DRTC), and Information Library Network (INFLIBNET) have been actively organizing workshops and training programs on various ICT applications relevant to the library profession.

DELNET conducts workshops regularly on open-source software, including KOHA and other software tools, to equip library professionals with the necessary skills for managing library resources effectively. DRTC offers workshops on open software, Greenstone Digital Library (GSDL), and other ICT applications, providing practical training to library professionals.

INFLIBNET, in collaboration with the University Grants Commission (UGC), organizes workshops across the country on library software such as Soul and Digital Library software. They also conduct user awareness programs on online journals and provide training on e-resource management for library professionals. Furthermore, with the development of open-source software, many libraries have started organizing workshops to train their staff members and professionals from other institutions on using these open software tools effectively.

Publishers also contribute to training programs by offering training sessions to library professionals on accessing and utilizing their electronic resources, thereby increasing their usage and effectiveness. Library associations in India, such as the Indian Library Association (ILA) and the Indian Association of Special Libraries and Information Centres (IASLIC), play a vital role in promoting professional development. They organize yearly conferences that encourage professionals to participate, share their research output, and stay updated on the latest trends and advancements in the field of library and information science. These conferences provide a platform for networking, knowledge sharing, and collaboration among library professionals.

### **1.18 Need of the Study**

Information and Communication Technology (ICT) has had a significant impact on housekeeping operations in libraries, enabling them to become more efficient, effective, and user-friendly. Here are some of the ways in which ICT has impacted housekeeping operations in libraries:

- **Automation of Processes:** The use of ICT has automated many library housekeeping operations, such as book circulation, cataloging, and inventory management. This has helped libraries to reduce the time and effort required for manual tasks and improve accuracy and reliability.
- **Online Catalogs:** Libraries now have online catalogs that can be accessed remotely by library users. This has made it easier for users to search and find the books they need, and reduced the workload of library staff.
- **Digital Libraries:** With the advent of digital libraries, libraries have been able to expand their collections and make them accessible to users around the world. Digital libraries provide users with easy access to a vast amount of information, and have made the process of information retrieval faster and more convenient.
- **Self-Check-in/Check-out:** Many libraries now offer self-check-in and check-out systems, allowing users to borrow and return books without the assistance of library staff. This has reduced the workload of library staff and made the borrowing process faster and more convenient for users.
- **RFID Technology:** Radio Frequency Identification (RFID) technology has been used in libraries to track books and other library materials. RFID tags can be read remotely, which has made it easier to track the movement of books within the library, and has reduced the number of lost or misplaced books.

Overall, ICT has had a significant impact on housekeeping operations in libraries, enabling them to become more efficient, effective, and user-friendly. With the continued advancement of ICT, we can expect libraries to become even more streamlined and user-focused in the future.

### **1.19 Statement of the Problem**

Time has come to realize the significance of developing library personnel engaged in education sector and make adequate investment in developing professionals engaged in

learning delivery system i.e. libraries. Developing competency framework for library personnel is the need of the hour in any university library that wants to be dynamic and growth oriented or to succeed in a fast-changing environment. Libraries can become dynamic and grow only through the efforts and competencies of their human resources. Personnel policies can keep the morale and motivation of the people high, but these efforts are not enough to make the organization dynamic and take it in new directions.

As no system is without constraints, particularly service-oriented point is also more prone to problem due to direct user interface who have motivated and varied expectations from the libraries. Different types of users are basically depended on library staff. Who provide the services to users for searching the database? Library is dynamic field, as it has witnessed man charges mode of services and approaches of users.

### **1.20 Research Questions**

While reviewing the related literature on evaluation of computer application in housekeeping operation in universities libraries the following research question arose mention below.

Under Management aspect:

- How many computers are used for providing the library services?
- Which type of hardisk are used in computers?
- Which type of library software are used of providing the users services?
- How many staff are recruited for providing this service?

Under service aspect:

- How many users are using these services?
- How many users are using the online service?
- How many users are using the offline service from universities libraries?
- How are they satisfied with the services?

### **1.21 Objectives of the Study**

The major objectives are:

- ✓ To depict the scenario of Library services in the West Bengal.
- ✓ To identity the infrastructural facilities of the University Libraries in West Bengal.
- ✓ To evaluate the nature of automation services and the skill competitive and qualitative of the professional staff of the Libraries in West Bengal.
- ✓ To identity the nature of use of Library documents by the users through online and offline mode.

- ✓ To assess the satisfaction level of users in the Universities Libraries of West Bengal
- ✓ To suggest a possible frame work for smooth functioning of housekeeping operation in the University Libraries of West Bengal.
- ✓ To know the advantages of automating the house-keeping operations
- ✓ To identify the functions that can be automated and
- ✓ To understand overall impact of automation on Library services and Library management

## **1.22 Scope and Limitation of the Study**

The scope of housekeeping operation system related to the teaching and research of the universities is to defined. In this study all the universities and their libraries in West Bengal will be covered keeping in mind the importance of housekeeping operation in the library services. I have taken of 8 universities out of 36 universities in West Bengal.

- i. Jadavpur University
- ii. University of Calcutta
- iii. The University of Burdwan
- iv. University of Kalyani
- v. Rabindra Bharati University
- vi. West Bengal State University
- vii. University of North Bengal
- viii. Vidyasagar University

## **1.23 Chapterization**

The study and the findings are reported in six chapters. The citation and the bibliographic reference follow APA style with slight variations.

Chapter I introduces the problem of the study. It includes a brief description of the subject, the significance of the study, objectives, hypothesis and limitations.

Chapter II deals with literature survey of related studies covering information communication technology, Library education and professional development, housekeeping operation in the library services.



Chapter III describes the methodology of research, briefly describing the population of the study, data collection methods, design of questionnaire, etc.

Chapter IV gives an overview of the university libraries of West Bengal.

Chapter V includes the analysis of data and its interpretation.

Chapter VI gives a summary of the important findings, suggestions and recommendations based on the study.

Chapter VII gives the suggestions/ recommendations and concludes the thesis.

## **Chapter 2: Review of Literature**

## **Chapter 2: Review of Literature**

### **2. Review of Literature**

#### **2.1 Definition of Literature Review**

A literature review is a critical and comprehensive analysis of published research and scholarly articles on a specific topic or research question. It involves identifying, evaluating, and synthesizing relevant literature to provide a summary of existing knowledge, highlight gaps or inconsistencies in the research, and propose potential areas for further investigation. The purpose of a literature review is to provide an overview of the current state of knowledge in a particular field, identify gaps or inconsistencies in existing research, and inform the development of new studies or research questions.

Here are some key definitions related to literature review:

- ✓ **Literature Review:** A literature review is an evaluative report of information found in the literature related to a selected area of study. It summarizes, evaluates, and analyzes the body of knowledge on a particular subject.
- ✓ **Scholarly Literature:** Scholarly literature refers to academic publications written by experts and researchers in a specific field. These publications are often peer-reviewed, meaning they have undergone a rigorous evaluation process by experts in the field before publication.
- ✓ **Summary:** In the context of a literature review, a summary involves condensing the main ideas, arguments, and findings of various sources into a concise form. It captures the key points and essential details of the literature to provide a clear understanding of the existing research (Cooper, 1988).
- ✓ **Analysis:** Analysis in a literature review involves critically examining and interpreting the information and ideas presented in the selected sources. It involves identifying patterns, themes, and relationships, as well as evaluating the strengths, weaknesses, and limitations of the existing research.
- ✓ **Synthesis:** Synthesis refers to the process of integrating and combining information from different sources to create a cohesive and comprehensive understanding of a topic. It involves drawing connections, identifying commonalities and differences, and developing new insights or perspectives.

- ✓ **Research Question:** A research question is a clear and focused inquiry that guides the literature review. It defines the scope and purpose of the review and helps to identify relevant sources and determine the key themes or issues to explore.
- ✓ **Gap in the Literature:** A gap in the literature refers to an area or aspect of a topic that has not been adequately addressed or studied in previous research. Identifying gaps in the literature is an essential component of a literature review, as it helps to identify opportunities for new research or areas where further investigation is needed (Cooper, 1988).

Overall, a literature review serves as a foundation for new research by providing a comprehensive understanding of the existing knowledge and research landscape, identifying gaps or limitations, and suggesting potential avenues for future investigation.

A literature review serves several purposes, including:

- Identifying the current state of knowledge on a particular topic.
- Evaluating the strengths and weaknesses of previous studies.
- Identifying gaps or unanswered questions in the existing literature.
- Providing a theoretical framework or conceptual basis for a research study.
- Guiding the selection of research methods and design.
- Supporting the development of research hypotheses or research questions.
- Demonstrating the significance and relevance of the proposed research.

## **2.2 Need for Literature review and its functions**

The literature review serves several important purposes and fulfills various needs within the research process. Here are some key reasons why literature reviews are necessary:

- **Establishing the Context:** A literature review provides the necessary background and context for a research study. It helps researchers situate their work within the broader academic conversation and understand the existing knowledge and theories related to their topic. By reviewing relevant literature, researchers can identify key concepts, theories, methodologies, and debates in their field.
- **Identifying Gaps and Research Opportunities:** Literature reviews help researchers identify gaps or deficiencies in the existing literature. By examining previous studies, researchers can identify unanswered questions, conflicting findings, or areas that have

received limited attention. This identification of gaps helps researchers formulate research questions and design studies that contribute to filling those gaps.

- **Informing Research Design and Methodology:** Through a literature review, researchers can gain insights into the appropriate research design, methodology, and data collection techniques for their study. They can learn from previous studies' strengths and weaknesses, identify appropriate measurement tools, and refine their research approach based on the lessons learned from the literature (Ridley, 2012).
- **Avoiding Redundancy and Duplication:** A literature review allows researchers to ascertain whether their proposed study has already been conducted or if similar studies have been published. By avoiding redundancy and duplication, researchers can ensure that their work contributes something novel and valuable to the existing knowledge base.
- **Supporting Theoretical Frameworks:** Literature reviews help researchers develop and refine their theoretical frameworks. By analyzing previous research, researchers can identify and integrate relevant theories and concepts into their own study. This enables them to build upon existing knowledge and provide a solid theoretical foundation for their research.
- **Providing Evidence and Justification:** A literature review provides researchers with evidence and justification for their research questions, hypotheses, and proposed methods. By referencing and citing existing studies, researchers can demonstrate the rationale and significance of their research, as well as establish credibility and build upon the work of others.
- **Enhancing Critical Thinking and Analysis:** Engaging in a literature review requires critical thinking and analytical skills. Researchers must evaluate the quality, relevance, and reliability of various sources, identify strengths and weaknesses in previous studies, and synthesize information from multiple perspectives. This process helps researchers develop a deeper understanding of their topic and enhances their ability to critically evaluate and interpret research findings (Ridley, 2012).

In summary, literature reviews are essential components of the research process. They provide a foundation of knowledge, identify research gaps, inform study design and methodology, support theoretical frameworks, provide evidence and justification, and enhance critical

thinking skills. By conducting a thorough literature review, researchers can contribute meaningfully to their field and ensure the relevance and novelty of their research.

## **2.3 Literature review search**

When conducting a literature review search, it's important to follow a systematic and organized approach to ensure comprehensive coverage of relevant literature. Here are the steps involved in conducting a literature review search:

- **Clearly define your research question or objective:** Clearly articulate the specific research question or objective that your literature review aims to address. This will help guide your search and ensure that you focus on the most relevant literature.
- **Identify keywords and search terms:** Brainstorm a list of keywords and search terms related to your research question. These terms should be broad enough to capture a wide range of relevant literature but specific enough to target your area of interest.
- **Select appropriate databases and sources:** Identify the most relevant academic databases, libraries, and online platforms for your research field. Commonly used databases include PubMed, Google Scholar, Scopus, Web of Science, and specialized databases specific to your field of study.
- **Conduct the initial search:** Begin your search by entering the keywords and search terms into the selected databases or search engines. Start with a broad search to get an overview of the available literature (Fink, 2014).
- **Refine your search:** Refine your search by using filters, such as publication date, study design, or language, to narrow down the results to the most relevant studies. You can also use Boolean operators (e.g., AND, OR, NOT) to combine or exclude specific terms.
- **Review the search results:** Go through the titles and abstracts of the search results to identify potentially relevant articles. Pay attention to the relevance of each article to your research question and objective.
- **Obtain full-text articles:** Retrieve the full-text articles of the selected studies for a more thorough evaluation. Access articles through academic databases, interlibrary loan services, or directly contacting authors if necessary.
- **Assess the quality of the literature:** Evaluate the quality and relevance of each selected article. Consider factors such as study design, sample size, methodology, data analysis, and credibility of the authors.

- Use references and citation tracking: Look for additional relevant sources by examining the reference lists of the articles you have selected. Citation tracking involves identifying articles that have cited the key articles you found during your search (Fink, 2014).
- Repeat the process and update: Repeat the search process using different combinations of keywords, search terms, and databases to ensure comprehensive coverage of the literature. Additionally, regularly update your literature review to include newly published studies.
- Organize and synthesize the literature: Organize the selected articles and their key findings based on themes, concepts, or other relevant categories. Synthesize the information by summarizing the main points, identifying patterns, and highlighting gaps in the literature.

Remember, a literature review search is an iterative process, and it may require several rounds of searching, screening, and refining to ensure a thorough and comprehensive review of the existing literature.

## **2.4 Reviews on ICT usage in Libraries**

Priya (2011) described that in libraries computers are specifically in practice for technical processing, acquisitioning, serial control, stock verification, circulation, cataloguing, interlibrary loan, documentation services, selective dissemination services, reference service etc.

Ramesh (2012) responded through his survey that ICT usage is on the way. 22.93% of users believed that electronic sources are better than print, 13.43% thought that eResources are faster and 21.64% replied that eResources are time saver and fastly retrievable.

Singh & Tyagi (2018) discussed the impact of online classification tools in his work that ICT gave the pace to library in needful manner under the fifth law of library science, and automatisisation gave the fine touch to documentation management by using the classification schemes... the emergence of vary databases of libraries shows the new way of classification of library documents by using the web tools, are freely accessible without any login credentials using DDC i.e. Classify, ISBNdb, IndCat, Library of Congress Online Catalogue, National Library of India OPAC, WorldCat, Institutional Web OPACs.

Singh (2010) identified that 67.7% and 59.4% of respondents use the internet and specific websites, maybe for personal or official purposes. Percentages of respondents who use library catalogue, institution's website, eJournals were almost equal i.e. 36.55%, 31.3% and 34.4%. Subject gateways were at 8.3%.

Kaushik, Vichare & Pothare (2011) analysed through their study that in new formats users preferred digital information and ICT to access & organise the information to have shift from print to digital; had an impact on information centres & on users too... ICT has also changed the way information is accessed and utilized. From physically accessing books/ journals in libraries, users have got used to accessing eResources from their desktop itself. Realising the convenience associated with eResources, library has not only built a huge collection of online resources but has also built infrastructure like cyber libraries, WiFi access to facilitate the learning process.

Kaushik, Vichare, & Pothare (2011) found that about 89 (79.46%) of users indicated the main purpose of visit to the cyber library, is to access eMails followed by 88 (78.57%) users who indicated accessing eJournals, online databases as their main purpose. Because of library's conducive ambience and 24x7 availability, other prominent purposes are studying 82 (73.21%), research work 80 (71.43%), prepare class notes 69 (61.61%), surfing 69 (61.61%) general awareness 64 (57.14% and social network 58 (51.79%).

Mishra & Angadi (2011) state that conjunction with computer technologies, libraries are increasingly being equipped with information infrastructure which enabled their users to rapidly access information from outside the libraries, i.e. beyond their four walls.

Shibu & Baby (2011) conducted a survey and found that information is a vital source and those who possess the right information at right time will only succeed. ICT has influenced the way in which users' approach for information. Academics have welcomed the automation of library, and a shift towards electronic information seeking is visible, which implies that ICT has an impact on academics. Users prefer to have electronic sources.

Francis (2012) elaborated among the utilisation of consortia based digital information resources usage, results shows that 87.14% students used CeRA (Consortium for eResources in Agriculture), 82% were having fair knowledge about CeRA and learn the required skills to access and use the digital information resources' through curriculum-based courses. The students would like to strengthen CeRA services by adding more resources.



Upadhyay et al. (2013) explained that nowadays eResources as well as printed resources are available in each academic library. But as a matter of research eResources were preferred in place of print resources by the users; while answering the query regarding the preferred resources. 58.1% prefer eResources, 13.33% users prefer to print and 28.57% prefer both formats.

Kevalkumar (2014) defined that libraries are using the latest communication technology to manage the various forms of information and related activities over the years. Now we can transfer eData from one place to another place, one person to another or one institution to another institution through IT. ICT also supports educational process, research & development activities and consists of all modern means to store and handling information.

Roy et al. (2014) examined that the development of ICT makes electronic information and resource sharing very easy and important in academic libraries today. Respondents are using different types of eResources; study shows that 62.5% of users are using eJournals, 47.32% using web OPAC and the purpose of mainly using the eResources was 77.67% for education.

Sujata (2014) elaborated through her study 'Freq using eResources by the faculty members in Andhra Pradesh JNTU: A study' that availability of eResources in a university is very common. Today the eResources are replacing the usage of print media in Jawaharlal Nehru Technological University in Andhra Pradesh. From the study it is evident that 76.62% of users use WWW daily, 49.19% use online databases weekly, 67.43% use CD/ DVDs, 64.24% use eBooks and 67.04% use eThesis. 79.56% of users are satisfied about the current usage of eResources. Thus eResources are very common among the teachers.

Tripathi & Kumar (2014) surveyed to know the eResources usage at Jawahar Lal Nehru University... eResources vendor/ publishers prepared a report to understand seasonality and trends of eResources usage in an academic library and found the popularity of eResources in terms of volume of downloads. The eResources have gained popularity in academic libraries.

Rath (2015)<sup>20</sup> described in his study that in libraries, mobile browsers i.e. Opera mobile, Opera mini, Safari, Skyfire, Google android, Firefox, Microsoft IE, Teashark, Bolt, Blazer, Bitstream's Thunderhawk, Mozilla's Minimo, S60 web browser are quite popular to accessing the internet based resources through mobile phone and mobile browser becomes important for library users to serve eInformation from all the access points.

Tyagi (2015) found in his study that the usage of eResources databases are very famous and subscribing based on easy to use, saving the space and user demand. Currency and timeliness of the information are the first and the cost of resources is the last factor in the collection development policy. Geographic parameters and remote accessibility are used in the selection of eResources.

Angom, Devi & Phuritsabam (2016) Referred their views that library automation relieved the library staff of repetitive work and saved the precious time of library professionals in routine housekeeping operations, that allowed to find out the information and books in need easier.

Chegoni (2016) made an examination and found that in recent years there has been a phenomenal growth of eResources in many consortiums, a large number of eJournals are hosted. His study shows that overall 85.14% of users are aware about eResources. 32.85% majority of users are using eResources for project purpose, teaching classes, and research only. The study emphasises that medical libraries give more importance to providing and access to medical eResources.

Khan & Tyagi (2016) retrieved the fact through a conducted case study which enlightens that 93.3% faculty members and 88.2% students are using eResources for study, research, teaching, preparation of notes, publishing books/ articles, projects, seminars/ workshop presentations purpose; out of them, 85.7% responded the reason of research.

Pandey (2016) shared his observation among OPAC utilization that it is a powerful search engine of bibliographical information retrieval system of library and information centre by which we can search by title, author, any keyword under Boolean search from library bibliographical database. The study indicates that 45.01% of users are using OPAC is to know the availability of required documents in the library, 39.62% using to know the location of required documents and 15.36% of users use OPAC to know whether the required document issued to someone or not.

Saraf (2016) justified that Libraries are using the latest devices of communication technology to manage the various forms of information and related activities over the years. Now the application of technological devices in libraries activities are not a new phenomenon. We can transfer eData or eInformation from one place to another place, one person to another or one academic institution to another through IT. ICT also supports an educational process, research & development activities and consists of all modern technical means used to store and handle information.

Zia & Singh (2016) enlightened the fact that the eJournals are getting popularity for research and teaching in area of studies, a noteworthy aspect is that consortia in area of studies are gaining popularity amongst the specialists. It is evident that seven databases namely Taylor & Francis, Jstor, Project Muse, Sage, Brill, SocIndex, and Scopus got the responses; undisputedly Jstor leads the pack and extensively used regularly 81.25%, Taylor and Francis 67.39%, whereas project Muse carries 75%, Sage shows 67.39% usage, Brill 75%, SocIndex of EBSCO's usage is 67.39%. Scopus, a citation database is more popular at 75%.

Kaul (2015) surveyed in India and found that 83% of the institutions reported having more than 10,000 ETDs. Two of India's programmes were considerably larger. About 75% of the institutions reported that they added up to 500 ETDs per year but three of the five Indian institutions reported adding less than 150.

Kaul (2015) observed that quality content was becoming available through MOOKs and these centres were providing readymade content to students and teachers, it was leaving an impact on the performance of academic libraries. He felt that the students, who did not use quality content through libraries, were depending on Google like resources. Therefore libraries had a proper selection of quality content from the web resources.

Amar Ujala (2010) stressed that as well as other things eBooks are also in trend. By the last few years graph is going upward side among the online readership. Vary websites are providing such facility. On-line books are having the literature, poems, novels as well as science fiction category. As per the age group of mass, books are available. Even by downloading the books we can store them in our computer for making our digital library, which saves space and money. It is the eBook inculcated us for reading habit. Now the quote 'out of stock' is outdated.

Singh (2010) revealed that library science is incorporating database management, information architecture, and knowledge management. Library and information science is an interdisciplinary field, and libraries have been the repositories of knowledge and information. Librarians are the custodians of libraries and they organise, maintain, and store the learning resources in libraries. They help people to find information and use it effectively in their personal and professional lives.

Vajpayee (2010) quoted that due to IT applications in libraries, now librarian is in the fourth generation; after librarian, information officer he is also known as cyberarian. Its main reason is digitization of libraries. In that entire, librarian has to required only systematized the concerned resources, software, modern techniques, and keep watching like an eagle eye. Now

study material available at global level, inter-library services, online catalogues, eJournals, eNewsletter, etc.

Wangchuk (2011) expressed that the eBook 'wave' is catching up fast. 'Traditional' readers are also appreciating the positive aspects of eBooks. An eBook reader has storage of 10,000 books and costing little over ₹6,000. One can easily download desired books from online repositories for happy reading. And the good news for readers- through a bad one for authors and publishers- is that an eBook costs less than half the price of its print version. A recent study by PricewaterhouseCoopers in the US, Britain, Netherlands, and Germany found that only 15% of people in these countries read 50% or more of all eBooks.

Singh & Khan (2017) observed that the advent of ICT, internet and particularly WWW has revolutionized everything. Evidences are everywhere in the form of eCamera, eDiary, digital television, eSignature etc. and information is recordable, storable, retrievable, and disseminatable in eFormats at large scale. Libraries provide their services by using more effective tools and techniques in smart eEnvironment. Platform specific apps, several mobile websites as well as mobile apps i.e. Safari, Internet Explorer, Firefox etc. optimized the use of smart devices to provide quick access to catalogue searching.

Chandandeep (2018) analysed in his study that new content is being acquired/ licensed in digital form. Digitization of library is a step towards preservation of published material in virtual space. 'Recently British Council also digitized its libraries to provide access across globally 24x7 to a millennial audience. Most of the books here are now available on tablets, laptops, and smartphones. 25000 members are accessing the digital library and in Delhi, approx 6000 members use the digital library, the only aim is to increase our reach and surprisingly... people have accepted the change'.

Chauhan (2018)<sup>38</sup> elaborated that at Amity University's central library, technology is a key enabler for knowledge sharing... The library gives students access to over 45000 leading online journals such as Oxford journals, Cambridge university press, Nature.Com, etc. also a fully automated library management system is in place with self-service kiosks for students to issue and return books.

Moudgal (2018) discussed in his article that library department, Karnataka plan to digitise books and exam material that will be available on the cloud. The state is having a large IT savvy workforce to start the cloud based academic platform for all academic institutions as digitization programme. Approx 10 lakh students will benefit from eLearning , accessible from

home for students of class 1 to 12. The programme will also provide digital content on competition material of UPSC and Karnataka Public Service Commission.

Moore (2010) observed that cloud computing is leading to new location based services with transparency, consumer specific, branded apps, mobile push to sharing the resources individual to individuals. Cloud computing offers the possibility for library to replace their IT infrastructure with an online solution, which can save library money, and provide capabilities in education programme in LIS by enhancing, flexibility with a simplified approach.

LibBest (2018) discussed that RFID usage reduced the time to perform circulation operations. The other time savings also realised by circulation staff. RFID system encoded the circulation status on the RFID tags. This is done by designating a bit as the "theft" (EAS) bit and turning it off at the time of check-out and on at the time of check-in. RFID tags are last longer than barcodes. Most RFID vendors also claimed for minimum 1,00,000 transactions before a tag may need to be replaced. They have longer read ranges about 3 to 5 feet.

Gasiorowski-Denis (2019) wrote that DOI- digital object identifier (ISO 26324:2012) is an international standard that provides unique international identification to objects for use on digital networks is expected to bring benefits for publishers, information managers, multi-media distributors, archive and cultural heritage communities, and the internet technology industry.

NALSAR Library (2019) commented that web OPAC is accessible 24x7, designed to provide online information on the availability of titles, allow the patrons for requests, renewal of books, patron's account access, including other information services. Apart from web catalogue, information services as SDI, table of contents of books & journals, list of new accessions, online chat with the library staff for reference services are also being provided. All the housekeeping activities are automated. The print collection is augmented by online access.

Refread (2019) illustrated that library users are shifting towards digital media for learning and information needs. libraries are building an online presence to serve its users whenever they are with desired content in need. Powerful discovery tools and engines are available for 24x7 access for all library resources.

Kaul (2012) observed that the national library had digitized about 25000 books so far, and subscribed about 7000 eJournals and want to print disabled to provide the eResources access

to its users 24x7. In the national library of Japan, about 20% of the total population is print disabled.

Kaur (2012) said that the digital revolution driven by ICT has an impact on academic library activities. Shift from print to ePublishing has been taken place. Due to enriching user's demand librarians have molded their collection development towards ePublications. Networked eResources become an integral part of the academic library during the last decade. Users are also more oriented towards a new medium for communicating research ideas. Academic libraries also started providing online access to more eJournals to boosting up the research programmes.

Natrajan & Dahiya (2012) found that libraries have library automation activity; mostly libraries use LibSys, NetLib, SOUL, Trodon, CDS/ISIS, Kaptron, Mindmill. Concisely reflect that LibSys have more facilities than other software. The budget allotted to selected libraries is vary from 3 lakh to 22 lakh. Essential automation modules are in practice along with barcode and RFID technology.

Sinha (2012) identified in his work that University library users in Assam university library accepted the internet as a means of accessing the academic and research work relevant information. Volume of eResources usage among users has been found at an optimum level. Results also show that how rapid change in information seeking behavior comes up due to the use of internet for online access of eResources, which have become a vital part of various information needs.

Thomas (2013) discussed that where mobile library services do stand in year 2012 and what librarians, technologists, and information professionals were learning about and experimenting with mobile technologies while exploring and adopting best practices from library peers, institutional partners, and cross industry experts.

Sivathaasanr (2014) revealed that readers' i.e. lecturers, senior lecturers, professors, and students have shown significance towards the attitude among electronic information resources usage.

Leeladharan (2015) concluded among the open-source software usage that DSpace seems to be the most preferred software for creating the eRepositories in SAARC reign i.e. 66.7% repositories are based on DSpace, and India itself has 58.7% implementation; ahead to that EPrint is at second preference with 22.2% in SAARC while India has 20.6% installations.

Greenstone has 3% of installations. Among language, English has been used as an apex installation language.

Noronha (2019) pointed out that FOSS supported to library and librarians in natural fit. FOSS tools are affordable to build knowledge. He also pointed out that among the vary FOSS tools for libraries- Koha, Evergreen, Open Journal system stand out. Apart from OSSSubjectPus (Open source subject guide), LibKi (public kiosk management system for library), BipApp (research social app), a guide on the slide (how to uses the library), open room (to manage reservation for library's public space), omeka (collection based web publishing platform).

In this section, we discussed many works as literature reviews, ideas propounded by vary authors worked on similar topics under ICT impression for the library and information structure. Maximum works are concerned since the year 2010 and mentioned in national and international publications. The reviews show the ICT usages in the library and information science by different dimensions associated with ICT impact on library & information structure and library's changing image and guide among the future path concerned to expanding information technology.

## **2.5 Review on Housekeeping operations of the library systems**

(Jabeen et al., 2020). This study examines the housekeeping practices in different library systems, comparing their approaches to maintaining cleanliness and organization. The authors analyze various factors such as staff training, cleaning schedules, and the use of technology to identify best practices that contribute to effective housekeeping operations in libraries.

(Bhoi, 2017). This literature review explores the connection between housekeeping operations and user satisfaction in library environments. The authors examine studies that investigate the influence of cleanliness, orderliness, and accessibility on users' perceptions of library services. The findings highlight the importance of effective housekeeping in creating a positive user experience.

(Clayton, 2018). This review focuses on technological advancements and their application in library housekeeping operations. The authors discuss the use of automated cleaning systems, RFID technology for tracking and locating misplaced items, and the implementation of self-checkout kiosks. The review provides insights into the benefits and challenges associated with adopting such technologies in libraries.

(Chow & Rich, 2018). This literature review examines housekeeping management specifically in special libraries, which have unique collections and services. The authors discuss the challenges faced by special libraries in maintaining cleanliness and organization, such as handling delicate materials and accommodating specialized storage requirements. The review offers practical solutions and recommendations for effective housekeeping in these settings.

(Nayana, 2019). This systematic review explores the impact of staff training on housekeeping operations in libraries. The authors analyze studies that investigate the effectiveness of training programs in improving staff knowledge and skills related to housekeeping tasks. The review emphasizes the significance of ongoing training and professional development for library staff to maintain high standards of cleanliness and organization.

(Mittal, 2017). This literature review focuses on examining best practices in library housekeeping operations. It explores various aspects of housekeeping in library systems, including collection maintenance, shelving and organization, inventory management, and cleanliness. The review highlights the importance of efficient housekeeping practices in providing a pleasant and accessible environment for library patrons.

(Takappa & Ramakrishna, 2017). This literature review investigates the role of automation in library housekeeping operations. It examines the implementation of technologies such as RFID (Radio Frequency Identification), automated sorting systems, and self-checkout machines. The review discusses the benefits of automation, such as increased efficiency, improved accuracy, and reduced labor requirements, while also addressing challenges and potential considerations for libraries.

(Muniraja, 2021). This literature review explores the significance of staff training and development in library housekeeping operations. It examines the various training methods and programs available to enhance the skills of library staff responsible for housekeeping tasks. The review also discusses the impact of well-trained staff on the overall effectiveness of housekeeping operations and user satisfaction.

(Jayamma & Krishnamurthy, 2017). This literature review focuses on user perspectives regarding library housekeeping operations. It reviews surveys, studies, and user feedback to identify the factors that influence user satisfaction in terms of cleanliness, organization, and accessibility of library spaces. The review also discusses the role of user feedback in improving housekeeping practices and tailoring services to meet the needs and expectations of library patrons.



(Adekoya, 2018). This literature review examines the concept of sustainability in library housekeeping operations. It explores strategies and practices that promote environmentally friendly approaches, such as waste reduction, energy efficiency, and the use of eco-friendly cleaning products. The review discusses the importance of integrating sustainability principles into housekeeping operations to align libraries with broader environmental goals and enhance their social responsibility.

## **2.6 Review on Housekeeping operations of the library systems in West Bengal**

(Rana & Mondal, 2021). This literature review investigates the housekeeping practices in libraries across West Bengal, India. It examines the similarities and differences in housekeeping operations, including collection maintenance, shelving systems, cleanliness standards, and staff training. The review highlights the challenges faced by libraries in West Bengal and identifies best practices that can be adopted to improve housekeeping operations in the region.

(Biswas, 2020). This literature review focuses on user satisfaction with library housekeeping operations in West Bengal. It reviews surveys conducted among library users to understand their perceptions of cleanliness, organization, and accessibility of library spaces in the region. The review highlights areas where improvements are needed and provides recommendations for enhancing user satisfaction in West Bengal libraries.

(Rana, 2019). This literature review examines the adoption of technology in housekeeping operations in West Bengal libraries. It explores the implementation of automation systems, such as RFID, automated sorting, and self-checkout machines, and their impact on efficiency and user experience. The review analyzes case studies of West Bengal libraries to identify the benefits and challenges associated with technology adoption in housekeeping.

(Sen & Das, 2022). This literature review focuses on the training and development of library staff in West Bengal for effective housekeeping operations. It explores the training programs, workshops, and skill-building initiatives available to library staff in the region. The review discusses the importance of continuous professional development and its impact on improving housekeeping practices in West Bengal libraries.

(Das Majumder & Jana, 2020). This literature review examines the promotion of sustainable housekeeping practices in libraries across West Bengal. It explores initiatives and strategies

aimed at reducing waste, conserving energy, and adopting eco-friendly cleaning practices. The review highlights case studies and success stories of West Bengal libraries that have implemented sustainable housekeeping practices, contributing to environmental conservation in the region.

## **2.7 Challenges and Issues in Housekeeping Operations in libraries**

(Mommoh & Emmanuel, 2019). This literature review examines the staffing challenges faced by libraries in their housekeeping operations. It explores issues such as recruitment, training, retention, workload management, and staff morale. The review highlights the impact of staffing challenges on the overall effectiveness of housekeeping operations and suggests strategies for addressing these challenges.

(Kumar, 2021). This literature review explores the challenges related to budget constraints and resource allocation in library housekeeping operations. It examines the impact of limited funding on cleaning supplies, equipment maintenance, staff hiring, and training opportunities. The review discusses strategies for optimizing resources, seeking external funding, and advocating for increased budget allocations for housekeeping in libraries.

(Surwade & Patil, 2021). This literature review focuses on the challenges posed by environmental factors in library housekeeping operations. It explores issues such as dust, humidity, temperature fluctuations, pests, and mold. The review examines the impact of these factors on collection preservation, cleanliness, and staff health. It also discusses preventive measures and mitigation strategies to address environmental challenges.

(Gul & Bano, 2019). This literature review investigates the challenges arising from user behavior and its impact on library housekeeping operations. It reviews research studies that analyze user behavior patterns, such as mishelving, misplacement of materials, food and drink spills, and vandalism. The review highlights the importance of user education, signage, and library policies in addressing these challenges.

(Enwerem et al., 2020). This literature review explores the technological challenges faced by libraries in their housekeeping operations. It examines issues related to the adoption and implementation of technology, such as RFID systems, automated sorting, and integrated library management systems. The review discusses challenges such as system compatibility, staff training, data security, and the need for ongoing technical support in housekeeping operations.

(Barathi et al., 2017). This literature review examines the challenges and issues faced in housekeeping operations within libraries. It provides insights into the key areas of concern and potential solutions proposed in the literature.

(Ali, & Sreenivasarao, 2019). This study presents a case study analysis of housekeeping operations in a university library. The authors identify challenges such as inadequate staff, insufficient training, and lack of standardized procedures. They suggest implementing regular training programs, employing adequate staff, and establishing clear guidelines to address these challenges effectively.

(Lee and Luyt, 2020) explore the challenges faced by library staff in maintaining clean and orderly libraries. Their research highlights issues like limited resources, user behavior, and managing high-traffic areas. The authors recommend developing strategies to address resource constraints, educating users on proper conduct, and establishing a preventive maintenance approach to mitigate challenges effectively.

(Singh, 2020) investigates challenges faced by libraries in managing housekeeping operations and provides potential solutions. The author emphasizes issues such as handling library material preservation, waste management, and infrastructure maintenance. Proposed solutions include utilizing technology for preservation, implementing waste management policies, and conducting regular maintenance and inspection activities.

(Parvez & Chowdhury, 2020). This research assesses housekeeping practices in Dhaka University Library and identifies various challenges. It discusses issues like staff training, lack of cleaning tools and equipment, and inadequate monitoring. The study recommends enhancing staff training programs, procuring necessary cleaning tools, and implementing effective monitoring mechanisms to overcome these challenges.

(Ogunkoya, & Omotosho, 2021). This review article provides a comprehensive analysis of housekeeping operations in academic libraries. It highlights challenges such as inadequate funding, staff turnover, and lack of recognition for housekeeping staff. The authors propose strategies such as advocacy for increased funding, developing a supportive work environment, and recognizing the contributions of housekeeping staff to address these challenges effectively.

These literature reviews collectively shed light on the challenges and issues in housekeeping operations in libraries, including staffing, resource constraints, user behavior, and infrastructure maintenance. The suggested solutions encompass staff training, technology

utilization, resource allocation, and policy implementation, providing valuable insights for library administrators and managers in improving housekeeping operations.

## **2.8 User Satisfaction with Housekeeping Operations in Libraries**

This literature review examines the factors influencing user satisfaction with housekeeping operations in libraries. It explores the key elements that contribute to a positive user experience and identifies areas for improvement.

(Abels and Boll, 2018) investigate the impact of library facilities and services on user satisfaction. They highlight the importance of cleanliness, organization, and comfortable spaces in enhancing user experiences. The authors emphasize the need for effective housekeeping practices to ensure a clean and welcoming library environment, ultimately contributing to user satisfaction.

(Kajberg & Hertzum, 2019). This study focuses on user satisfaction with various aspects of the library, including housekeeping operations. The findings reveal that cleanliness and orderliness significantly influence user satisfaction. The authors emphasize the importance of maintaining a clean and well-organized library environment to meet user expectations and enhance overall satisfaction.

(Edwards, 2019) conducts a systematic review of literature to examine the impact of library environments on user satisfaction. The review identifies cleanliness and maintenance as critical factors affecting user satisfaction. The author suggests that library administrators prioritize housekeeping operations to create a positive and satisfying user experience.

(Huvila et al., 2020). This study explores the materiality of library housekeeping and its impact on user satisfaction. It examines the relationship between cleanliness, organization, and user perceptions of library services. The authors argue that effective housekeeping practices positively influence user experiences and satisfaction, emphasizing the significance of maintaining a clean and orderly library environment.

(Strothmann and Bennett, 2020) investigate users' perceptions of space and service quality in academic libraries. The study reveals that cleanliness, including well-maintained restrooms and tidy spaces, significantly contributes to user satisfaction. The authors highlight the need for comprehensive housekeeping strategies that address cleanliness throughout the library to ensure positive user perceptions.

(Cheng & Ng, 2020). This literature review examines user satisfaction with library facilities and services, including housekeeping operations. The authors highlight the importance of cleanliness, maintenance, and a well-organized environment in enhancing user satisfaction. They emphasize the need for regular housekeeping practices to create a positive user experience.

(Chiu and Cheng, 2019) review literature on user satisfaction in library spaces, with a focus on housekeeping operations. The review highlights the impact of cleanliness, orderliness, and comfortable seating arrangements on user satisfaction. The authors suggest that effective housekeeping practices contribute to a positive user experience and overall satisfaction.

(Zahid & Chaudhry, 2019). This literature review explores the impact of service quality on user satisfaction in academic libraries, including housekeeping operations. The authors identify cleanliness, maintenance, and a pleasant environment as essential factors affecting user satisfaction. They recommend implementing effective housekeeping practices to enhance service quality and improve user satisfaction.

(Grant and Zeeman, 2020) conduct a systematic review and qualitative synthesis to explore users' experiences and expectations of library spaces. The review reveals that cleanliness and a well-maintained environment significantly impact user satisfaction. The authors emphasize the need for proactive housekeeping operations to create a positive user perception and satisfaction.

(Deodhar & Jatkar, 2020). These literature reviews collectively highlight the importance of housekeeping operations in influencing user satisfaction in libraries. Cleanliness, organization, and maintenance are consistently identified as critical factors affecting user perceptions and experiences. The findings underscore the need for effective housekeeping practices to create a clean, welcoming, and satisfying environment for library users.

## **2.9 Technology and Automation in Housekeeping Operations in libraries**

This literature review explores the use of technology and automation in housekeeping operations within libraries. It examines the benefits, challenges, and potential applications of technology to improve efficiency and effectiveness in maintaining library spaces.

(Heim, 2018) discusses the potential of automation and robotics in library operations, including housekeeping. The review examines the use of robots for tasks such as cleaning, shelving, and

inventory management. The author highlights the benefits of automation, such as increased efficiency and cost-effectiveness, while also addressing challenges and ethical considerations.

(Tian & Williams, 2019). This literature review provides an overview of automation in libraries, encompassing various aspects, including housekeeping operations. The authors discuss the implementation of technology-driven systems for book sorting, cleaning, and space management. They highlight the potential for automation to streamline housekeeping processes and improve overall library operations.

(Yang and Lei, 2020) examine the concept of smart libraries, which leverage technology for efficient operations. The review discusses the application of automation, Internet of Things (IoT), and artificial intelligence (AI) in housekeeping tasks such as cleaning, maintenance, and security. The authors emphasize the potential of technology to enhance housekeeping operations and improve user experiences.

(Akintunde & Adeyem, 2021). This review focuses on the automation and digitization of library services, including housekeeping operations. The authors discuss the adoption of technology for tasks such as RFID-based shelf management, self-checkout systems, and sensor-driven cleaning processes. The review highlights the benefits of automation, such as improved accuracy, efficiency, and user satisfaction.

(Chisenga and Machila, 2021) explore the use of artificial intelligence (AI) and emerging technologies in libraries, including housekeeping operations. The review discusses the application of AI for smart cleaning, robotic systems, and predictive maintenance. The authors emphasize the potential of technology-driven solutions to optimize housekeeping processes and enhance library operations.

(Maharana & Mohanty, 2019). This literature review provides an overview of automation in libraries, specifically focusing on the adoption of technology in housekeeping operations. The authors discuss various automation technologies employed, including robotics, smart sensors, and automated cleaning equipment. The review highlights the advantages of technology-driven housekeeping, such as improved productivity, resource optimization, and enhanced user experiences.

(Nair and Mani, 2020) conduct a review of literature on library automation and its impact on services, encompassing housekeeping operations. The authors examine the use of technology for tasks like shelf management, inventory control, and cleaning processes. The review

emphasizes the positive effects of automation on accuracy, efficiency, and overall service quality in library housekeeping.

(Zhang et al., 2020). This literature review focuses on the applications of artificial intelligence (AI) technologies in library services, including housekeeping operations. The authors explore the use of AI for tasks such as smart cleaning, predictive maintenance, and energy management. The review highlights the potential of AI technologies to improve efficiency, sustainability, and user satisfaction in library housekeeping.

(Mu et al., 2021) conduct a review of literature on the application of artificial intelligence (AI) in library management, including housekeeping operations. The authors discuss the use of AI technologies, such as computer vision, natural language processing, and machine learning, for tasks like space optimization, cleanliness monitoring, and preventive maintenance. The review highlights the potential of AI in improving efficiency, accuracy, and user experiences in library housekeeping.

These literature reviews collectively highlight the potential of technology and automation in housekeeping operations within libraries. The use of robots, AI, IoT, and digitization offers opportunities to streamline tasks, improve efficiency, and enhance user experiences. However, challenges such as implementation costs, ethical considerations, and training requirements need to be addressed for successful integration of technology in library housekeeping operations.

## **2.10 Research gap**

The use of ICT (Information and Communication Technology) applications in the housekeeping operations of university libraries is a relatively underexplored area. While there is existing literature on technology and automation in library operations, there is a research gap specifically focusing on the use of ICT in housekeeping operations.

Some potential research gaps in this area could include:

1. Limited studies on the effectiveness of ICT applications in streamlining housekeeping operations in university libraries in West Bengal: While there may be anecdotal evidence or case studies on the use of ICT applications in library housekeeping, there is a lack of comprehensive studies evaluating the impact and effectiveness of these applications in improving efficiency, reducing costs, and enhancing user experiences.

2. User perspectives on the integration of ICT in library housekeeping in West Bengal: Research could focus on understanding the perceptions, attitudes, and experiences of library users regarding the use of ICT in housekeeping operations. Exploring user satisfaction, preferences, and potential concerns would provide valuable insights for library administrators in implementing and improving ICT applications.

3. Evaluation of specific ICT tools and technologies for housekeeping tasks in West Bengal university libraries: There is a need for research that examines the suitability and effectiveness of specific ICT tools and technologies in various housekeeping tasks within university libraries. This could include the use of automation systems, sensor-based technologies, or mobile applications for inventory management, cleaning, and maintenance processes.

4. Challenges and barriers to implementing ICT in library housekeeping in West Bengal Universities: Research could investigate the obstacles faced by university libraries in adopting and integrating ICT applications in housekeeping operations. This could include issues related to financial resources, staff training, infrastructure requirements, and data security concerns.

5. Best practices and guidelines for implementing ICT in library housekeeping West Bengal Universities: A research gap exists in terms of comprehensive guidelines and best practices for university libraries to effectively utilize ICT applications in housekeeping operations. Studies that identify successful case studies, highlight lessons learned, and provide practical recommendations would be beneficial for library administrators and practitioners.

Addressing these research gaps would contribute to a better understanding of the potential benefits, challenges, and opportunities in utilizing ICT applications in the housekeeping operations of university libraries. It would also help inform decision-making processes and guide the development of strategies for successful implementation and utilization of ICT in library housekeeping.



## **Chapter 3: Research Methodology**

## **Chapter 3: Research Methodology**

### **3. Research Methodology**

#### **3.1 Meaning of Research Methodology**

Research methodology is the systematic process through which researchers design, plan, and conduct their studies to answer specific research questions or investigate hypotheses. It involves the techniques, procedures, and tools used to gather, analyze, and interpret data in a rigorous and objective manner. The ultimate goal of research methodology is to ensure the reliability, validity, and generalizability of the research findings, making them credible and trustworthy (Flick, 2015).

At the heart of research methodology lies the formulation of research objectives and the selection of appropriate methods to achieve those objectives. Researchers must carefully choose between qualitative and quantitative approaches, depending on the nature of the study and the type of data they seek to collect. Qualitative methods involve the exploration and interpretation of non-numeric data, such as interviews, focus groups, and observations, to gain in-depth insights into complex phenomena (Mackey & Gass, 2015). In contrast, quantitative methods rely on numerical data, often obtained through surveys or experiments, which allows for statistical analysis and the establishment of correlations or causality.

In addition to selecting the research approach, researchers also need to decide on the data collection instruments and sampling techniques. Surveys, questionnaires, interviews, and observations are common data collection tools, each with its strengths and limitations. Moreover, the sampling process determines how the participants or subjects are selected from the target population, ensuring the representativeness of the sample and the generalizability of the findings.

Research methodology involves addressing ethical considerations to protect the rights and well-being of study participants. Researchers must obtain informed consent from participants, maintain confidentiality, and ensure that their work adheres to ethical guidelines and institutional review board (IRB) approvals. The data analysis phase is a crucial aspect of research methodology, where researchers use statistical software or qualitative analysis techniques to process and interpret the collected data (Hegde, 2015). The chosen method of analysis should align with the research design and objectives. Finally, the research methodology encompasses reporting and communicating the research findings to the scientific community and the public through publications, presentations,

and other dissemination methods. Transparent reporting of the research process allows other scholars to assess the study's validity and potentially replicate or build upon the research in their own work. Research methodology serves as the backbone of any scientific investigation, providing a structured framework for conducting research and generating reliable knowledge. By employing rigorous methodologies, researchers contribute to the advancement of their respective fields and enhance our understanding of the world around us.

### **3.2 Importance of Research Methodology**

Research methodology plays a pivotal role in the realm of academic and scientific investigations, providing a systematic approach to conducting research that ensures the integrity and reliability of the results. One of the most significant contributions of research methodology is its ability to establish the credibility of research findings. By employing well-designed methodologies, researchers can minimize biases, errors, and confounding factors that could otherwise compromise the validity of their work (Koro-Ljungberg, 2015). This, in turn, bolsters the confidence of readers, peers, and the wider community in the accuracy and trustworthiness of the research outcomes.

Research methodology helps in validating the research design and approach. The choice of research design, whether it be experimental, correlational, cross-sectional, or longitudinal, significantly influences the study's ability to address research questions effectively. A well-articulated research methodology ensures that the chosen design aligns seamlessly with the research objectives, leading to the efficient collection of relevant data and a focused analysis (Saunders & Bezzina, 2015). In doing so, it enhances the study's overall coherence and ensures that the research process follows a logical progression, yielding valuable insights into the subject matter under investigation.

The importance of research methodology extends to the potential for replication and generalizability of research findings. Transparently documenting the research process enables other researchers to replicate the study, essentially re-conducting the research with a similar methodology to validate or challenge the original results. Replicability is an essential aspect of the scientific method as it fosters the accumulation of knowledge and strengthens the empirical foundation of various fields of study. Additionally, a robust research methodology enhances the generalizability of findings, allowing researchers to infer conclusions beyond the sample studied,

thus making the research more applicable and relevant to a broader population or different contexts.

Ethical considerations are also integral to research methodology. Adherence to ethical guidelines and principles is essential to protect the rights and well-being of study participants. Research methodology ensures that informed consent is obtained, that participants' privacy is maintained, and that any potential risks are mitigated. By addressing ethical concerns, research can be conducted with integrity and respect for human subjects, promoting trust between researchers and the communities they study (Gabriel, 2015). Research methodology aids in optimizing data collection efforts. By carefully choosing appropriate data collection tools and techniques, researchers can gather the necessary information efficiently and effectively. Whether through surveys, interviews, observations, or experiments, a well-designed research methodology allows researchers to maximize the utility of collected data, minimizing redundancy and ensuring that research resources are utilized optimally.

From a broader perspective, the importance of research methodology lies in its role in contributing to the advancement of knowledge. Rigorous and well-executed studies lead to credible findings that enrich our understanding of various phenomena, making valuable contributions to the academic, scientific, and professional communities. Moreover, evidence-based research outcomes are valuable resources for policymakers, businesses, and organizations. Such findings can inform decision-making processes and drive the development of policies, interventions, and strategies that are grounded in reliable data, leading to more effective and impactful outcomes.

Research methodology is also a cornerstone of academic and professional recognition. Sound methodologies lend credibility to researchers' work, increasing the likelihood of acceptance for publication in reputable journals and garnering recognition within the scholarly community. Furthermore, by continuously evaluating and refining research methodologies, researchers contribute to the ongoing improvement of research practices and standards, leading to higher-quality and more meaningful research outcomes over time. Research methodology is of paramount importance in the field of research. It underpins the credibility of research findings, validates the research design, enables replication and generalizability, addresses ethical considerations, optimizes data collection, and contributes to the advancement of knowledge. By upholding

rigorous research methodologies, researchers ensure the quality and impact of their work, fostering a robust and dynamic scientific landscape that benefits society at large.

### **3.3 Types of Methodology**

Research methodology encompasses various approaches and techniques used to conduct research and gather data. Here are some common types of research methodology:

#### **3.3.1 Quantitative Research**

Quantitative research is a systematic and empirical approach to studying phenomena that involves the collection and analysis of numerical data. This method is particularly suitable for research questions that seek to understand relationships between variables, make predictions, and draw statistical inferences. In quantitative research, researchers design studies with well-defined hypotheses and use structured data collection instruments, such as surveys or experiments, to obtain standardized and measurable data. The data is then subjected to rigorous statistical analysis to draw conclusions and make evidence-based claims.

One of the key strengths of quantitative research lies in its emphasis on objectivity and replicability. By using standardized data collection methods and statistical analyses, researchers can minimize subjective bias and ensure that the findings are independent of the individual conducting the research. This objectivity enhances the credibility of the research, allowing other researchers to replicate the study to verify its results and build upon its findings (Hoy & Adams, 2015). Replication is a fundamental aspect of the scientific method, as it helps establish the reliability of research findings and contributes to the accumulation of knowledge in a particular field.

Quantitative research is also well-suited for studies with large sample sizes and the investigation of population-level trends. The statistical analysis allows researchers to identify patterns, correlations, and associations within the data that might not be apparent from qualitative approaches. Moreover, quantitative research facilitates generalizability, allowing researchers to draw conclusions and make inferences about broader populations beyond the study sample, provided the sampling process is representative. Quantitative research also has its limitations. It may not capture the richness and depth of human experiences and behaviors, which are often better addressed through qualitative research. Additionally, the reliance on pre-determined data

collection instruments may limit researchers' ability to explore unexpected phenomena or adapt to evolving research questions during the study.

Despite these limitations, quantitative research remains a powerful tool for generating empirical evidence and testing hypotheses in many disciplines, including psychology, sociology, economics, and public health. It has contributed to significant advancements in various fields, ranging from medical research and policy evaluation to market analysis and social sciences. By providing systematic and quantifiable insights, quantitative research plays a crucial role in informing decision-making, shaping policies, and driving progress in both academic and real-world contexts.

### **3.3.2 Qualitative Research**

Qualitative research is a methodological approach that seeks to understand and interpret the complexities of human behavior, experiences, and social phenomena through non-numeric data. It focuses on exploring the meanings, perspectives, and emotions of individuals or groups, aiming to gain in-depth insights and develop a rich understanding of the research topic. In qualitative research, researchers employ various data collection techniques, such as interviews, focus groups, observations, and document analysis, to gather textual or visual information that can be analyzed in a context-specific and nuanced manner.

One of the primary strengths of qualitative research lies in its ability to capture the depth and complexity of human experiences. Through open-ended questions and flexible data collection methods, researchers can delve into the subjective realities of participants, allowing for a deeper exploration of their beliefs, attitudes, and motivations. This approach is particularly valuable when investigating topics that are not easily quantifiable or involve intricate social dynamics, cultural contexts, or historical influences.

Qualitative research also promotes a more empathetic and holistic understanding of individuals and communities. Researchers often engage directly with study participants, creating rapport and trust that can lead to more candid and genuine responses. This intimate connection enables researchers to uncover unique insights and explore unexpected themes or perspectives that may not have been evident in quantitative research (Merriam & Tisdell, 2015). Qualitative research is especially well-suited for generating hypotheses and theory development. Instead of testing pre-

existing hypotheses as in quantitative research, qualitative studies allow researchers to develop theories grounded in the data itself. By identifying patterns, themes, and conceptual frameworks that emerge during data analysis, researchers can propose new ideas and construct meaningful theoretical frameworks that contribute to the advancement of knowledge. Qualitative research is not without its challenges. The interpretation of non-numeric data is inherently subjective and dependent on the researcher's perspective and biases. Ensuring rigor and reliability in qualitative research involves establishing credibility, transferability, dependability, and confirmability of the findings. This is often achieved through methods such as member checking, triangulation, and systematic data analysis techniques.

Despite its challenges, qualitative research provides valuable and complementary insights to quantitative approaches, offering a more comprehensive understanding of complex phenomena. It is commonly used in fields such as anthropology, sociology, education, and psychology, where it sheds light on human behavior, culture, and social interactions. Qualitative research plays a vital role in informing policy, guiding interventions, and bringing attention to marginalized voices, ultimately contributing to a deeper and more meaningful understanding of the diverse facets of the human experience.

### **3.3.2.1 Mixed-Methods Research**

Mixed-methods research is an innovative and comprehensive approach that combines elements of both qualitative and quantitative research methodologies. It aims to leverage the strengths of both approaches, providing researchers with a more holistic understanding of complex research questions. In mixed-methods research, data is collected and analyzed using both numerical and non-numeric techniques, allowing for triangulation of findings and a deeper exploration of the research topic.

One of the key advantages of mixed-methods research is its ability to provide a more comprehensive and nuanced understanding of the research problem. By integrating both qualitative and quantitative data, researchers can validate and complement their findings. For instance, qualitative data may offer rich insights into participants' experiences and motivations, while quantitative data can provide statistical evidence to support or refute these qualitative insights. The convergence of evidence from different data sources strengthens the overall validity and reliability of the study's conclusions (Clark & Ivankova, 2015). This research allows

researchers to address complex research questions that cannot be adequately answered by either qualitative or quantitative methods alone. It offers flexibility in study design, allowing researchers to adapt their approach based on emerging findings and unforeseen developments during the research process. This adaptability ensures that the research remains responsive to the dynamic nature of the subject being studied. Mixed-methods research fosters a deeper understanding of contradictory or unexpected findings. If qualitative and quantitative data present conflicting results, researchers can use the mixed-methods approach to explore the reasons behind these discrepancies. This process of data triangulation helps to identify potential contextual factors or underlying mechanisms that may contribute to the variations in the findings.

Despite its benefits, mixed-methods research also presents unique challenges. Integrating qualitative and quantitative data requires careful planning and coordination to ensure coherence in data collection, analysis, and interpretation. Researchers must have expertise in both methodologies and possess a clear understanding of when and how to combine the data effectively. Additionally, mixed-methods research may be more time-consuming and resource-intensive compared to single-method approaches. Mixed-methods research offers a powerful and flexible framework for addressing complex research questions and gaining a deeper understanding of multifaceted phenomena. By integrating qualitative and quantitative data, researchers can triangulate findings, validate results, and explore unexpected insights. While it requires careful planning and execution, mixed-methods research is an invaluable tool for researchers seeking to provide more robust and holistic answers to their research inquiries, contributing to the advancement of knowledge across various disciplines. This method is employed in the study.

### **3.3.3 Descriptive Research**

Descriptive research is a fundamental and essential type of research methodology that focuses on accurately describing the characteristics, behaviors, and attributes of a specific population, group, or phenomenon. The primary goal of descriptive research is to provide an objective and comprehensive portrayal of the subject under investigation without manipulating or intervening in the natural settings. It involves observing and documenting existing conditions, rather than testing hypotheses or establishing cause-and-effect relationships.

One of the key strengths of descriptive research lies in its ability to provide a clear and detailed picture of a particular topic. By collecting data through methods such as surveys, observations, or



content analysis, researchers can systematically gather information about the participants' attitudes, behaviors, demographics, or any other relevant variables. This approach helps in identifying patterns, trends, and associations, offering valuable insights into the characteristics of the studied population (Nassaji, 2015).

Descriptive research is particularly useful in the early stages of a research inquiry when little is known about a topic. It allows researchers to explore and familiarize themselves with the subject, providing a solid foundation for more in-depth studies in the future. Additionally, descriptive research is valuable for generating hypotheses and formulating research questions that can be further investigated using other research designs. Descriptive research serves as a valuable tool for evaluating and monitoring changes over time. By repeatedly measuring and documenting a particular phenomenon, researchers can track trends and identify shifts in behaviors or attitudes. This longitudinal perspective helps inform policymakers, educators, and practitioners about the effectiveness of interventions or policies. Descriptive research has its limitations. Since it is primarily concerned with description rather than explanation, it does not establish causality or provide insights into the underlying mechanisms of observed patterns. Furthermore, the data collected in descriptive research may be subject to biases or limitations due to the reliance on self-reports, limited sample sizes, or the absence of experimental controls.

Despite these limitations, descriptive research plays a critical role in the research landscape, providing a foundational understanding of a wide range of topics. It is commonly used in social sciences, marketing, public health, and education, among other fields. By objectively documenting the characteristics and behaviors of individuals or populations, descriptive research informs decision-making processes, contributes to the development of theories, and lays the groundwork for further empirical investigations.

### **3.3.4 Experimental Research**

Experimental research is a highly controlled and systematic approach to scientific inquiry, aimed at investigating cause-and-effect relationships between variables. It involves the manipulation of one or more independent variables to observe their impact on one or more dependent variables, while holding all other factors constant. The hallmark of experimental research is random assignment, wherein participants are assigned to different experimental conditions randomly,

ensuring that any observed differences in the dependent variable can be attributed to the manipulation of the independent variable.

One of the key strengths of experimental research is its ability to establish causality. By manipulating the independent variable and controlling for confounding factors through random assignment and experimental design, researchers can confidently assert that changes in the dependent variable are directly caused by the manipulated factor. This level of control allows researchers to draw strong conclusions about the causal relationship between variables, which is vital for understanding the mechanisms underlying phenomena (Gile, 2015).

Experimental research is particularly well-suited for testing hypotheses and theories. It allows researchers to test specific predictions and assumptions derived from existing theories or generate new hypotheses based on prior knowledge. This hypothesis-testing approach enables researchers to refine or validate existing theories, leading to a deeper understanding of the subject under investigation. Experimental research can be used to evaluate the effectiveness of interventions, treatments, or programs. By randomly assigning participants to different conditions, researchers can assess whether a particular intervention has a statistically significant impact on the dependent variable. This evaluation is crucial for evidence-based decision-making, policy development, and program improvement in various fields, including healthcare, education, and social sciences. Experimental research also has some limitations. In some cases, it may not be feasible or ethical to manipulate certain variables, especially in social or behavioral research. Additionally, the controlled nature of experiments may not always reflect real-world complexity, potentially limiting the generalizability of findings to everyday situations.

Ethical considerations are essential in experimental research, as researchers must ensure the well-being and informed consent of study participants. Experimental studies involving human subjects must adhere to strict ethical guidelines to protect their rights and minimize potential risks. Experimental research is a powerful and widely used approach in the scientific community for studying cause-and-effect relationships. Through careful manipulation of independent variables and random assignment, experimental research provides a rigorous foundation for establishing causal connections, testing hypotheses, and evaluating the effectiveness of interventions. While it may have some limitations and ethical challenges, the insights gained from well-designed

experimental studies contribute significantly to advancing knowledge and informing evidence-based practices across various disciplines.

### **3.3.5 Case Study Research**

Case study research is a qualitative research method that involves in-depth exploration and analysis of a single individual, group, organization, or event. It is a comprehensive and holistic approach that aims to understand complex phenomena within their real-life contexts. In case study research, researchers collect rich and detailed data through various methods, such as interviews, observations, documents, and artifacts, to gain a comprehensive understanding of the case being studied.

One of the key strengths of case study research is its ability to provide detailed insights into unique and rare situations. By focusing on a specific case, researchers can delve deeply into the intricacies and complexities of the subject, uncovering nuanced aspects that may not be evident in larger, more generalized studies. This depth of exploration allows researchers to develop a rich and detailed understanding of the case, leading to valuable and context-specific findings.

Case study research is particularly valuable for exploratory and explanatory purposes. It is often used when little is known about a specific phenomenon or when researchers seek to explain a complex interaction between variables. The flexibility of case study research allows researchers to adapt their methods and approach as they discover new insights during the investigation, enabling them to pursue unexpected leads and explore emerging themes (Tumele, 2015). Case study research is well-suited for studying dynamic and evolving situations. It enables researchers to capture changes over time and observe how various factors influence the case being studied. This longitudinal perspective is especially useful for tracking processes, understanding development, and identifying trends that may not be apparent in cross-sectional research.

Case study research also has its limitations. The focus on a single case means that the findings may not be easily generalized to other contexts or populations. As a result, the external validity of case study research is often limited. Additionally, the subjective nature of data collection and analysis may introduce potential biases, and the interpretation of findings may be influenced by the researcher's perspective. Despite these limitations, case study research remains a valuable and insightful method for understanding complex phenomena and generating hypotheses for further

investigation. It is commonly used in fields such as psychology, sociology, education, and business, where it offers a detailed and context-specific perspective on real-world situations. By providing in-depth and richly detailed data, case study research contributes to a deeper understanding of the intricacies of human behavior, social dynamics, and organizational processes.

### **3.3.6 Survey Research**

Survey research is a widely used quantitative research method that involves the collection of data through structured questionnaires or surveys. It is a popular approach for studying attitudes, opinions, behaviors, and characteristics of individuals or groups within a larger population. Surveys are designed to be administered to a representative sample, allowing researchers to make inferences about the entire population based on the responses obtained. The questions in surveys can be closed-ended (multiple-choice or Likert scale) or open-ended, offering participants the opportunity to express their thoughts in their own words.

One of the key strengths of survey research lies in its efficiency and scalability. Surveys can be administered to a large number of participants simultaneously, making it a practical and cost-effective method for data collection. It allows researchers to gather data from a diverse and geographically dispersed sample, providing a broader perspective on the research topic. Survey research enables researchers to quantify attitudes, behaviors, and opinions, facilitating the identification of patterns and trends within the data (Story & Tait, 2019). Statistical analysis of survey data helps in drawing objective conclusions and making generalizations about the entire population under study. This quantitative approach is particularly valuable for research questions that involve measuring prevalence rates, examining correlations, or testing hypotheses.

Survey research is also well-suited for exploring public opinion, consumer preferences, or societal trends. By collecting data on a wide range of topics, researchers can gain insights into the preferences and attitudes of individuals or specific target groups. This information is valuable for market research, policy evaluation, and decision-making in various fields, including marketing, public opinion research, and social sciences. Survey research also has its limitations. The reliance on self-reporting may introduce response biases, such as social desirability bias or recall bias, leading to potential inaccuracies in the data. Additionally, surveys may not capture the nuances and complexities of certain research questions, as they often provide limited scope for participants to elaborate on their responses.

Designing effective survey instruments requires careful attention to question wording, response options, and survey structure. Poorly designed surveys can lead to ambiguous or misleading results, affecting the reliability and validity of the data collected. Survey research is a valuable and widely used method for collecting quantitative data on attitudes, behaviors, and characteristics of individuals or groups within a population. It offers efficiency, scalability, and the ability to draw generalizations from the data collected. However, researchers must be attentive to survey design and potential biases to ensure the accuracy and reliability of the findings. By providing quantitative insights into a wide range of research topics, survey research contributes to evidence-based decision-making and enriches our understanding of human behavior and social trends.

### **3.3.7 Action Research**

Action research is a participatory and collaborative approach to problem-solving and knowledge generation, primarily used in practical and real-world settings. It involves a cyclical process of planning, action, observation, and reflection, where researchers work closely with practitioners or stakeholders to identify and address practical issues or challenges. The ultimate goal of action research is to create positive change and improve practices, policies, or processes based on evidence and feedback gathered from the field.

One of the key characteristics of action research is its focus on practical application and relevance. Unlike traditional research that may be conducted in isolation from the real world, action research directly engages with the people or organizations affected by the issue under investigation. By involving stakeholders actively in the research process, action research ensures that the findings are contextually relevant and actionable (Cohen et al., 2017). Action research typically starts with a collaborative identification of a problem or an area for improvement. The researchers and practitioners work together to develop research questions and design interventions or changes to address the identified issue. The interventions are then implemented, and data is collected through various methods such as surveys, interviews, or observations to evaluate the outcomes and effects of the changes.

The next phase involves data analysis and reflection. Researchers and practitioners examine the data together, seeking insights into the effectiveness of the interventions and identifying areas for further improvement. This process of continuous feedback and learning is integral to action research, as it allows for ongoing adjustments and refinements to the interventions based on the

evolving understanding of the issue. The iterative nature of action research means that the process is not linear but dynamic, with multiple cycles of planning, action, and reflection. Each iteration builds on the knowledge and experiences gained from previous cycles, leading to progressively better outcomes and more effective solutions (Mac Naughton, 2020).

Action research is widely used in fields such as education, healthcare, community development, and organizational management. It empowers practitioners to be active agents of change, and it fosters a culture of learning and improvement within organizations and communities. Additionally, action research generates valuable insights that can contribute to broader research and theory development, as the findings often shed light on practical realities and contexts that may not be evident in traditional research settings. Action research is a collaborative and participatory approach that seeks to create positive change and improve practices through an iterative process of planning, action, observation, and reflection. By directly engaging with stakeholders and real-world contexts, action research generates relevant and actionable knowledge, making it a powerful tool for addressing practical challenges and advancing both theory and practice in various fields.

### **3.3.8 Ethnographic Research**

Ethnographic research is a qualitative research method that involves the in-depth study and immersion in a particular cultural group, community, or social setting. It aims to understand the beliefs, values, behaviors, and practices of the people within the context of their everyday lives. Ethnographers typically spend extended periods of time observing and interacting with the participants, often living among them to gain a deeper understanding of their culture and social dynamics.

One of the key characteristics of ethnographic research is its emphasis on cultural relativism. Ethnographers aim to adopt an open and non-judgmental perspective, recognizing that each culture has its own unique worldview and way of life. By immersing themselves in the culture being studied, researchers can gain insights into the participants' experiences and beliefs from their own perspective, rather than imposing external viewpoints (Shagrir, 2017).

Ethnographic research relies on a range of data collection methods, including participant observation, interviews, focus groups, and artifact analysis. Participant observation involves the researcher observing and participating in the daily activities of the community or group, allowing

for the identification of underlying cultural norms and patterns of behavior. Interviews and focus groups provide opportunities for participants to share their perspectives, experiences, and opinions in their own words. Artifact analysis involves examining the material objects, symbols, and cultural products used by the community, offering additional insights into their values and practices.

The data collected through ethnographic research is typically rich in detail and context-specific, providing a comprehensive understanding of the culture being studied. Ethnographers often use thematic analysis and narrative techniques to identify patterns, themes, and cultural meanings within the data. Ethnographic research is widely used in anthropology, sociology, education, and other social sciences, where it is employed to study various cultural groups, communities, and organizations. It offers valuable insights into human behavior, social interactions, and the complexity of cultural systems. Ethnographic findings can inform policies, interventions, and programs that are culturally sensitive and contextually relevant, contributing to better outcomes in diverse social contexts. Ethnographic research has some challenges. The immersive and time-intensive nature of the approach may limit the number of cases or sites that can be studied in-depth. Additionally, the researcher's subjectivity and biases may influence the data collection and interpretation process. To address these challenges, ethnographers often engage in reflexivity, reflecting on their own role and perspective in the research process and acknowledging their influence on the findings.

Ethnographic research is a powerful and culturally sensitive method for understanding the complexities of human behavior and social dynamics within specific cultural contexts (Hammersley, 2016). By immersing themselves in the lives of the participants, ethnographers gain unique and valuable insights into the cultural practices and beliefs that shape individuals' experiences and interactions. Ethnographic research enriches our understanding of diverse cultures, fostering cross-cultural understanding and contributing to the broader body of knowledge in the social sciences.

### **3.3.9 Historical Research**

Historical research is a methodological approach that involves the systematic and critical investigation of past events, developments, and contexts. It aims to understand and interpret historical phenomena through the analysis of primary and secondary sources, artifacts, documents,

and other historical evidence. Historical research is often used to reconstruct the past, provide insights into the evolution of societies, and identify patterns and trends over time.

One of the key characteristics of historical research is its reliance on primary sources. These are original materials created during the time period being studied, such as letters, diaries, official records, newspapers, and artifacts. By examining primary sources, historians can gain a direct and firsthand perspective on historical events and the people involved (Meroño-Peñuela et al., 2015). Secondary sources, on the other hand, are interpretations or analyses of historical events made by other scholars or researchers. Both primary and secondary sources are essential for constructing a comprehensive and well-rounded historical narrative. Historical research involves rigorous and critical analysis of the evidence. Historians evaluate the reliability, authenticity, and bias of the sources to ensure the accuracy and validity of their findings. They also consider the historical context and the social, political, economic, and cultural factors that shaped the events being studied. By placing historical events within their broader contexts, historians can provide deeper insights into the motivations and consequences of past actions.

Historical research can take various forms, including narrative history, comparative history, and case studies. Narrative history involves the chronological retelling of events, creating a coherent and sequential account of the past. Comparative history examines similarities and differences between different historical periods or societies, seeking to identify patterns and draw comparisons. Case studies focus on in-depth investigations of specific historical events, individuals, or phenomena, offering detailed insights into their significance and impact.

Historical research is prevalent in disciplines such as history, archaeology, art history, and literature, where it is used to study different periods, civilizations, and cultural traditions. It contributes to our understanding of human civilization, providing a foundation for contemporary knowledge and informing current debates and discussions. Historical research also faces challenges, such as the scarcity of primary sources or the biases inherent in historical records (Buckley, 2016). Historians must navigate these limitations and uncertainties to construct well-supported and credible historical narratives. By adhering to rigorous research methods and critical analysis, historical researchers contribute to the preservation and interpretation of the past, enriching our collective understanding of human history.



### **3.3.10 Grounded Theory**

Grounded theory is a qualitative research method developed by sociologists Barney Glaser and Anselm Strauss in the 1960s. It is an inductive approach that aims to develop theories or conceptual frameworks directly from the data, rather than testing pre-existing theories. Grounded theory involves systematically gathering and analyzing data to discover patterns, categories, and themes, and then generating theory based on these empirical findings (Birks & Mills, 2015).

The process of grounded theory begins with data collection, typically through interviews, observations, or documents. As data is collected, researchers engage in constant comparative analysis, where they compare the new data with previously collected data and systematically code the information to identify emerging themes and categories (Lambert, 2019). The goal is to identify concepts and relationships that are grounded in the data and reflect the participants' experiences and perspectives. As the analysis progresses, researchers continually refine and revise their concepts and theories based on the emerging data. This iterative process allows the theory to evolve and become more grounded and robust as it is continually tested against the data.

One of the key strengths of grounded theory is its ability to produce rich and contextually relevant theories. Since the theory is derived directly from the data and the participants' experiences, it is more likely to be applicable and meaningful in real-world settings. Grounded theory also allows researchers to explore complex and multifaceted phenomena, providing a comprehensive understanding of the subject under investigation. Grounded theory is widely used in sociology, anthropology, nursing, and other social sciences, where it is employed to study a wide range of topics and social processes. It is particularly valuable for exploring new and unexplored areas of research, generating hypotheses, and developing theories that are firmly grounded in empirical evidence. Grounded theory also presents challenges, particularly regarding the potential subjectivity of the researcher in the coding and interpretation of the data. To address this, researchers must be diligent in their reflexivity and document their decisions and thought processes throughout the analysis. Additionally, grounded theory studies can be time-consuming and labor-intensive due to the iterative nature of the process.

Grounded theory is a rigorous and systematic qualitative research method that aims to develop theories directly from the data. It offers a valuable approach for exploring complex phenomena and generating contextually relevant theories. By building on the experiences and perspectives of

participants, grounded theory enriches our understanding of social processes and contributes to the development of theory that is firmly rooted in empirical evidence.

### **3.3.11 Content Analysis**

Content analysis is a research method used to systematically analyze and interpret the content of textual, visual, or audio materials. It involves the objective and systematic examination of the content to identify patterns, themes, and trends. Content analysis is commonly used in various disciplines, including communication studies, media research, psychology, sociology, and marketing. In content analysis, researchers first define a set of specific research questions or objectives. They then select a sample of texts, documents, images, videos, or audio recordings that are relevant to the research topic. The content can be obtained from various sources, such as books, articles, social media posts, advertisements, interviews, or television programs.

Once the data is collected, researchers develop a coding scheme or a set of categories to classify the content (Drisko & Maschi, 2016). The coding scheme is designed to capture specific variables or themes of interest. For example, in a study analyzing news articles about climate change, categories may include the frequency of references to climate-related terms, the tone of the articles (positive, negative, or neutral), and the sources cited. Next, researchers systematically analyze the content by applying the coding scheme to each piece of data. This coding process involves categorizing the content based on predetermined criteria. Inter-coder reliability is often established by having multiple coders independently code the same data to ensure consistency and reliability of the coding process.

The final step in content analysis involves data interpretation and drawing conclusions from the coded content. Researchers analyze the frequencies and patterns of the coded categories and interpret the findings in relation to the research questions or objectives. Content analysis can involve both quantitative and qualitative data analysis methods, depending on the nature of the research and the type of data collected. Content analysis has several strengths. It allows researchers to analyze large volumes of data efficiently and objectively. It is particularly useful for studying media representations, public discourse, and social trends. Content analysis also provides a systematic and replicable way to examine textual, visual, or audio materials, making it well-suited for cross-sectional and longitudinal studies. Content analysis also has limitations. The interpretation of content may be influenced by the researcher's subjective judgment, leading to

potential biases. The process of developing coding schemes and categorizing content can be challenging and time-consuming, requiring careful planning and piloting. Additionally, content analysis may not capture the full context and nuances of the content being studied, as it focuses on surface-level features rather than deeper meanings. Content analysis is a valuable research method for systematically analyzing and interpreting the content of textual, visual, or audio materials. It offers insights into patterns, themes, and trends in data, making it useful for studying media representations, public opinion, and social phenomena. However, researchers must be attentive to potential biases and limitations in the coding and interpretation process to ensure the validity and reliability of the findings.

Each type of research methodology has its strengths and limitations, and the choice of the most appropriate approach depends on the research questions, available resources, and the nature of the research problem. Researchers often combine multiple methodologies to gain a more comprehensive understanding of complex issues.

### **3.4 Research Design**

The research methodology used in this study aimed to assess the professional development, educational needs, and ICT skills of library professionals for housekeeping in the University Libraries of West Bengal within the context of the changed information environment. The main objective was to understand how library professionals keep their knowledge and skills up to date to support user-centered applications and services in today's information society.

To achieve the research objectives, the study employed multiple data collection methods. The survey method was used, and a questionnaire was designed to gather information from the library professionals. This questionnaire likely consisted of structured questions that allowed respondents to provide quantitative data about their educational background, professional development activities, and ICT skills, and housekeeping operations.

In addition to data collection through primary methods like the survey, the study also involved a comprehensive literature survey. The researchers conducted an extensive review of relevant literature related to the research topic and other related fields. They likely consulted bibliographies, online information resources, conference proceedings, and library science journals to gather existing knowledge and insights relevant to the study.

By combining these various data collection methods and sources of information, the researchers aimed to provide a comprehensive understanding of the professional development and ICT skills and housekeeping operations of library professionals in the University Libraries of West Bengal. The study's findings would contribute to better understanding the educational needs of these professionals and support the improvement of library services in response to the changing information environment.

### **3.5 Data Collection**

The research utilized a survey method with data collection through questionnaires from various stakeholders, including University Libraries, faculty, research scholars, and postgraduate students. This approach allowed the researchers to gather quantitative data on the professional development, educational needs, and ICT skills, housekeeping operations of library professionals and library users within the University Libraries of West Bengal.

To gain a more comprehensive understanding, the researchers conducted on-the-spot studies by physically visiting the University Libraries. This on-site observation provided valuable insights into the actual practices, services, and facilities offered by the libraries, enriching the data collected through the questionnaires. The study also incorporated the use of primary sources, including actual reports and publications, to corroborate and supplement the data collected. By referring to these sources, the researchers ensured the accuracy and reliability of their findings.

Additionally, the researchers utilized personal visits and email questionnaires to identify the prevalence of current activities and assess the actual scenario within the University Libraries. This approach provided a more detailed and nuanced perspective, capturing real-time information from the library personnel and users. Data analysis was conducted to examine library usage patterns and functions, enabling the researchers to identify trends and areas that needed improvement in library services. The compatibility of the time schedule of library personnel was considered to evaluate the availability and accessibility of library services during different hours of the day. This aspect is essential to ensure that library services align with the needs of users.

The researchers also investigated the process of book and journal acquisition, particularly in relation to the use of software. Understanding this process helped assess the efficiency and effectiveness of library resource management. Furthermore, the study explored the limitations of

the libraries, identifying areas where improvements or enhancements were necessary to better meet the needs of library users. Overall, the survey of selected University Library Services in West Bengal State, recognized as State Universities by the University Grants Commission, provided valuable insights into the state of library services, the role of ICT, housekeeping operations and the challenges faced by library professionals and users. The research findings could serve as a foundation for improving library services and developing appropriate strategies to address the evolving needs of the academic community in West Bengal.

### **3.6 Definition of Hypothesis**

A hypothesis is a statement or proposition that suggests a possible explanation for a specific phenomenon or problem, based on existing knowledge or preliminary evidence. It is a tentative assumption that can be tested through empirical research and analysis. Hypotheses play a crucial role in the scientific method, as they guide researchers in formulating research questions, designing experiments, and interpreting the results. In a hypothesis, researchers typically propose a cause-and-effect relationship between variables. The hypothesis may predict how one variable (the independent variable) will affect another variable (the dependent variable). It may also state the direction or nature of the relationship, such as whether the variables are positively or negatively related.

Hypotheses are formulated based on a review of existing literature, theoretical frameworks, or observations from previous studies. They serve as a starting point for empirical investigation, allowing researchers to systematically test and validate their ideas or predictions. In hypothesis testing, researchers collect data and use statistical analysis to determine whether the evidence supports or refutes the hypothesis (Anupama, 2018). If the data support the hypothesis, it can be considered as tentatively confirmed. If the data do not support the hypothesis, it may be rejected or modified, and further investigation may be warranted.

Hypotheses are crucial elements in research because they provide a clear and testable direction for the study, ensuring that the investigation is structured and focused. They encourage objectivity and rigor in scientific inquiry and contribute to the advancement of knowledge by confirming or challenging existing assumptions and theories.

### 3.7 Types of Hypotheses

Hypotheses can be classified into different types based on their characteristics and the nature of the research question. The main types of hypotheses are:

#### ***Null Hypothesis ( $H_0$ )***

The null hypothesis is a statement that suggests there is no significant relationship or difference between variables. It assumes that any observed differences or relationships in the data are due to chance or random variability. Researchers typically test the null hypothesis to determine if there is enough evidence to reject it in favor of an alternative hypothesis.

#### ***Alternative Hypothesis ( $H_a$ )***

The alternative hypothesis is the opposite of the null hypothesis. It suggests that there is a significant relationship or difference between variables. If the data provide sufficient evidence to reject the null hypothesis, the alternative hypothesis is accepted.

#### ***Directional Hypothesis (One-Tailed Hypothesis)***

A directional hypothesis predicts the direction of the relationship between variables. It states that one variable will have a specific effect on the other variable.

#### ***Non-Directional Hypothesis (Two-Tailed Hypothesis)***

A non-directional hypothesis does not predict the specific direction of the relationship between variables. It only suggests that there is a significant relationship or difference between variables without specifying the direction.

#### ***Simple Hypothesis***

A simple hypothesis involves a single relationship between two variables. It makes a clear prediction about the relationship.

#### ***Complex Hypothesis***

A complex hypothesis involves multiple relationships or comparisons between variables. It may include more than two variables or predict more intricate relationships.

The choice of hypothesis type depends on the research question, the nature of the variables being studied, and the specific goals of the study. Formulating clear and testable hypotheses is essential for conducting rigorous and meaningful research.

### **3.8 Hypothesis**

H1. There are significant differences in the quality and availability of Library services among different University Libraries in West Bengal.

H2. There is a significant relationship between the size of the University Library and the availability of infrastructural facilities.

H3. There is a significant relationship between the level of automation in Libraries and the skill competency of the professional staff.

H4. There is a significant difference in the frequency of Library document use between online and offline modes.

H5. There are significant differences in user satisfaction levels among different University Libraries in West Bengal.

H6. There is a significant relationship between the implementation of the suggested framework and the efficiency of housekeeping operations in University Libraries.

H7. There are significant differences in the perceived advantages of automating housekeeping operations among Library professionals.

H8. There is a significant relationship between Library functions and their suitability for automation.

H9. There are significant differences in Library services and management before and after automation implementation

### **3.9 Research Population**

The research focuses on libraries in various universities, each having both a Central Library and Department Libraries. The Department Libraries are associated with specific teaching departments within the university. Library professionals are responsible for managing these libraries, and their posts are transferable among different libraries within the same university system. The study's total population includes individuals, specifically those who are permanently employed professionals, postgraduate students, researchers, and library staff within the Central Libraries that are under investigation.

The research aims to assess the professional development, educational needs, and ICT skills. housekeeping operations of these library professionals and library users within the Central Libraries. It also seeks to understand the challenges and limitations faced by these libraries in meeting the needs of their users effectively. On-site visits to the Central Libraries and Department Libraries allow for direct observation of the libraries' facilities, services, and interactions among library professionals and users. This observation provides valuable insights into the actual practices and challenges within these libraries.

In addition to survey questionnaires and on-site visits, the research also utilizes primary sources, such as actual reports and publications, to validate and enrich the data collected. Personal visits and email questionnaires are used to gain real-time information about the current activities and user experiences within the libraries, providing a more comprehensive understanding of the library services. Data analysis of library usage patterns and functions will be conducted to identify trends and areas for improvement. The process of book and journal acquisition, particularly with the use of software, will be studied to evaluate the efficiency of library resource management.

### **3.10 Sampling Method**

In the context of the content described above, the researchers likely used purposive sampling as their sampling method. Purposive sampling is a non-probability sampling technique where the researchers deliberately select specific individuals or groups from the population who are most relevant and knowledgeable about the research topic. This approach is also known as judgmental or selective sampling (Veal, 2017).

In this study, the researchers were interested in assessing the professional development, educational needs, and ICT skills of library professionals in the University Libraries of West Bengal. They also aimed to gather information about the infrastructure, staff strength, and other aspects of the central libraries in the selected universities. Given the specific focus of the study, the researchers would have purposefully selected respondents who meet the criteria of being permanently employed professionals, postgraduate students, researchers, and library staff in the central libraries under investigation. By targeting these specific groups, the researchers could obtain insights from individuals who have direct experience and knowledge relevant to the research objectives.



The purposive sampling method allowed the researchers to ensure that their sample includes individuals who are most likely to provide valuable and relevant information about the research topic. This approach is particularly useful when the researchers are interested in in-depth insights from knowledgeable participants and when a random sample may not be feasible or necessary for the research objectives. Using purposive sampling, the researchers were able to focus their data collection efforts on key stakeholders and experts in the field, leading to a more targeted and insightful study of university library services and their professionals in the selected universities in West Bengal.

### **3.11 Questionnaire preparation**

The researchers adopted the questionnaire method as the primary data collection tool for this study. Additionally, survey was conducted with library professionals to gather supplementary information. The design of the questionnaire was based on discussions with professional colleagues and previous research studies, ensuring its relevance and appropriateness for the current study.

The questionnaire intended for the university librarian aimed to gather data on various aspects related to the infrastructure of university libraries. It sought information on the budget allocation, total collection size, library membership, availability and utilization of ICT services, level of automation, networking facilities, databases created, staff size, details of staff training, housekeeping operations, and challenges faced in implementing ICT applications.

The researchers sent out the questionnaires to the university librarians, and all the distributed questionnaires were returned, indicating a high response rate from this group. By combining the responses from both the university librarians and the library professionals, the researchers aimed to gain a comprehensive understanding of the state of university libraries in the selected universities. The collected data would enable the researchers to assess the infrastructure, services, and challenges faced by these libraries and the library professionals working within them.

The combination of questionnaire surveys and interviews allowed the researchers to gather both quantitative and qualitative data, enhancing the richness and depth of their findings. The research findings would provide valuable insights into the current state of university libraries and support the identification of areas for improvement and the development of effective strategies to enhance library services and operations.

### **3.12 Data Analysis Techniques**

The data analysis for this study involved two main techniques: Microsoft Excel and the Statistical Package for Social Sciences (SPSS).

Microsoft Excel:

Microsoft Excel was used for initial data processing and organization. The data collected from the respondents through questionnaires and interviews were entered into Excel spreadsheets. Excel allows researchers to manage and manipulate large datasets efficiently, facilitating data cleaning and preparation for further analysis.

In Excel, researchers might have used various features such as sorting, filtering, and data validation to ensure data accuracy and consistency. They might have also used Excel formulas and functions to calculate descriptive statistics, such as mean, median, and standard deviation, for certain variables.

### **3.13 Statistical Package for Social Sciences (SPSS)**

SPSS is a powerful statistical software widely used in social sciences for data analysis. The researchers used SPSS to conduct more advanced statistical analyses and derive meaningful insights from the data. For the comparative details of university libraries (e.g., infrastructure, budget, membership, staff strength), the researchers likely used simple percentage analysis in SPSS. This technique involves calculating the percentage distribution of responses for each variable to understand the patterns and trends within the data.

Other statistical techniques that researchers might have used in SPSS include:

- Descriptive statistics: This involves calculating measures of central tendency (mean, median) and measures of variability (standard deviation, range) to summarize the data.

- Inferential statistics: If the data collected from the questionnaires and interviews were representative of the entire population of interest, researchers could use inferential statistics to draw conclusions and make generalizations. This could include techniques such as t-tests, ANOVA (Analysis of Variance), and regression analysis.
- Cross-tabulation: This technique allows researchers to explore the relationship between two or more categorical variables by creating contingency tables and calculating chi-square tests for independence.
- Factor analysis: If the researchers were interested in identifying underlying factors or dimensions within the data, factor analysis might have been used to reduce the data complexity and uncover latent patterns.

The choice of specific data analysis techniques would depend on the research questions and the nature of the data collected. By using both Microsoft Excel and SPSS, the researchers were able to process and analyze the data effectively, leading to meaningful and reliable results for their study on university libraries' infrastructure, budget, membership, staff strength, and other relevant factors.

## References

1. Anupama, K. (2018). Hypothesis types and research. *International Journal of Nursing Science Practice and Research*, 4(2), 78-80.
2. Birks, M., & Mills, J. (2015). *Grounded theory: A practical guide*. Sage.
3. Buckley, P. J. (2016). Historical research approaches to the analysis of internationalization. *Management International Review*, 56, 879-900.
4. Clark, V. L. P., & Ivankova, N. V. (2015). *Mixed methods research: A guide to the field* (Vol. 3). Sage publications.
5. Cohen, L., Manion, L., & Morrison, K. (2017). Action research. In *Research methods in education* (pp. 440-456). Routledge.
6. Drisko, J. W., & Maschi, T. (2016). *Content analysis*. Pocket Guide to Social Work Re.

7. Flick, U. (2015). *Introducing research methodology: A beginner's guide to doing a research project*. Sage.
8. Gabriel, Y. (2015). Reflexivity and beyond—a plea for imagination in qualitative research methodology. *Qualitative Research in Organizations and Management: An International Journal*, 10(4), 332-336.
9. Gile, D. (2015). Experimental research. In *Researching translation and interpreting* (pp. 220-228). Routledge.
10. Hammersley, M. (2016). *Reading ethnographic research*. Routledge.
11. Hegde, D. S. (Ed.). (2015). *Essays on research methodology*. Springer.
12. Hoy, W. K., & Adams, C. M. (2015). *Quantitative research in education: A primer*. Sage Publications.
13. Koro-Ljungberg, M. (2015). *Reconceptualizing qualitative research: Methodologies without methodology*. Sage Publications.
14. Lambert, M. (2019). Grounded theory. *Practical research methods in education: An early researcher's critical guide*, 132-143.
15. Mac Naughton, G. (2020). Action research. In *Doing early childhood research* (pp. 208-223). Routledge.
16. Mackey, A., & Gass, S. M. (2015). *Second language research: Methodology and design*. Routledge.
17. Meroño-Peñuela, A., Ashkpour, A., Van Erp, M., Mandemakers, K., Breure, L., Scharnhorst, A., ... & Van Harmelen, F. (2015). Semantic technologies for historical research: A survey. *Semantic Web*, 6(6), 539-564.
18. Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation*. John Wiley & Sons.
19. Nassaji, H. (2015). Qualitative and descriptive research: Data type versus data analysis. *Language teaching research*, 19(2), 129-132.

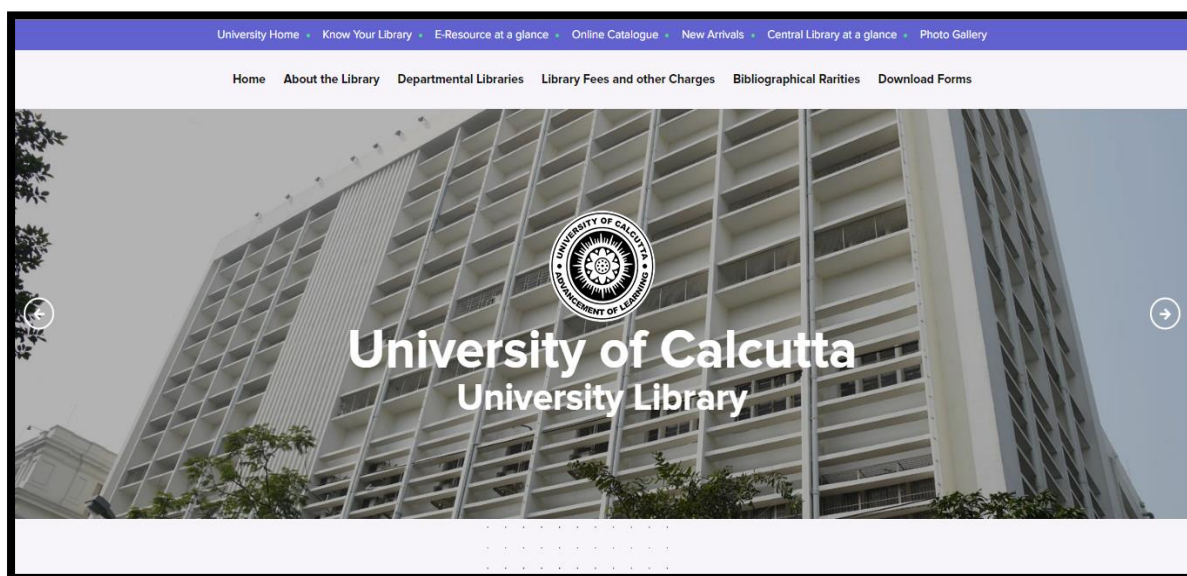
20. Saunders, M. N., & Bezzina, F. (2015). Reflections on conceptions of research methodology among management academics. *European management journal*, 33(5), 297-304.
21. Shagrir, L. (2017). *Journey to ethnographic research*. Cham, Switzerland: Springer International Publishing.
22. Story, D. A., & Tait, A. R. (2019). Survey research. *Anesthesiology*, 130(2), 192-202.
23. Tumele, S. (2015). Case study research. *International Journal of Sales, Retailing & Marketing*, 4(9), 68-78.
24. Veal, A. J. (2017). *Research methods for leisure and tourism*. Pearson UK.
25. University of Calcutta. (n.d). Available at: [University of Calcutta \(caluniv.ac.in\)](http://caluniv.ac.in) [Last accessed date: 22.09.2023]
26. University of Jadavpur (n.d). Available at: [jaduniv.edu.in](http://jaduniv.edu.in) [Last accessed date: 22.09.2023]
27. University of Kalyani (n.d). Available at: [klyuniv.ac.in](http://klyuniv.ac.in) [Last accessed date: 22.09.2023]
28. Rabindra Bharati University (n.d). Available at: [rbu.ac.in](http://rbu.ac.in) [Last accessed date: 22.09.2023]
29. University of North Bengal (n.d). Available at: [nbu.ac.in](http://nbu.ac.in) [Last accessed date: 22.09.2023]
30. Vidyasagar University (n.d). Available at: <http://www.vidyasagar.ac.in/> [Last accessed date: 22.09.2023]
31. The University of Burdwan (n.d). Available at: [buruniv.ac.in](http://buruniv.ac.in) [Last accessed date: 22.09.2023]

## **Chapter 4: University Libraries in West Bengal: An Overview**

## Chapter 4: University Libraries in West Bengal: An Overview

### 4. University Libraries in West Bengal: An Overview

#### 4.1 University of Calcutta



The **University of Calcutta** (informally known as **Calcutta University**; abbreviated as **CU**) is a public state university located in Kolkata, West Bengal, India. It has 151 affiliated undergraduate colleges and 16 institutes in Kolkata and nearby areas. It was established on 24 January 1857 and is the oldest multidisciplinary university of Indian Subcontinent and South East Asian Region. Today, the university's jurisdiction is limited to a few districts of West Bengal, but at the time of its establishment it had a catchment area ranging from Kabul to Myanmar. Within India, it is recognized as a "Five-Star University" and accredited an "A" grade by the National Assessment and Accreditation Council (NAAC).

The university has a total of fourteen campuses spread over the city of Kolkata and its suburbs. As of 2020, 151 colleges and 21 institutes and centres are affiliated with CU. The university was fourth in the Indian University Ranking 2021 list, released by the National Institutional Ranking Framework of the Ministry of Education.

Its alumni and faculty include several heads of state and government, social reformers, prominent artists, the only Indian Dirac Medal winner, many Fellows of the Royal Society and six Nobel laureates as of 2019. The Nobel laureates associated with this university are Ronald Ross, Rabindranath Tagore, C. V. Raman, Amartya Sen, and Abhijit Banerjee.

The university has the highest number of students who have cleared the National Eligibility Test. The University of Calcutta is a member of the United Nations Academic Impact.

The University of Calcutta was established on 24 January 1857 following a despatch sent by The Court of Directors of the East India Company. This despatch suggested the establishment of the University of Calcutta along with Madras and Bombay. Initially, the university adopted the pattern of the University of London and slowly modified its constitution. This university had a tremendous amount of jurisdiction for a significant period of time until it was altered by the Universities Act of 1904 which defined the territorial limits of the universities. In the beginning, the university functioned as an affiliating and examining body. Some of the heritage buildings associated with this university are

- University College of Science (old)
- university college of science
- Centenary building
- Ashutosh building
- Darbhanga building
- The Senate House
- Bengal engineering college
- Calcutta medical college and hospital
- Sanskrit college
- Presidency college
- Town hall
- Writers' buildings

As mentioned above, the university acted as an examine body in its initial years. Therefore, the library did not receive the required attention. But only after 1872, after the University of Calcutta got a home of its own, the setting up of a library gained attention. The initial help for setting the library was received from Joy Krishna Mukherjee, Zamindar of Uttarpara where he made a donation of Rs. 5000 in 1869. During the same period, Esan Chandra Ghosh also donated a small collection of books to the library.

At present, the university's library system consists of forty departmental libraries, libraries of the centres for advanced studies, five campus libraries, and finally a central library. The libraries are located in 8 major campuses. The university has more than ten lakh books in its



collection and approximately two lakh journals, dissertations, conference proceedings, CDs, microfilms and manuscripts.

The departments and the courses offered by each departments are

Agriculture department:

- Institute of Agricultural Science
- Agricultural Chemistry & Soil Science
- Agronomy
- Genetics & Plant Breeding
- Plant Physiology
- Horticulture
- Seed Science & Technology

Arts department:

- Ancient Indian History & Culture
- Arabic & Persian
- Archaeology
- Bengali Language and Literature
- Buddhist Studies
- Comparative Indian Language and Literature
- Economics
- English Language and Literature
- French
- Hindi
- History
- Islamic History and Culture
- Languages
- Linguistics
- Museology
- Pali
- Philosophy
- Political Science
- Sanskrit
- Sociology

- South and South East Asian Studies
- Tamil Studies
- Urdu

Commerce, Social Welfare & Business Management department;

- Business Management
- Commerce

Education, Journalism & Library Science department:

- Education
- Journalism & Mass Communication
- Library and Information Science

Engineering & Technology department:

- Applied Optics & Photonics
- Computer Science & Engineering
- Applied Physics
- Instrumentation Engineering, Applied Physics
- Polymer Science and Technology
- Chemical Engineering
- Radio Physics and Electronics
- Chemical Technology
- Jute and Fiber Technology

Fine Arts, Music and Home Science department:

- Home sciences

Law department:

- law

Science department:

- Anthropology
- Applied Mathematics
- Applied Psychology
- Atmospheric Science

- Bio-Chemistry
- Bio-Physics, Molecular Biology and Bioinformatics
- Biotechnology and Dr. B. C. Guha Centre for Genetic Engineering and Biotechnology
- Botany
- Chemistry
- Electronic Science
- Environmental Science
- Genetics
- Geology
- Geography
- Marine Science
- Microbiology
- Physics
- Physiology
- Psychology
- Pure Mathematics
- Statistics
- Zoology
- S. N. Pradhan Centre for Neurosciences

## Campuses

The university has a total of 14 campuses spread over the city of Kolkata and its suburbs. They are referred to as *Siksha Prangan*, which means education premises. Major campuses include the Central Campus (Ashutosh Shiksha Prangan) on College Street, University College of Science, Technology and Agriculture (Rashbehari Shiksha Prangan or Rajabazar Science College or Science College) in Rajabazar, Taraknath Palit Shiksha Prangan in Ballygunge and Sahid Khudiram Siksha Prangan in Alipore. Other campuses include the Hazra Road Campus, the University Press and Book Depot, the B. T. Road Campus, the Viharilal College of Home Science Campus, the University Health Service, the Haringhata Campus, the Dhakuria Lakes (University Rowing Club) and the University Ground and Tent at Maidan.

### Asutosh Siksha Prangan

Asutosh Siksha Prangan (commonly called the College Street Campus) is the university's main campus where the administrative work is done. Located on College Street, it is spread over an

area of 2.7 acres (1.1 ha). It houses the Arts and Language department, administrative offices, museum, the central library, an auditorium etc. Exhibits like folk art of Bengal are present in the Asutosh Museum of Indian Art. Senate House was the first university building situated on this campus; it opened in 1872. In 1960, it was demolished to make way for a larger building, the Centenary Building, which opened in 1968. The Darbhanga Building and the Asutosh Building are the two other buildings opened in 1921 and 1926, respectively.

#### Rashbehari Siksha Prangan

*Main article: University College of Science, Technology and Agriculture*

Rashbehari Siksha Prangan (also known as University College of Science and Technology or more commonly Rajabazar Science College), is located on Acharya Prafulla Chandra Road in Rajabazar. Established in 1914, it houses several scientific and technological departments, including pure and applied chemistry, pure and applied physics, applied optics and photonics, radio physics, applied mathematics, psychology, physiology, biophysics, molecular biology, and others.

#### Taraknath Palit Siksha Prangan

*Main article: University College of Science, Technology and Agriculture*

Taraknath Palit Siksha Prangan (also known as University College of Science or commonly Ballygunge Science College) on Ballygunge Circular Road in the southern part of the city, houses the departments of agriculture, anthropology, biochemistry, microbiology, botany, geography, genetics, statistics, zoology, neuroscience, marine science, biotechnology, and most notably geology, among others. It also houses S. N. Pradhan Centre For Neurosciences and the Institute of Agricultural Science.

#### Sahid Khudiram Siksha Prangan

Sahid Khudiram Siksha Prangan, commonly known as Alipore Campus, located at Alipore, is the humanities campus of the university. The departments of history, ancient Indian history and culture, Islamic history and culture, South and Southeast Asian studies, archaeology, political science, business management and museology are situated on this campus.

#### Technology Campus

The Technology Campus, also known as the Tech Camps, is the newest on the university. It brings together the three engineering and technical departments: the Department of Computer

Science and Engineering, the A.K.C. School of Information Technology and the Department of Applied Optics and Photonics, in Sector 3, JD Block, Salt Lake.

The university is governed by a board of administrative officers, which includes the vice-chancellor, pro-vice-chancellor for academic affairs, pro-vice-chancellor for business affairs and finance, the registrar, the university librarian, the inspector of colleges, the system manager and 35 others. They monitor the operation of the university and its affiliated colleges and the university's funding. In 2017, Sonali Chakravarti Banerjee became the 51st vice-chancellor of the university. The university is funded by the University Grants Commission, the Government of West Bengal, other agencies for various research works and by the university's own initiatives like fees, sales proceeds, publications and service charges generated from endowment funds.

### **Jurisdiction**

*Main articles: List of colleges affiliated to the University of Calcutta and List of centres affiliated to the University of Calcutta*

At one time, the university had a huge catchment area in British India, ranging from Lahore in the west to Rangoon in east and Ceylon in the south. Colleges like Thomason Engineering College (now IIT Roorkee), Muhammedan Anglo-Oriental College (now Aligarh Muslim University) etc. were affiliated to the university. Schools situated in districts like Rawalpindi, Lahore, Jaypur, Cawnpur, Lucknow, and Mussoorie used to prepare and send students for the university entrance examination. No provisions to curtail territorial control were made after establishment of University of Punjab and Allahabad in 1882 and 1887 respectively. After the Indian Universities Act of 1904 came in, however, for the first time, the university's control was curtailed to Bengal (which included Orissa and Bihar), Assam and Burma provinces. In the act, the Governor-General-in-Council was given the power to the limit territorial jurisdiction of the five universities; Calcutta, Bombay, Madras, the Punjab and Allahabad.

Following the Government of British India notification on 20 August 1904, Ceylon went under the University of Madras; provinces, states and agencies of Central India, such as the Central India Agency, Rajputana Agency, United Provinces of Agra and Oudh etc. went to the hands of University of Allahabad; Northern and North-Western provinces and states went under the University of Punjab. Jurisdiction of schools and colleges in Eastern India was retained by

Calcutta University. By 1907, two colleges in Punjab, three in the Central Province, five in the State of Rajputana Agency, six in the United Provinces of Agra and Oudh and seven in Ceylon were disaffiliated. A series of disaffiliations continued till 1948. Schools and colleges in Orissa and Bihar province went under University of Patna after its establishment in 1917. University of Rangoon was established in 1920 and the Burma region went under it in 1921. In the same year, University of Dacca was established and some colleges in East Bengal went under it and whole control was cut with the partition of India in 1947. In 1948, all the schools and colleges in Assam left the university after the establishment of Gauhati University.

As of 2020, 151 colleges and 22 institutes and centres, in West Bengal are affiliated with the university. Some of the affiliated colleges include:

- Asutosh College
- Bangabasi College
- Bethune College
- City College, Kolkata
- Dinabandhu Andrews College
- Goenka College of Commerce and Business Administration
- Gurudas College
- Jogamaya Devi College
- Lady Brabourne College
- Maharaja Manindra Chandra College
- Maulana Azad College
- Sammilani Mahavidyalaya
- Scottish Church College
- Seth Anandaram Jaipuria College
- Surendranath College
- Vidyasagar College

Faculties, departments and centres

The university has 60 departments organized into seven faculties: arts, commerce, social welfare and business management, education, journalism and library science, engineering and technology, fine arts, music and home science, law and science; and an agriculture institute with six departments.

To provide agricultural education and research, the Institute of Agricultural Science was established under the University of Calcutta. It was founded by Pabitra Kumar Sen, who was the Khaira Professor of Agriculture (another endowment chair) in the early 1950s. Initial efforts began as early as 1913, but the first institute was set up only in 1939 at Barrackpore (a city near Kolkata) by the university, following the establishment of the Imperial Council of Agricultural Research (now known as the Indian Council of Agricultural Research) in 1926. Although it was shut down in 1941 due to World War II. Then, in 1954, a postgraduate department in agriculture was started in Ballygunge Science College by the university, with agricultural botany as the only subject; two years later, a Veterinary Science Institute was included and the department was upgraded into a faculty called agriculture and veterinary science. In 2002 university decided to reopen undergraduate agriculture courses in the agricultural experiment farm campus at Baruipur, a city south of Calcutta. In the same year, the department was restructured as a separate Institute of Agricultural Science.

The Faculty of Arts consists of 23 departments; commerce consists of three departments; education, journalism and library science consist of three departments; engineering and technology consist of eight departments; science has 22 departments and home science offers courses on subjects such as food and nutrition, human development, and home science. The Faculty of Law was established in January 1909 as the University College of Law. It was granted status as the university's department of law in February 1996. This campus is popularly known as Hazra Law College. The faculty has many luminaries associated with it, including Rajendra Prasad, Rashbehari Ghose, and Chittaranjan Das.

#### Centres at University of Calcutta

- A. K. Choudhury School of Information Technology
- Centre for Testing and Training for Providing Technical Back up to the Beneficiaries for Agricultural and Horticultural Development
- Women's Studies Research Centre
- Centre for Pakistan and West Asian Studies
- Centre for Research in Nanoscience and Nanotechnology
- USIC
- Nehru Studies Centre
- Centre for the Study of Social Exclusion and Inclusive Policy

- Gandhian Studies Centre
- Centre for Urban Economic Studies
- S. K. Mitra Centre for Space Environment
- Peace Studies Research Centre
- Centre for Horticultural Studies
- CPEPA-UGC center for “Electrophysiology & Neuro-Imaging Studies including Mathematical Modeling”
- Centre for Millimeter Wave Semiconductor Devices & Systems
- Centre for Social Sciences and Humanities
- Centre for South and Southeast Asian Studies
- Centre for Studies in Book Publishing
- Institute of Foreign Policy Studies
- Centre for Pollination Studies
- University of Calcutta – Calcutta Stock Exchange
- Centre of Excellence in Financial Markets (CUCSE-CEFM)

## Academics

### Admission

For undergraduate courses—Arts (BA), Commerce (B.Com.) and Science (BSc) streams (except engineering courses)—one can apply directly for multiple courses based on their Higher Secondary School Certificate examination or any equivalent exam results. Students are shortlisted according to their marks and the number of places available. For some departments, entrance exams may take place at the sole discretion of the head of the department. Anyone can apply within five years of passing the Higher Secondary Examination.<sup>[48]</sup> For engineering courses, admission is based on the West Bengal Joint Entrance Examination (WBJEE) rankings.<sup>[49][50]</sup> Meanwhile, for postgraduate courses and doctoral degree courses, one has to take an entrance exam or written test given by the university or any national level exam related to the subject, held by the UGC. A merit list is prepared on the basis of the exam results.



## Research

Notable scientists from the University of Calcutta. Seated (L to R): Meghnad Saha, Jagadish Chandra Bose, Jnan Chandra Ghosh. Standing (L to R): Snehmoy Dutt, Satyendranath Bose, Debendra Mohan Bose, NR Sen, Jnanendra Nath Mukherjee, N C Nag

Undergraduates may enroll for a three- or four-year program in engineering. Students choose a major when they enter the university, and cannot change it unless they opt later for the university's professional or self-financed postgraduate programs. Science and business disciplines are in high demand, largely in anticipation of better employment prospects. Most programs are organized on an annual basis, though some programs are semester dependent. Most departments offer master's programs of a year or a few years' duration. Research is conducted in specialized institutes as well as individual departments, many of which have doctoral programs.

The University of Calcutta has the largest research center, which started from the 100th Science Congress of India in January 2013. This is the Center for Research in Nanoscience and Nanotechnology (CRNN) on the Technology Campus of CU at Salt Lake, West Bengal.<sup>[54]</sup> The university has 18 research centres, 710 teachers, 3000 non-teaching staff and 11,000 postgraduate students.



University Central Library viewed from College Square

## Libraries

The central library at the Asutosh Siksha Prangan was started around the 1870s. Apart from 39 departmental libraries, it has a central library, two campus libraries, and two libraries at the advanced centers spread across the seven campuses. Students of affiliated colleges can also access the central library. The university library has over one million books and more than 200,000 bound journals, proceedings, manuscripts, patents and other valuable collections.

## Publishing

The university has its own publishing house called University Press and Publications along with a book depot, which was established in the 20th century. It publishes textbooks, treatises, journals and confidential papers for all the examinations conducted by the university. It also

publishes the journal *The Calcutta Review*, which is one of the oldest Asian university journals. The *Calcutta Review* was established by Sir John Kaye in May 1844. It has been issued biannually since 1913.

They also have an associated journal with Sage Publishing, *Arthaniti: Journal of Economic Theory and Practice*.

## 4.2 Jadavpur University



**Jadavpur University** (abbr. **JU**) is a public state funded research and technology university with its main campus located at Jadavpur, Kolkata, West Bengal, India. It was established in 1906 as *Bengal Technical Institute* and was converted into Jadavpur University in 1955. As of 2023 NIRF rankings, Jadavpur University has been ranked 4th among universities, 10th among engineering institutes, and 13th overall in India. The university has been recognized by UGC as an institute with "Potential for Excellence" and accredited an "A" grade by the National Assessment and Accreditation Council (NAAC).

Jadavpur University was established on 24 December 1955 in West Bengal. The history of this university can be traced back to the freedom movement of India or at least from the Swadeshi movement. The National Council of Education was established as a result of trying to establish education as a new form of resistance to challenge the dominance of the British. The primary aim of this organization was to impart literary, technical and scientific education to the people

under the control of the nation. The goal of this university was to achieve self-reliance through education. In 1910, the Society for the Promotion of Technical Education in Bengal was combined with NCE. Finally in 1955, West Bengal Government along with the Indian Government passed the legislation to establish the university.

## History



Stamp featuring Jadavpur University

On 25 July 1906, Bengal Technical Institute was founded by Society for the Promotion of Technical Education at 92, Upper Circular Road. On 7 July 1910, the Society for the Promotion of Technical Education in Bengal was merged with the National Council of Education (NCE). The institute became College of Engineering and Technology, Bengal looked after by NCE. After Independence, on 24 December 1955, Jadavpur University was officially established by the Government of West Bengal with the concurrence of the Government of India.

## Campuses

### Main campus

Jadavpur University main campus map (as of 2015)

Jadavpur University has its main campus located at Jadavpur on 60 Acres area. The campus contains major engineering, arts and science departments.

### KP Basu Memorial Hall



Gandhi Bhaban from outside

The main campus have 7 auditoriums: H.L. Roy Auditorium, Triguna Sen Auditorium, K.P. Basu Memorial Hall, Vivekananda Hall, Anita Banerjee Memorial Hall and Gandhi Bhavan. The campus also has an Open Air Theatre with a seating capacity of around 3000.



The playground along with Aurobindo Bhaban in the back

The 6 Acres sports complex have Badminton court, Tennis court, Kabaddi court and playground for other organising sports like cricket and football.

Additionally the university has a six canteens, amenities center, and guest house, cafeteria, health centre, gymnasium, Pwd centre and other facilities like banks, post office, book shops etc.

### **Salt Lake campus**

Jadavpur University has its second campus on 26 Acres area in Bidhannagar (Salt Lake) Sector-III. There are 5 departments in the campus namely Construction Engineering, Instrumentation Engineering, Printing Engineering, Information Technology and Power Engineering. The Eastern Regional Offices of the UGC and the Inter-University Consortium for Atomic Energy are also located on this campus.<sup>[15]</sup> Jadavpur University Campus Ground is located in this campus.

### **West Annexe campus at Jadavpur**



### **Erstwhile NIL campus, Jadavpur University**

On 1 January 2009, Jadavpur University took over National Instruments Limited, a former PSU under Department of Heavy industries, GOI on a 297 year lease. From 2014, the campus is used as a research hub of the university and known as West Annexe campus.<sup>[17]</sup> Research institutes like DRDO and CSIR also operate from the campus.<sup>[18]</sup> A portion of land and building of the campus is leased out to DRDO for long term,<sup>[19]</sup> which is the 40 percent of the space. At that, the "Jagadish Chandra Bose Centre for Advanced Technology" (JCBCAT) is established by collaboration of JU and DRDO.

The regional centre of "National Afforestation & Eco-Development Board" is also located in the campus.

### **New Town campus**

Jadavpur University Newtown campus is under construction. State-of-the-art facilities along with laboratories and a convention centre are planned on the 5 acre campus.

### **Affiliated institutes**

In addition to being a unitary university, it has other institutes like the J D Birla Institute, and the Institute of Business Management affiliated to it, which operate out of independent

campuses. While these institutes have their own independent curriculum as well as examination systems, the final degree is offered by Jadavpur University.

## **Academics**

Departments and schools

As of 2023, Jadavpur University has 37 Departments and 21 Schools of Interdisciplinary Research.

### **Departments**

#### **Faculty**

#### **Departments**

#### **Faculty of Arts**

- Bengali
- Comparative Literature
- Economics
- Education
- English
- Film Studies
- History
- International Relations
- Library & Information Science
- Philosophy
- Physical Education
- Sanskrit
- Sociology

#### **Faculty of Engineering & Technology**

- Architecture
- Chemical Engineering
- Civil Engineering
- Computer Science & Engineering
- Construction Engineering
- Electrical Engineering
- Electronics & Telecommunication Engineering

## Departments

- Food Technology & Bio-Chemical Engineering
- Information Technology
- Instrumentation and Electronics Engineering
- Mechanical Engineering
- Metallurgical & Material Engineering
- Pharmaceutical Technology
- Power Engineering
- Printing Engineering
- Production Engineering
- Chemistry
- Geography
- Geological Sciences

## Faculty of Science

- Instrumentation Science
- Life science & Bio-technology
- Mathematics
- Physics

To facilitate interdisciplinary learning and research in diverse fields, there are a number of schools.

## Schools

### Faculty

### Schools

### Faculty of Interdisciplinary Studies, Law & Management

- School Of Advanced Studies in Industrial Pollution Control
- School Of Automotive Engineering
- School Of Bio-Science and Engineering
- School Of Cognitive Science
- School of Cultural Texts and Records

## **Schools**

- School Of Education Technology
- School Of Energy Studies
- School Of Environmental Radiation and Archaeological Sciences
- School of Environmental Studies
- School Of Illumination Science, Engineering and Design
- School Of International Relations and Strategic Studies (SIRSS)
- School of Languages and Linguistics
- School Of Laser Science and Engineering
- School Of Materials Science and Nanotechnology
- School Of Media Communication & Culture
- School Of Mobile Computing and Communication
- School Of Natural Product Studies
- School Of Nuclear Studies and Application
- School of Oceanographic Studies
- School of Water Resource Engineering
- School of Women's Studies

In March 2011, Indian American scientist Manick Sorcar assisted in the opening of a laser animation lab under the School of Illumination Science, Engineering and Design.

## **Centre for Studies**

To facilitate interdisciplinary learning and higher research in diverse fields, there are nearly fifty Centre for Studies.



## **Centre for Studies**

- Centre for African Literatures and Cultures
- Centre for Ambedkar Studies
- Centre for Canadian Studies
- Bio Equivalence Centre
- Centre for African Literatures and Culture
- Centre for Counselling Services and Studies in Self-Development
- Centre for Theatre Studies
- Centre For Advanced Study
- Centre for Computer-Aided Design
- Centre for Knowledge Based Systems
- Centre for Distributed Computing
- Centre for European Studies
- Centre for Experiments in Social & Behavioral Sciences
- Centre for Human Settlement Planning
- Centre for Marxian Studies
- Centre for Mathematical Biology and Ecology
- Centre for Medicinal Food and Applied Nutrition
- Centre for Microprocessor Applications for Training, Education and Research
- Centre for Plasma Studies
- Centre for Quality Construction
- Centre for Quality Management System
- Centre for Refugee Studies
- Centre For Rural & Cryogenic Technologies
- Centre for Sri Aurobindo Studies
- Centre for Surface Science
- Centre for The Study of Religion and Society
- Centre for Translation of Indian Literatures
- Centre for Victorian Studies
- Centre of Indology



### **Centre for Studies**

- Condensed Matter Physics Research Centre Embedded System in Instrumentation
- Hariprasanna Biswas Centre for India-China Cultural Studies
- IC Design and Fabrication Centre
- IMPACT Centre
- Latin American Literature & Culture Language Studies
- Nuclear and Particle Physics Research Centre
- Rabindra Studies
- Relativity and Cosmology Research Centre
- Sir C V RAMAN Centre for Physics and Music
- Swami Vivekananda Centre for Technical Manpower Development
- Transportation Studies
- V. Ravi Chandran Centre for Pharmaceutical Sciences
- Welding Technology Centre
- Yoga Centre
- Centre For Disaster Preparedness & Management
- Adult and Continuing Education & Extension Centre
- Centre For Digital Library and Documentation

### **Library**

To satisfy the academic and research needs the library was started along with the University in 1955. It is believed to be one of the best equipped library in the nation. The library system consists of the following

- Central Library
- Salt Lake Campus Library
- 36 Departmental Libraries under the Faculty of Arts, Science, Engineering and Technology
- about 23 Libraries attached with the Schools and Centres for studies under the Faculty of Interdisciplinary Studies Law and Management.

The Central Library at Jadavpur campus occupies 41,500 square feet (3,860 m<sup>2</sup>) and houses 6,46,296 books, 80,700 bound volumes of journals, and 13000 theses and dissertations, 37,000 items of non-book materials such as reports pamphlets, maps and micro-forms and 1159 print and 1448 online journals. The library also has access to around 3000 online journals more through INFLIBNET and INDEST Consortia. In total, the University Library has access to around 11000 Journals. The library subscribes to 30 databases which include Scopus, Econlit etc. and also about 10000+ E-books (as of 2018). The Salt Lake campus has a library with 65,00 sq. ft. of space.

In 2003, under the guidance of UGC Centre for Digital Library and Documentation with Learning Resource Centre was established which is now used by a variety of people. Currently, the library has

- 8150 e-books
- 11762 e-journals
- 29 resource database\
- 13755 question paper
- audio books
- video lectures and
- lecture notes

### **Recognition and notable works**

Former President of India Dr. A.P.J. Abdul Kalam compared Jadavpur University to be the future Nalanda of India while addressing the Golden Jubilee Celebrations of the University on July 14, 2005.

Science and technology

In the 2022 edition of the "**List of top 2% global scientists**" published by the Stanford University, Jadavpur University has 42 scientists in the list. This is the highest from any university or institute of India.

Two professors from Jadavpur University were involved in a soft-landing project named "**RESPOND**" for a planetary mission sponsored by Indian Space Research Organisation.<sup>[29][30]</sup> Jadavpur University also contributes to the satellite launch vehicle programme of ISRO and LCA programme of DRDO.

**Nature Index** ranked Jadavpur University in 1st among universities and 19th among all Indian institutes in the field of Physical Science taking into account publications in 82-select high-quality science journals (2020-2021).

Jadavpur University's High Energy Physics Group, Nuclear & Particle Physics Research Centre which comes under Department of Physics has been awarded the status of “Associate Membership” of **ALICE – INDIA Collaboration** and **CERN (European Council for Nuclear Research) - ALICE (A Large Ion Collider Experiment) Collaboration** and received a grant of Rs. 1.115 crores.

**The Global Change Programme** at Jadavpur University (GCP-JU) is active at the **Intergovernmental Panel on Climate Change (IPCC)**. It has also worked with Ministry of Environment, Forest and Climate Change towards the preparation of NATCOM (National Communication) for United Nations Framework Convention on Climate Change (UNFCCC). A joint open energy modelling project was initiated by GCP-JU in collaboration with Indian Institute of Science (Bengaluru), and the Environmental Defense Fund (US). Since 2020, they are also collectively developing a comprehensive energy model and evaluate alternative decarbonization strategies and pathways for future India.

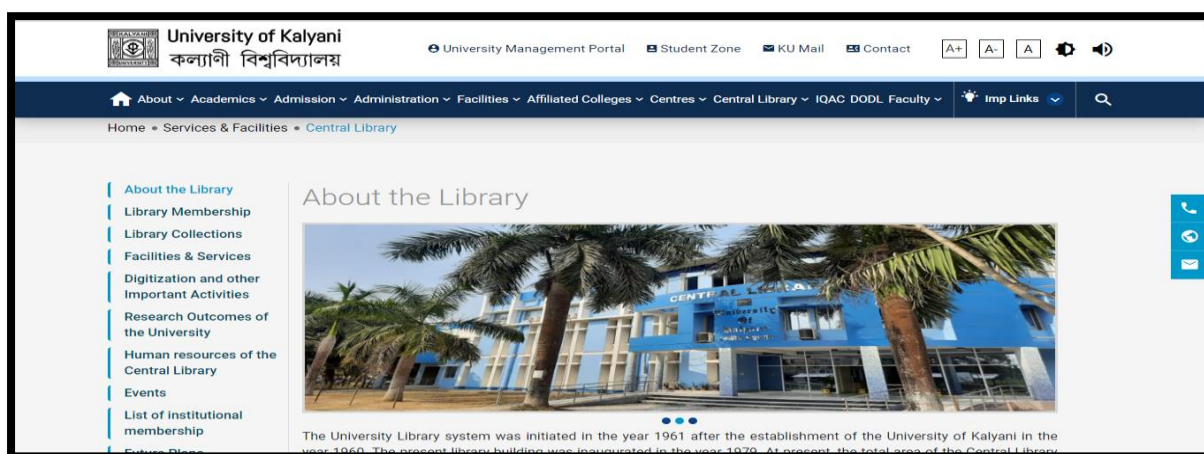
Some major research ventures undertaken by *School of Environmental Studies* are highlighting the presence of arsenic in groundwater in countries like India and Bangladesh and the development of the first alcohol based car by the School of Automobile Engineering.

### Industry

Jadavpur University's **Innovation Council (IIC)** was established in 2018 to promote innovations and startups in the campus. IIC arranges awareness programmes, seminars and workshops on innovation and entrepreneurship and organises visits to industries and start-ups for the first year students. The University hosted a HULT event. IIC participated in Bengal Global Business Summit (GBBS) 2022, Smart India Hackathon (SIH) 2022. Three alumni members from JU has successfully established their startups by enlisting in startup MSME venture. Four Memorandum of Understandings (MOUs) have been signed with companies like Garden Reach Shipbuilders and Engineers, Haldia Petrochemicals Limited, MCPI Private Limited and Nexgen Plasma Private Limited for student internships. Jadavpur University organised *SERB-INAE Hackathon 2022*, in which nearly 100 students from all over India participated.

The University also has an **Industry-Institute Partnership Cell (IIPC)** in which consultancy and testing services are provided to industry, service sectors and other public or private organizations. During 2022-2023, the IIPC generated a revenue of Rs 13.5 crores. Up to 2023, the IIPC has worked with around 161 leading industries or organisations. They include organisations like Tata Steel, RITES, Airport Authority of India, Kolkata Port Trust, Bajaj Electricals, L&T, KMC and KMDA, Rail Vikas Nigam Ltd., CPCB, CESC etc.

### 4.3 University of Kalyani



The **University of Kalyani**, established in 1960, is a Government of West Bengal administered, UGC affiliated, NAAC accredited, collegiate Public Research university in Kalyani, West Bengal, India. It offers courses at the Undergraduate, Postgraduate and Doctoral levels.

Under the long-term perspective plan of Calcutta Urban Agglomeration, Kalyani was a satellite township which was the idea of former Chief Minister Dr. Bidhan Chandra Roy. The need for education and infrastructure for health was emphasized for the development of this township and for the educational aspect, in 1960 the University of Kalyani was built. Initially it was just a single entity with faculties of Arts, Science, Education, and Agriculture under it. Today, it has 62 colleges affiliated under its name in Murshidabad and Nadia districts. The alumni of the university includes researchers, scholars, and scientist, sportspeople and public representatives. In the last decade the university has established the School of Interdisciplinary studies with 3 new departments namely the Geonome Science, Nano science and Data science. The food and nutrition department was also introduced along with Departments of Sanskrit, Hindi and philosophy. During the year 1975, the university was divided into two branches. they are

- Faculty of Agriculture which was converted into an independent Agricultural University
- the Bidhan Chandra Krishi Viswavidyalaya in Mohanpur in Nadia

## History

The university was established on 1 November 1960 by 'The Kalyani University Act 1960' of the Government of West Bengal. The University of Kalyani is a State University and its activities are guided by 'The Kalyani University Act, 1981 (amended up to 2001)', enacted by the Government of West Bengal. The Act is supplemented by 'Statutes', 'Ordinances', 'Regulations' and 'Rules'. This act replaced 'The Kalyani University (Temporary Suppression) Act, 1978', which in turn replaced 'The Kalyani University Act, 1960'. The University Grants Commission accorded recognition to the university.

## Campus

The university is placed in an Urban areas setting touching the boundaries of some green Rural areas. The eastern bank of the Ganges is only 2000 meters from the University and its serene background is only 50 km from Kolkata. It is close to Kalyani Ghoshpara railway station, 10 minutes walking distance to Administration Building from the station, and the other campuses are around it. During the Second World War this land was under the control of the American army who maintained an Army depot here. Few roadways and other constructions are still there to prove that past history. The Campus spans over a huge area of 400 acres (largest State University of West Bengal based on area).

## Faculties and Departments



Administrative Building, University of Kalyani

The University of Kalyani has 37 departments organized into 6 faculty councils.

## Faculty of Science

This faculty consists of the departments of

- Mathematics
- Physics
- Chemistry
- Botany
- Biochemistry & Biophysics
- Ecological Studies
- Geography
- Microbiology
- Molecular Biology & Biotechnology
- Environmental Science
- Statistics
- Zoology
- Physiology

### **Faculty of Engineering, Technology & Management**

This faculty consists of the departments of

- Computer Science & Engineering
- Engineering & Technological Studies
- Business Administration

### **Faculty of Arts & Commerce**

This faculty consists of the departments of

- Bengali
- English
- Hindi
- Modern Language
- Sanskrit
- Economics
- History
- Political Science
- Philosophy
- Rural Developmental Studies
- Library & Information Science

- Folklore
- Sociology
- commerce

### **Faculty of Education**

This faculty consists of the departments of

- Lifelong Learning & Extension
- Education
- Physical Education

### **Faculty of Music & Fine arts**

This faculty consists of the department of

- Visual Arts

### **School of Interdisciplinary Studies**

This faculty consists of the departments of

- Nanoscience & Nanotechnology
- Data Science
- Genomic Science

### **Centers**

- Bioinformatics Infrastructure Facility Center
- Center for Information Resource Management (CIRM)
- ENVIS Center on Environmental Biotechnology
- Centre for Bengali Diaspora

### **Affiliated Colleges**

This university is providing academic guidance and leadership to 57 affiliated colleges and 7 others recognized institutes (as of 1 January 2020). Colleges are independent from the university but they follow the Course Curriculum of the university. Colleges are headed by the Principal and Professors, Teachers of the colleges are appointed via West Bengal College Service Commission (WBCSC). Colleges have responsibility for

admitting Undergraduates and organising their classes. Here are names of total 64 affiliated colleges/other recognized institutes :

**Govt./Govt.-Aided General Degree Colleges**

1. Asannagar Madan Mohan Tarkalankar College
2. Berhampore College
3. Berhampore Girls' College
4. Bethuadahari College
5. Chakdaha College
6. Chapra Bangaljhi Mahavidyalaya
7. Domkal Girls' College
8. Dr. B.R. Ambedkar College
9. Dukhulal Nibaran Chandra College
10. Dumkal College
11. Dwijendralal College
12. Haringhata Mahavidyalaya
13. Hazi A.K. Khan College
14. Jalangi Mahavidyalaya
15. Jangipur College
16. Jatindra Rajendra Mahavidyalaya
17. Kalyani Mahavidyalaya
18. Kanchrapara College
19. Kandi Raj College



20. Karimpur Pannadevi College
21. Krishnagar Government College
22. Krishnagar Women's College
23. Krishnath College
24. Lalgola College
25. Murshidabad Adarsha Mahavidyalaya
26. Muzaffar Ahmed Mahavidyalaya
27. Nabadwip Vidyasagar College
28. Nabagram Amar Chand Kundu College
29. Nagar College
30. Nur Mohammad Smriti Mahavidyalaya
31. Panchthupi Haripada Gouribala College
32. Plassey College
33. Pritilata Waddedar Mahavidyalaya
34. Prof. Sayed Nurul Hasan College
35. Raja Birendra Chandra College
36. Ranaghat College
37. Rani Dhanya Kumari College
38. Sagardighi Kamada Kinkar Smriti Mahavidyalaya
39. Santipur College
40. Srikrishna College

41. Sripat Singh College
42. Sewnarayan Rameswar Fatepuria College
43. Subhas Chandra Bose Centenary College
44. Sudhiranjan Lahiri Mahavidyalaya
45. Tehatta Government College
46. Muragacha Government College
47. Government General Degree College, Kaliganj
48. Government General Degree College, Chapra

**Self-financed General Degree Colleges**

1. Institute of Mass Communication Film & Television Studies
2. G.D. College, Shaikpara

**Govt.-aided B.P.Ed. College**

1. Union Christian Training College

**Self-financed B. P. Ed. Colleges**

1. Prabharani Institute of Education
2. Sunil Dhar Memorial B.P.Ed. College

**Self-financed Law Colleges**

1. Bimal Chandra College of Law
2. J.R.S.E.T. College of Law
3. Mohammad Abdul Bari Institute of Juridical Science
4. S. K. Acharya Institute of Juridical Science

## Other Recognized Institutes

1. Central Sericultural Research and Training Institute
2. Kalyani Technology Academy
3. Tagore School of Rural Development and Agricultural Management
4. Dr. K.R. Adhikary College of Optometry & Paramedical Technology
5. Monarch College of Art and Technology
6. Susrijo Institute of Paramedical Technology and Optometry
7. Susrijo Institute of Agricultural Science, Technology and Management

## 4.4 Rabindra Bharati University



**Rabindra Bharati University** is a public research university in Kolkata, India. It was founded on May 8, 1962, under the Rabindra Bharati Act of the Government of West Bengal in 1961, to mark the birth centenary of the poet Rabindranath Tagore. It is located at the Tagore family home, Jorasanko Thakur Bari. The university offers undergraduate and postgraduate programmes in Performing Arts and Visual Arts under the Faculty of Fine Arts, Humanities, Social Sciences and other subjects under the Faculty of Arts.

The current interim Vice-Chancellor of the university is Subhro Kamal Mukherjee, former Chief Justice of Karnataka High Court.

This university was established in 1962 on the birth centenary of the poet Rabindranath Tagore. He was the first Asian as well as an Indian to become a Nobel Prize for Literature. This is a state university whose primary purpose is to teach and spread the ideas and thoughts of Tagore through social sciences, humanities and art and culture. The major faculties of this university are Fine arts, Arts and Visual arts. The original campus of this university Jorasanko and the current campus is Emerald Campus. The current campus now functions as a museum and hosts various events. This university is a unique higher educational institution that caters to the students from the outer parts of the state. Though it is meant for the economically backward people of the state, there are numerous international students from Europe to Asia who have been admitted through Indian Council of Cultural Relations (ICCR) or on their own in order to study the Indian arts and culture.

Departments under the Arts Faculty are:

- Adult & Continuing Education
- Bengali
- Comparative Literature
- Economics
- Education
- English
- Environmental Studies
- Geography
- Hindi
- History
- Human Development Studies
- Human Rights and Human Development
- Library & Information Science
- MSW
- Mathematics
- Philosophy
- Political Science
- Sanskrit

- Santali Language, Literature and Culture
- Sociology
- Women Studies

Departments under the Fine Arts Faculty are:

- Dance
- Drama
- Instrumental Music
- Mass Communication & Videography
- Musicology
- Percussion
- Rabindra Sangeet
- Vocal Music

Departments under the Visual Arts Faculty are:

- Painting
- Sculpture
- Graphics (print making)
- Applied arts
- History of arts
- Museology

There are three campuses in this university, one is the Emerald Bower campus, next is the Jorasanko campus and finally the salt lake campus. Presently, the university provides 11 distant education programmes.

The library of this university was started in 1962 and consists of a central library, a Sangeeth Bhavan library and each department has departmental library. The first library was started in a small room in the old campus. Then the whole library was shifted to Maharshi Bhavan's first floor within a year which was bigger and had more room for books and for readers. Then, a part of the library and some departments were shifted to Emerald Bower campus. Since 2001 the central library is located at that campus with a separate four-storied building for the library., called the Kendriya Granthagar Bhavan. Finally, all the departments and the library was shifted to the Emerald Bower campus in 2007. The library from old campus is now in the first floor of

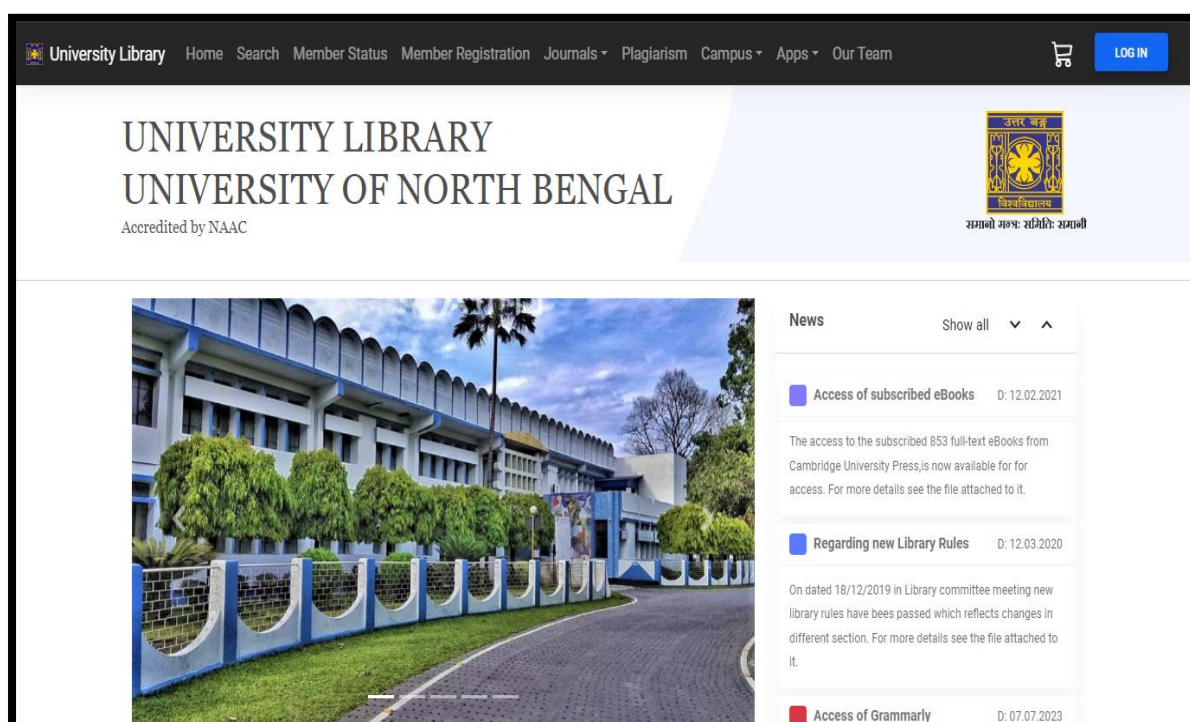
Sangeet Bhavan. The library has a collection of 2550 bound journals, 120500 books, 800 theses, reports, rare books and proceedings of conference.

### Tagore museum

*Main article: Jorasanko Thakur Bari*

The Jorasanko Thakur Bari is the ancestral home of the Tagore family. The first non-European Nobel laureate Rabindranath Tagore was born here.

## 4.5 University of North Bengal



**University of North Bengal** (abbreviated as **NBU**) is a public state collegiate major research university in North Bengal region of West Bengal, which is located in Raja Rammohanpur, Siliguri, Darjeeling district, in the Indian state of West Bengal. A second campus is in Danguajhar, Jalpaiguri in Jalpaiguri district and a third campus is in Salt Lake, Kolkata also in West Bengal. The university was established in 1962 to fill growing manpower needs in the six North Bengal districts and the neighbouring state of Sikkim. North Bengal University offers degrees in undergraduate, post-graduate taught-research, doctorate and post doctoral programs.

## **History**

The University of North Bengal was established by Act of the Legislature of West Bengal in 1962. It was the first university in the region. It served predominantly rural areas in six districts: Darjeeling, Jalpaiguri, Cooch Behar, Maldah, Uttar Dinajpur and Dakshin Dinajpur.

In 2008, the University of Gour Banga was established and almost all the 28 colleges in Maldah, Uttar Dinajpur and Dakshin Dinajpur (with the exception of Raiganj University College) were affiliated to it.

In 2012-13, Cooch Behar Panchanan Barma University was established with all the colleges of Cooch Behar district and Alipurduar subdivision of Jalpaiguri district affiliated with it. The University of North Bengal has jurisdiction over the districts of Darjeeling and Jalpaiguri. It is accredited by NAAC with B++ grade.

## **Campus**

The main campus is spread over an area of 330 acres (1.3 km<sup>2</sup>) and lies between Siliguri and Bagdogra Airport, Bairatisal Town in the Terai region. The second campus is in Danguajhar in Jalpaiguri.

The university has an annual enrollment of more than 36,000 undergraduate and more than 1,500 postgraduate students and scholars. Students come from North Bengal mainly from hills and plain areas. North Bengal University also provide distance education in MA English, Philosophy, Bangla etc.

## **Faculties and Departments**

University of North Bengal has 30 departments organized into two faculty councils.

### **Faculty of Science**

Department of  
Anthropology

Department of Bio-  
Technology

Department of  
Bioinformatics

Department of Botany

## Faculty of Science

Department of Chemistry	Department of Computer Science & Technology	Department of Food Technology	Department of Geography and Applied Geography
-------------------------	---	-------------------------------	---

## Faculty of Arts, Commerce & Law

Department of Management <sup>[7]</sup>	Department of Geology	Department of Microbiology	Department of Pharmaceutical Technology
Department of Physics	Department of Tea Science	Department of Zoology	Department of Mathematics

## Centres

The university offers affiliation to research and academic centres on and off-campus.

### Centre For Studies

- University Science & Instrumentation Centre
- Computer Centre
- Centre for Development Studies
- Centre for High Energy & Cosmic Ray
- Centre for Remote Sensing Application
- Centre for Tea Management
- Centre for Mass Communication
- Centre for Himalayan Studies
- Centre for Women's Studies
- Center for Social Research
- Centre for Studies in Local Language and Culture
- Centre for Tourism and Hotel Management
- Centre for Marketing Management
- Centre for Ambedkar Studies
- Centre for Innovative Studies
- North Bengal University Research Centre



on Diplomacy  
and War

The University of North Bengal offers three or Four years (B.A./B.Sc./B.Com.) undergraduate degrees and five years B.A. LLB degree on its Law School. It also offers two-year M.A., M.Com., M.B.A., M.Sc., M.C.A., M.Pharm, two-years MPhil and PhD degrees.

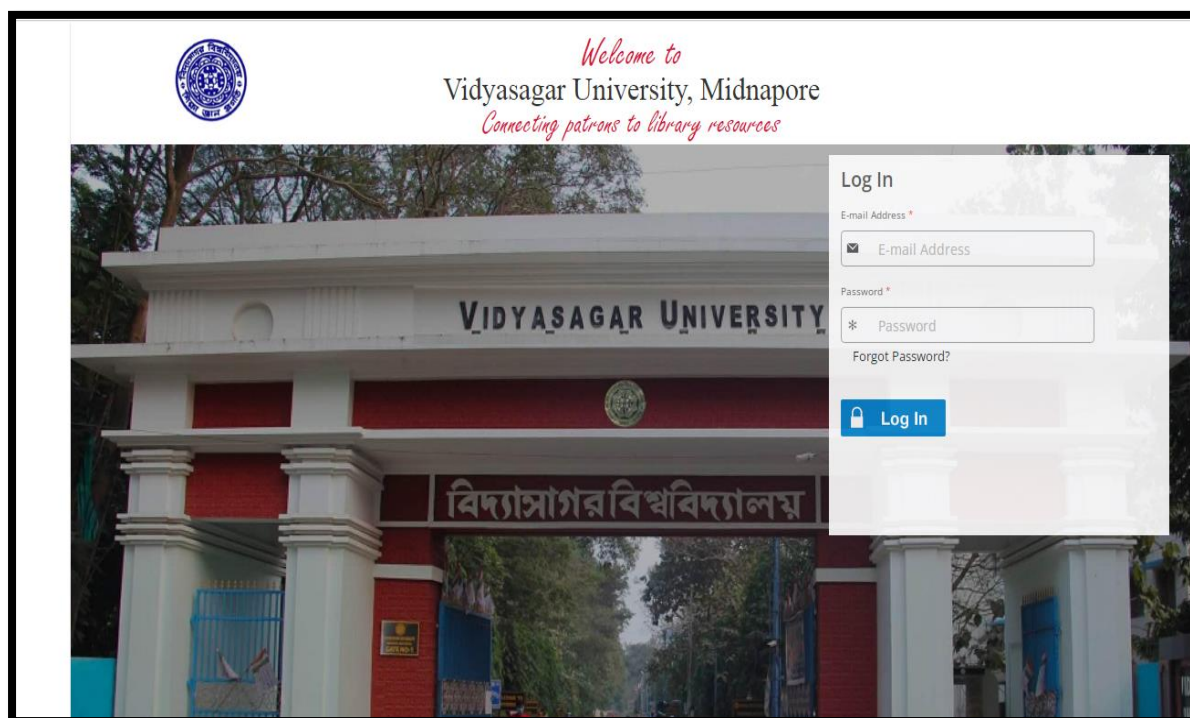
The university has 3 campuses and they are

- Raja Rammohanpur campus
- Jalpaiguri campus
- Salt lake campus

The campus has various departments and they are divided into 2. One is the Faculty of science and the next is the faculty of arts, commerce and law.

The University Library was also established in 1962 along with the University of North Bengal. This is the only library in the North Bengal region to provide higher learning and research. The library is a separate building with three-stories and a carpet area of 2662.61 sq. mtr. The university also has an Annexe in a two-stories building with a carpet area of 445.52 sq. mtr. The library is situated to the west side of the administrative building of the university and north of Padmaja park. The library has a vast collection of resources on a wide range of fields like Arts, Law, science, commerce and management. The library LAN is connected with the campus wide network along with worldwide network. This makes accessing different information easier for various academic community. They have a completely autonomous library system with advanced RFID system and uses SOUL3 as the Library Management System. The university library also has a state of the art technology to ensure the efficient and accurate book tracking and transection of books and other materials. The university contains a Library Committee to regulate the policy, planning and processes and all the activities for the development of the library.

## 4.6 Vidyasagar University



**Vidyasagar University** was established by an Act of the West Bengal legislature which was notified in the *Calcutta Gazette* on 24 June 1981. It is an affiliating university in Paschim Medinipur district of southern West Bengal, India. It offers courses at the undergraduate and post-graduate levels.

It was founded by the mathematician and statistician from the University of Cambridge, Anil Kumar Gain.

### History

The university was established on 29 September 1981 by the Vidyasagar University Act 1981 (West Bengal Act XVIII of 1981) of the state of West Bengal to commemorate Pandit Iswar Chandra Bandyopadhyay, also known as Ishwar Chandra Vidyasagar, an educationist and social worker of 19th century Bengal. The University Grants Commission accorded recognition to the university under Section 12 B on 1 March 1990.

A short history of Vidyasagar University is written by a faculty of the Anthropology Department in Bengali which was published in January 2001 from Kolkata. In this book the author being one of the founder teachers of the university narrated the missions of the institution as well as the deviations and the future possibilities in the context of globalisation.

Prof. Anil Kumar Gayen: Founder

Anil Kumar Gayen (Bengali: অনিল কুমার গায়েন), FRS (1 February 1919 – 7 February 1978) was an Indian mathematician and statistician best known for his works on the Pearson product-moment correlation coefficient in the field of applied statistics, with his colleague Sir Ronald Fisher. He received his Ph.D. from the University of Cambridge under the supervision of Henry Ellis Daniels, who was the president of the Royal Statistical Society. He was honoured as a Fellow of the Royal Statistical Society and the famous Cambridge Philosophical Society.

Gayen was the president of the Statistics section of the Indian Science Congress Association, as well as the head of the Department of Mathematics at the Indian Institute of Technology (IIT) Kharagpur. He went on to found Vidyasagar University, naming it after the famous social reformer of the Bengali Renaissance, Ishwar Chandra Vidyasagar.

Gayen dedicated the later years of his life towards the establishment of Vidyasagar University as a non-traditional institution of higher education in the erstwhile Medinipur district of the West Bengal state in India. Gayen's vision was reflected in the Vidyasagar University Act of 1981 wherein among others, it was stated that the "University shall have the power to make such academic studies as may contribute to the improvement of economic conditions and welfare of the people in general and the tribal people in particular" (Vidyasagar University Act 1981 amended in 1997 and 2011.)

The Ghani Committee appointed by the U.G.C. suggested, among others, setting up of a university in Midnapore on the ground of its 'having a compact area and a manageable number of colleges' (at that time there were 36 colleges with an enrolment of about 42,000), and of its 'having the great advantage of co-operation of the IIT, Kharagpur. The committee was also of the opinion that the new University would develop on the lines suited to the needs of this backward area. The recognition of Gayen as the founder of Vidyasagar University was belated.<sup>[9]</sup> After three decades of its establishment in the Seventh Executive Council meeting held on 04.05.2012 based on the proposal of a professor of Anthropology a committee was formed to honour the founder of the university.

#### Establishment

Following the approval of UGC, the Government of West Bengal decided in 1978 to establish Vidyasagar University and, in consultation with the U.G.C., the State Government appointed a

Planning Committee in March 1979 to lay down the lines of development and to take initial steps to found the university. The committee submitted its report in October. Then the Vidyasagar University Act, 1981 (West Bengal Act XVIII of 1981) was passed in the State Legislative Assembly. Professor Bhupesh Chandra Mukherjee, a former teacher of History of the then Presidency College, Kolkata, joined as the first vice chancellor on 29 September 1981. Professor B.C. Mukherjee wrote an article in the *Journal of Higher Education* (published by the UGC) in which he stated the mission and objectives of Vidyasagar University and mentioned the name of the founder of VU—Professor Anil Kumar Gain.

Academic activities started when through a notification [no. 983-Edn (U), dated Calcutta 23 May] issued by the State Government, 30 colleges of the District of Midnapore were affiliated to the Vidyasagar University with effect from 1 June 1985. The foundation stone of the main campus (at Tantigaria mouza of Midnapore Sadar Town for post graduate teaching and central administration) was laid on 18 July 1983 by the university's chancellor and West Bengal governor B.D. Pande. On 15 January 1986, it was inaugurated by Jyoti Basu, the then chief minister of West Bengal.

On 16 January classes commenced in six post graduate departments: Anthropology, Applied Mathematics with Oceanology and Computer Programming, Commerce with Farm Management, Economics with Rural Development, Library and Information Science, Political Science with Rural Administration.

The U.G.C. accorded recognition to the university in terms of Section 12B of the U.G.C. Act, on 1 March 1990. The university houses 27 PG departments (apart from MBA which is run under the Department of Commerce with Farm Management), 12 in Humanities and 15 in Science while 46 undergraduate colleges apart from 11 courses in yet 11 other colleges / institutes are affiliated to it. Fourteen vocational subjects and six other specialised courses are offered at the UG level. The overall emphasis of the university is not to perpetuate the traditional nature of the other universities of West Bengal but to merge as a distinctive entity with a special nature of its own. The National Assessment and Accreditation Council (NAAC) awarded Vidyasagar University a three-star status.

### **Campus**

The total area of university campuses in the semi-rural areas is 182.75 acres (0.7396 km<sup>2</sup>). It may be distributed as:

- Main Campus: 103.79 acres (0.4200 km<sup>2</sup>)
- Residential Campus: 35.00 acres (141,600 m<sup>2</sup>)
- Third plot: 43.97 acres (177,900 m<sup>2</sup>) The third plot which was given by the district administration was taken back since the university could not use it for its purpose.

### **Faculties and Departments**

Vidyasagar University has 29 departments organized into two faculties: Science and Arts & Commerce.

- **Faculty of Science**

This faculty consists of the departments of Applied Mathematics with Oceanology and Computer Programming, Physics, Chemistry, Anthropology, Fishery Sciences, Botany and Forestry, Biomedical Laboratory Science and Technology, Clinical Nutrition and Dietetics, Computer Science, Human Physiology, Electronics, Geography, Microbiology, Remote Sensing & GIS, and Zoology

- **Faculty of Arts & Commerce**

This faculty consists of the departments of Bengali, English, Hindi, Sanskrit, Santali, History, Political Science, Philosophy, Economics, Library and Information Science, Sociology, Commerce, and Business Administration.

### **Centres**

- Women's Studies Centre
- University Scientific Instrumentation Centre (USIC)
- Gandhian Study Centre
- Computer Centre
- Social Research Centre
- Centre for Adivasi Studies and Museum
- Centre for Environmental Studies
- Centre for Life Sciences
- Centre for Continuing and Adult Education

## **Affiliations**

The university is an affiliating institution and has its jurisdiction over Purba Medinipur and Paschim Medinipur districts or any district which may be created in future out of any parts thereof. Thirty colleges of the University of Calcutta in the erstwhile district of Midnapore were initially deemed to be affiliated to Vidyasagar University.

## **Vidyasagar University Teachers' Association (VUTA)**

The professors of Vidyasagar University formed their association in 1986 with nine teachers of the six postgraduate departments. Gradually the organization developed into a viable entity. Apart from looking into the pure financial and promotional interests of the teachers, the association regularly organizes academic seminars and cultural programmes in which many students and other members of the university community participate. On 24 July 2013 VUTA celebrated its belated silver jubilee function and published a souvenir.<sup>[16]</sup> The organization got its registration in 2015. On 4 December 2015, and for the first time in the history of the association, a Professor in Anthropology wrote an open letter to the President of the association pointing out the anomalies in the study leave rules for the teachers.<sup>[17]</sup>

## **Academics**

### **Admission**

Admission in undergraduate and postgraduate course is mainly based on the result of higher secondary (10+2) and graduation (10+2+3) level results, respectively. Each college sets up their own criteria for admission in undergraduate course, but all are mainly based on higher secondary results.

For research level programs, the aspirants have to sit for a qualifying test (RET) followed by an interview. It is mandatory that they secure at least 55% marks in their post graduate level examination.

If the aspirants qualify the all India examination like NET, GATE, SET then their admission in Ph.D is only based on interview.

### **Distance Education**

Vidyasagar University has a Directorate of Distance Education (DDE, VU) for conducting post graduate studies in distance mode. This is for people who cannot undergo post graduate studies in regular (full-time) mode. The DDE, VU is on the main campus.

It was established in 1994 and started offering correspondence courses in postgraduate subjects from the session 1994-1995. Candidates pursuing distance learning courses are provided with study materials in modules on topics prescribed in the syllabus. The Directorate of Distance Education organises the Personal Contact Programme (PCP) for interaction with leading academic experts in the subjects who give counselling and advice rather than classroom lectures. PCPs are held ordinarily during Summer Recess, Puja Recess and Winter Recess and on holidays. Courses of distance education in the university are approved by the University Grants Commission (UGC) and the Distance Education Council.

### **Computer Centre**

Computer centre takes an important role for spreading the knowledge of computer education in rural areas of West Bengal. They offers certificate and diploma courses on computer-based subjects like Office Automation and Financial Accounting, Office Automation and Internet Technologies. They offered few post graduate diploma courses in collaboration with CMC. It maintains the campus-wide LAN (optical fiber based GBIC) with 400 nodes throughout the campus and providing Internet services.

### **Sports and games**

Games and sports of the university are an integral part of academic achievements. Sports events like Athletics, Football, Volleyball, Kho-Kho, Swimming, Kabadi, and Cricket competitions are organised regularly as per the university's Sports Calendar. The university has shown remarkable performance in All India Inter-University tournaments and all Bengal Inter-University tournaments even with limited infrastructural facilities.

### **Accreditation**

Vidyasagar University has been awarded B grade by the National Assessment and Accreditation Council (NAAC).<sup>[24]</sup> In the third cycle of accreditation by NAAC, Vidyasagar University has been awarded a cumulative grade point average (CPGA) of 2.86 and was placed under B Grade.

## **Publishing**

The faculties of Vidyasagar University and its vice-chancellors have written and edited a books on subjects mainly by availing financial grant from the UGC Unassigned grant scheme.<sup>[27]</sup>

The academic departments have been publishing journals. There are two multidisciplinary journals: one published by the biological science departments and the other by the physical science departments.

Currently, there are 27 PG departments out of which 12 are in Humanities and 15 in sciences. There 46 UG colleges affiliated to the university. At the UG level 14 vocational subjects and 6 specialized courses are offered.

The library was established in the year 1986. The central library has its own building with a total area of 11,000 sq. ft. with four floors. In 2018, a 34920 sq.ft., Annex library building was added to expand the library. Including text books, volumes of journals, reference books, standard etc., and the library has a total of 138065 resources. The basics functions of the library includes development of the collection, organizing and retrieval of information. In 2001, using SOUL package, the library adapted a computer based storage and retrieval system. The SOUL package helps in the operations like acquisition, cataloguing, circulation and periodical services. In 2018, RFID technology was also adopted in the library making it fully automated modern library system. A digital resource center with all feature is currently in development in order to provide digital resources and institutional repositories.

The library is being utilized by 4263 PG students and Research Scholars, approximately 161 faculty members of 28 departments, about 131 non-teaching and administrative staff of this university. It also has a membership service. The central library is a member of the e-ShodhSindhu which provides online access to nearly 8.3 thousand peer-reviewed journals and database services. The university also provides membership of British Council Library, Kolkata and Developing Library Network (DELNET) New Delhi.



## 4.7 The University of Burdwan



**The University of Burdwan** (also known as **Burdwan University** or **B. U.**) is a public collegiate state university located in Purba Bardhaman, West Bengal, India. It was established by the West Bengal Government as a teaching and affiliating university on 15 June 1960 with six graduate departments and 30 undergraduate colleges spread over three districts that come under the jurisdiction of the university. The university currently offers more than 30 undergraduate and 66 postgraduate courses.

Burdwan is an Anglicized version of the Sanskrit *Vardhamana* and the connected *Bardhaman* in Bengali. The root of this term dates before to the sixth century BC and is explained to the twenty-fourth Jain Tirthankar, or *Vardhamanswami*, who spent some duration in *Astikagrama*, according to the Jain *Kalpasutra*. This location has been renamed *Vardhamana* in his recognition. A second opinion holds the literal meaning of the name, a flourishing base, to argue that this place represented a frontier settlement of the improvement of *aryanisation* through the upper Ganga valley. Nevertheless, the Aryans failed to proceed further east. So, the name was retained. Archaeological proof proposes that this province, comprising a major part of *Radh Bengal*, could be traced even back to 4000-2000 BC. Burdwan is a place of mixed culture with Buddhist architecture.

## **History**

The last maharaja of Burdwan, Udaychand Mahtab, left the entire property of Burdwan to the government of West Bengal after the zamindari system ended in the 1950s. The then chief minister of West Bengal, Bidhan Chandra Roy took the initiative of establishing a university at the premises of the palace of the maharaja. Thus the university was established in 1960. Sukumar Sen (ICS) was the first vice-chancellor. The university began with the humanities division, with the science and engineering courses included afterwards.

The university had jurisdiction over Purulia district, Birbhum district, Paschim Bardhaman district, Bankura district, Purba Bardhaman district and Hooghly district except the Srirampore subdivision. Over the years, the university lost the jurisdiction over the districts of Purulia, Bankura, Birbhum and Asansol, Durgapur to local universities,<sup>[6]</sup> namely Sidho Kanho Birsha University in Purulia, Bankura University in Bankura, Biswa Bangla Biswabidyalay in Birbhum, Kazi Nazrul University in Asansol & Durgapur and Rani Rashmoni Green University in Hooghly.

## **Faculties and departments**

The University of Burdwan has 39 departments organized into two faculty councils.

- **Faculty Council of Science**

Biotechnology, Botany, Chemistry, Computer Science, Electronics and Communication, Environmental Science, Geography, Geospatial Science, Mathematics, Microbiology, Molecular Biology and Human Genetics, Nutrition and Public Health, Physics, Physiology, Psychology, Statistics, Zoology

- **Faculty of Arts, Law, etc**

Arabic, Bengali, Business Administration, Business Administration (Human Resource), Commerce, Economics, Education, English and Culture Studies, Foreign Language, Hindi, History, Law, Library and Information Science, Mass Communication, Philosophy, Physical Education, Political Science, Sanskrit, Santali, Sociology, Tourism Management, Women's Studies

- **Other Academic Departments**

Malaviya Mission Teacher Training Centre, Sports Board, Swami Vivekananda Advance Research Centre, National Service Scheme, Lifelong Learning



- **Professional Courses**

Certificate in Yoga Education, Post-graduate Diploma in Guidance and Counselling, Post-graduation Diploma in Yoga, Certificate Course in Communicative English, Diploma in Cyber Law

- Others

- **Institutions and Extensions**

Centre for Distance and Online Learning University Institute of Technology (UIT)

- B.ed, M.ed, Special B.Ed.

University Institute of Technology (UIT)

*Main article: University Institute of Technology, Burdwan University*

University Institute of Technology (UIT) is a Government autonomous old professional Engineering Campus. Now Department/Faculty of Engineering & Technology Campus in The University of Burdwan. It represents the faculty of Engineering that was at National Institute of Technology, Durgapur since its inception. This college was inaugurated in 2001 by the then chief minister of West Bengal Shri Buddhadeb Bhattacharya.

#### Affiliations

The University of Burdwan is an affiliating institution and has jurisdiction over the colleges of the Birbhum district, Purba Bardhaman district and Hooghly district except Srirampore subdivision. There are currently 189 affiliated colleges (including degree colleges, BEd colleges and private professional institutes) under the University of Burdwan.

#### Academics

##### Admission

Burdwan University academic complex, South Gate

For admissions to the Engineering faculty at the undergraduate level, students are admitted through the WBJEE,<sup>[12]</sup> an entrance examination open to students from all over India. Unlike in a large number of states, there is no domicile quota in BU (or for other engineering colleges admitting students through the WBJEE). Postgraduate students in engineering are admitted through GATE.

### **Distance education**

The University of Burdwan has a Directorate of Distance Education (DDE, BU) for conducting post-graduate studies in distance mode. This is for people (mainly workers) who cannot undergo post-graduate studies in regular (full-time) mode. The DDE was established in 1994. Courses of distance education in the university are approved by University Grants Commission (UGC) and the Distance Education Council.

### **Meghnad Saha Planetarium**

The Meghnad Saha Planetarium, established in 1944, is the only planetarium in India operating under any university. This planetarium is the pride of the university. This planetarium organizes different shows on the mysteries of the universe, birth of stars, the motion of planets, aspects of lunar exploration, and other astrophysical phenomena using modern technologies.

### **University museum and art gallery**

Burdwan University Museum and Art Gallery have collections of different antiquities and art objects dating from 1500 BC to the 19th century AD. Museum also has collections of stone sculptures bronze figures, ancient coins, brass and alloy, painting of the Indo-European school, terracotta plaques, etc. One can visit the university museum any day (except holidays) during office hours (11 AM to 4 PM).

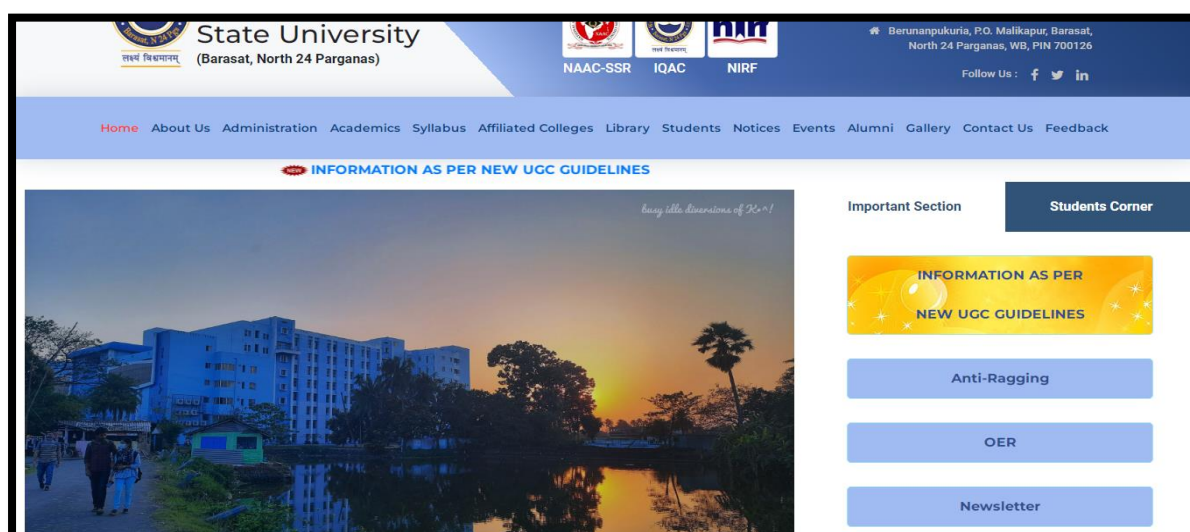
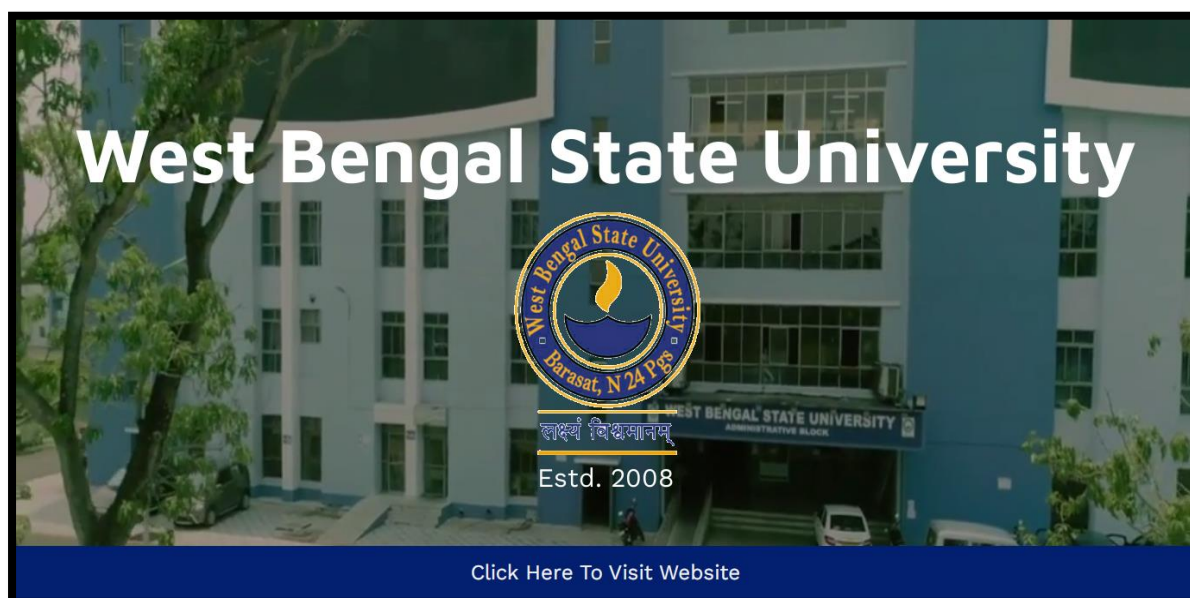
The central library of this university is located in the Golapbag campus in a two-storied building. The library is situated on the middle of the campus and hence it is easily accessible to all the departments in the university. The library is built over a carpet area of 12,000 sq. ft. There are also 19 departmental libraries and the libraries also provide consultation services to external scholars and affiliated colleges. The library consists of

- 1,58,962 books
- 8170 research or project books
- 24,812 journals

- 918 reprints
- 2365 thesis and dissertations
- 1983 reports
- 500 microfilms
- 8000 rare books
- 20794 donated books
- 1111 CD ROMs

The central library of the university is computerized under the INFLIBNET program of the UGC. The SOUL packages are used to take care of the library activities.

#### 4.8 West Bengal State University





**West Bengal State University (WBSU)** is a public university situated in Berunanpukuria, North 24 Paraganas, West Bengal, India. It was established by an Act of the Legislative Assembly on 2007.

### **History**

The Government of West Bengal through an Act of the Legislative Assembly has passed *West Bengal Act XXVIII, 2007* implementing a long-standing public demand in creating the university named West Bengal State University at Barasat, North 24 Paraganas. This became functional from the academic session 2008–09. On 26 May 2008, there were 63 colleges formerly affiliated with the University of Calcutta. They were, through a government notification (*No.300-Edn (U)/ IU-38/08*), transferred to this new university. The university began functioning under its first Vice-Chancellor Ashoke Ranjan Thakur, the erstwhile Pro-Vice-Chancellor of Jadavpur University.

### **Campus and location**



WBSU old building and campus

The total area of university campuses is 29 acres (0.12 km<sup>2</sup>). The university is located in very quiet place, free of crowd, at a remote village named Berunanpukuria, which is located in the North 24 Parganas district, 7 km off Barasat city (the district headquarters of North 24 Parganas), North 24

Paraganas, West Bengal, India.

### **Faculties and departments**

West Bengal State University has 30 departments organized into three faculty councils.

- **Faculty of Science**

This faculty consists of the departments of Anthropology, Mathematics, Physics, Chemistry, Computer Science, Biochemistry, Psychology, Geography, Rural Studies, Electronics, Food and Nutrition, Microbiology, Statistics, Economics, Botany, Zoology, and Physiology.

- **Faculty of Arts**

This faculty council consists of the departments of Bengali, English, Hindi, Sanskrit, Urdu, Arabic, History, Political Science, Philosophy, Education, Sociology, Library Science, Film Studies, and Journalism.

- **Faculty of Commerce and Management**

This faculty consists of the departments of Commerce and Business Administration.

### **Affiliations**

The university is an affiliating institution. All the 55 colleges (including Undergraduate, Postgraduate and B.Ed.) in the district of North 24 Parganas, which were formerly affiliated with the University of Calcutta, are affiliated to this university. As of April 2020 the university has 49 affiliated colleges and 5 B.Ed. colleges. Out of 49 colleges, eight are NAAC accredited A-grade colleges and 19 colleges offer Postgraduate courses. Affiliated Colleges:

- ACHARYA PRAFULLA CHANDRA COLLEGE
- AMDANGA JUGAL KISHORE MAHAVIDYALAYA
- BAMANPUKUR HUMAYUN KABIR MAHAVIDYALAYA
- BANIPUR MAHILA MAHAVIDYALAYA
- BARASAT COLLEGE
- BARASAT GOVT. COLLEGE
- BARRACKPORE RASTRAGURU SURENDRANATH COLLEGE
- BASIRHAT COLLEGE
- BHAIRAB GANGULY COLLEGE
- BIDHAN NAGAR GOVT. COLLEGE
- BRAHMANANDA KESHAB CHANDRA COLLEGE
- CHANDRAKETUGARH SAHIDULLAH SMRITI MAHAVIDYALAYA
- DEROZIO MEMORIAL COLLEGE
- DINABANDHU MAHAVIDYALAYA
- DR. A.P.J. ABDUL KALAM GOVERNMENT COLLEGE
- DR. B.R. AMBEDKAR SATABARSHIKI MAHAVIDYALAYA
- DUM DUM MOTIJHEEL COLLEGE
- DUM DUM MOTIJHEEL RABINDRA MAHAVIDYALAYA
- EAST CALCUTTA GIRLS' COLLEGE
- GLF BUSINESS SCHOOL
- GOBARDANGA HINDU COLLEGE
- HINGALGANJ MAHAVIDYALAYA
- HIRALAL MAZUMDAR MEMORIAL COLLEGE FOR WOMEN
- KINGSTON COLLEGE OF SCIENCE
- KINGSTON LAW COLLEGE
- KALINAGAR MAHAVIDYALAYA
- MAHADEVANANDA MAHAVIDYALAYA
- MORNING STAR COLLEGE
- MRINALINI DATTA MAHAVIDYAPITH
- NABA BARRACKPORE PRAFULLA CHANDRA MAHAVIDYALAYA
- NAHATA JOGENDRANATH MONDAL SMRITI MAHAVIDYALAYA
- P.N.DAS COLLEGE

- P.R.THAKUR GOVT. COLLEGE
- PANIHATI MAHAVIDYALAYA
- PRASANTA CHANDRA MAHALANOBISH MAHAVIDYALAYA
- R.K. SARADA MISSION VIVEKANANDA VIDYABHAVAN
- RAMAKRISHNA MISSION VIVEKANANDA CENTENARY COLLEGE
- RISHI BANKIM CHANDRA COLLEGE
- RISHI BANKIM CHANDRA COLLEGE FOR WOMEN
- RISHI BANKIM CHANDRA EVENING COLLEGE
- SAHID NURUL ISLAM MAHAVIDYALAYA
- SARADA MA GIRLS' COLLEGE
- SARAJINI NAIDU COLLEGE FOR WOMEN
- SREE CHAITANYA COLLEGE, HABRA
- SREE CHAITANYA MAHAVIDYALAYA
- TAKI GOVT. COLLEGE

VIVEKANANDA COLLEGE

### **Academics**

#### **Admission**

One can take admission in the undergraduate course of the university based on their results in the higher secondary (10+2) examination. For admission in the postgraduate courses and doctoral degree courses, one has to take an entrance exam (written test/interview) given by the university or any national level exam related to the subject, held by the University Grants Commission.

#### **Library**

The university has a library on the first floor of its main building with an internet facility. This library is usually called as "Central library of WBSU". The recent Librarian is Dr. Sushanta Banerjee. The central library maintains various subjects like,

- Number of books - 29000 (approx)
- Number of journals - 20 (approx)
- Number of reference books - 500 (approx)

All the Convocations till date were presided over by Excellency under the Honourable Governor of West Bengal and Honourable Chancellor of the University. The University has completed distribution of all under-graduate (UG) certificates to the affiliated colleges for graduates till the year 2016. The post-graduate (PG) certificates have been issued up to the year



2018. Thus, backlogs of yesteryears have been cleared through sustained efforts of the University administration.

The University Library of West Bengal State University started its journey 10 years back with a collection of 1800 books. It was housed at the university's Guest House. About 8 years back the collection was shifted to its present location at the academic building of the university. Over the years collection of the library has grown and at present the library has more than 28000 books on almost all the subjects. It has a great collection of rare books in the form of hardcopy as well as electronic copy. The library is equipped with more than 50 computers with high speed internet facility. Wi-Fi facility is also available now. With the help of the university librarian who has joined recently, the pace of the modernization of library has been on an accelerated path.

Of Various new initiatives that have now been taken, the organization of books through application of modern library management software needs mention. The process of giving a huge facelift of the library's look and feel is also started. The plan over the next one year is to make the library a Center of Excellence where both the students and teachers will get information through modern technologies as well as through reading of books. The library also has plans to organize many events on subjects like Women Empowerment, Career enhancement, debate, JAM, quiz etc.

Presently the library has a footfall of more than 200 people per day. Most of the library visitors are young university students. They get book lending service, photocopying service, Internet and printing facility is also provided.

The University has total 53 affiliated colleges, all of them together have enrolled 53,000 UG students in the year 2018, about 65% of which are first-generation learners. As of now, nineteen colleges offer PG courses in different subject (subject-based autonomy). Out of the 46 colleges, eight colleges are NAAC-accredited A – Grade colleges. The University has one B. P. Ed. College under its fold and several Special – education colleges.

The University has total 31 PG teaching departments include wide-range subjects from language, literature, social science, commerce and managements are taught. The total sanctioned strength of students in the PG departments is 1256 and this year, more than 80% seats have been filled up. More than 96% of the teachers are in the PG-Departments and they

possess Ph. D degrees and some of them having Post-doctoral experiences in reputed overseas institutions and laboratories. Although the number of first-generation learners in the PG departments is quite large, the success of pass-outs from the University in the All-India NET examination from various departments is remarkable. Students are getting opportunities to pursue higher studies in eminent research Institutes like IIT, ISI, IISC, National Institute of Biomedical Genomics etc and other reputed Universities.

Although the creation of infrastructure has not been as fast as it should have been, teachers in the PG Departments have engaged themselves in research activities right from the beginning and in the first three Convocations, a total number of 130 Ph.D were awarded with Degrees and Certificates. This indeed is an achievement for a new university. Two teachers of the Zoology Department have got a patent, and teachers engaged in research have tried to publish their research results in the best of national and international journals. Some of the teachers from humanities and social sciences have achieved renown as authors of books at national and international levels, receiving literary awards for their accomplishments. This is of course a continuous effort and slowly but steadily, improvement in all arena is being felt.

The present Vice Chancellor of the University has been working since September 2015, and during the last four years, a speed in the development of infrastructure has been noted by the outsiders. Despite unusual delays in the initial years in appointing full time teachers in various Departments, no PG Department is now without permanent faculties. The vacant posts are also being filled up with an unprecedented speed now. State-of-the-art laboratory in the Department of Mathematics has been created with State Government funds. A G+5 administrative building and a G+7 academic block have been completed. The University has recently created a museum as well. A course on Korean language has also been initiated as part of the University's attempt to create a school of foreign language. To facilitate this process, the University has entered into a MOU with Anan University of the Republic of South Korea. A language laboratory, two auditorium, development of a Conference Room, Roof-top solar system for power generation, etc. are projects in the pipeline.

The UG and PG examinations are being held in accordance with the academic calendar and results are being published on time. Grievances of the students about examinations are being solved proactively, and a sense of trust and confidence in the University system has been built. The drastic reduction in the number of court cases in this regard is an indicator of a transparent system. Applications under the RTI are being processed rapidly in the interest of the students.

From the academic session 2018–19, the entire UG system of the University has come under the CBCS as recommended by the University Grants Commission and the Department of Higher Education, Government of West Bengal. Similarly, the PG curricula of the University have adopted the CBCS model from the session 2019-20. The University also offers several value-added courses from time to time. The Finance Office of the University has been working with utmost transparency, and the annual audit results have been a pointer to that.

The University has almost all statutory committees, and meetings of the Executive Council and the Court are held regularly. The students union has so far been very responsible, and deserves congratulations for their support in running the University.

The University believes in offering a flexible academic environment with spaces for the development of free thinking and interactions between teachers, students, researchers and external experts. Therefore it has allowed academic flexibility to the Departments since its inception. Many Departments do not rigidly follow the syllabus as such and try to incorporate emerging areas of research into teaching-learning process. They also freely collaborate with research institutes within and outside the state and country in developing a quality infrastructure of teaching-learning-research. Many Departments also involve teachers and scholars from ancillary disciplines from within and outside the University for PG teaching and M.Phil – Ph.D Coursework.

The teachers are engrossed in teaching and research, their support to the university administration has been laudable. Occasional differences are indicators of active minds, and teachers in the WBSU possess active minds that ensure removal of stagnation. Four teachers of the university are recipients the prestigious State Government award of *Shkisharatna* for their contributions to higher education and in research while many of them have received national and international fellowships for higher research.

Lectures by overseas scientists and scholars are organized in the University regularly. Seminars, Conferences and workshops are being arranged by the Departments where turn-outs are becoming remarkable. Various PG Departments of the University have been instrumental in creating effective research collaboration with reputed national and international higher educational institutions. The University too has signed a few MoU with to foster fruitful academic exchanges.

Apart from regular processes of teaching-learning and research, the University, being an institution situated in a rural area, takes special care to engage with local communities through various outreach activities like social awareness campaigns, sensitization programmes, psychological counseling and so on including visits of students to school and the University.

A large number of students of the University are getting Government jobs in teaching, defense sector, railways, banking, and also in reputed private sectors. For first-generation learners, this is a tremendous achievement, and their joy is palpable and infectious. In the session 2018-19, the number of students who have cleared UGC – NET and JRF tests and SET examination has been very impressive.

Although the location of the university has been in remote far areas, the introduction of vehicles have been improved. The Government of West Bengal has been generous in supporting the University and the Honorable Chief Minister of the State and the Honorable Minister of Higher Education have come forward with help and assistance as and when required.

The process of modernization in the University has been noticeable in recent years. The University has created modern infrastructure including ICT – enabled smart class-rooms for students. The library is in the process of attaining 100 percent automation, offering service not only to students, scholars and teachers of the University but to outside researchers as well. It has recently opened a section on rare books. Similarly, given the fast-developing infrastructure, human resources and funds, the University is expected to create or offer opportunities for further academic collaboration, consultancy and innovative ecosystem in diverse interdisciplinary fields. The University is augmenting modern amenities for physically and mentally challenged communities of the institution including students, teachers, non-teaching officials and visiting people. It is also taking necessary steps to create an environment-friendly culture to focus on its natural biodiversity and resources. Needless to say, this development is an on-going process and the University is committed to maintain its growth. If the present trend continues, this University is sure to have a bright future. The University has taken new initiative for starting a new Gymnasium for the students and a canteen which is runned by a self-help group. Industries and houses have come forward with donations to the University which help needy students in getting tutions.

The University is a cradle of civilization. Over the last ten years, the West Bengal State University has spread the light of education to the remotest corners of the district of North 24 Parganas where the minority population is quite large. The University has a significantly large

number of students enrolling at the PG level, including a substantial number of female students and those coming from remote areas and marginal and minority communities. The University has taken up in right earnest the challenge of imparting higher education to a diverse group of students of which the majority has been first generation learners, coming mostly from socially and economically backward classes. The University continuously strives to motivate them to pursue post-graduate and higher studies by providing them sufficient knowledge resources and by addressing the burden of their educational expenses by means of providing them with study materials and e-resources as far as possible. Over all, the University aims to achieve a sustainable academic environment and quality in terms of national and global standards.

## **Chapter 5: Data Analysis and Interpretation**

## **Chapter 5: Data Analysis and Interpretation**

### **5. Data Analysis and Interpretation**

#### **5.1 Introduction**

The twenty-first century has come to be seen as a time of transition and evolution. It has grown into a powerful force that is changing the social, political, and economic landscape on a worldwide scale. In the contemporary information and communication technology (ICT) landscape, the emphasis is on generating, sharing, and leveraging digital and electronic data. Modern libraries try to deliver the right information to the right individual at the right moment. The world is on the verge of transforming into a global community thanks to advancements in information and communication technologies. The information sector is also experiencing transformation because of changes in the IT industry. Libraries are evolving to accommodate the increasing demands placed upon them. The younger generation, whose thirst for information is insatiable, continues to advocate for the transformation of traditional libraries into fully equipped, interconnected ICT-based facilities.

Mahapatra and Ramesh defined Information Communication Technology (ICT) as the outcome of the technological convergence of distinct standalone technologies such as computer technology, communication technology, information processing, publishing technology, etc. ICT has a tremendous and far-reaching impact on a global scale, thanks to its remarkable features that include a significant reduction in cost and size, as well as a substantial increase in processing speed, storage capacity, and communication capabilities. The profound effect of ICT on the advancement and growth of human civilization cannot be overstated. This field encompasses various tools such as computer programs, databases, communication networks, analysis and design techniques, programming languages, artificial intelligence, and knowledge bases. As a result, ICT has established a longstanding influence in nearly every facet of human activity.

#### **5.2 Sample size**

Out of the universities affiliated with West Bengal State that is considered, 8 provided a response, while one declined to share any information on the library. The following information was gathered from the survey and structured questionnaire, and it is shown in tabular and graphical form. An overview of colleges and their libraries is provided, which is

important for assessing the current situation. Next, data on ICT infrastructure, statistics on the use of e-resources, and user opinions from a survey are succinctly displayed through tables and charts.

### 5.3 Year of Establishment

Every institution was founded following independence, and the ones I surveyed became a part of WBSU upon the establishment of the university in 2008. University of Calcutta served as the parent organization of these colleges till WBSU was founded.

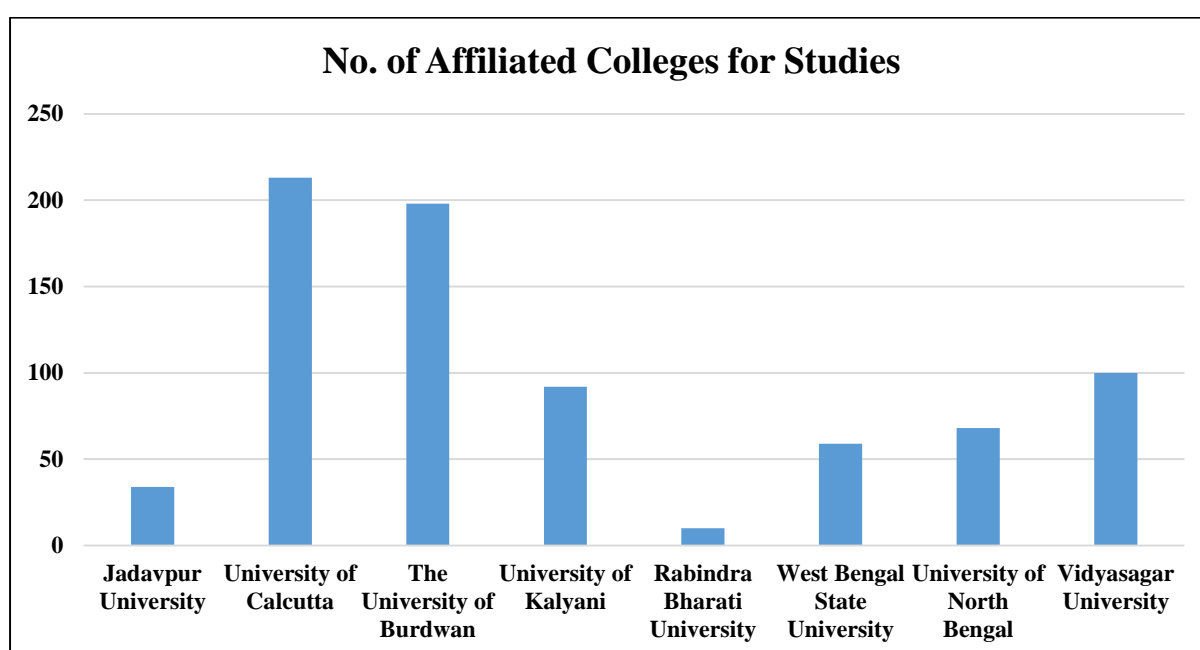
*Table 5: Year of establishment*

NAME OF UNIVERSITY	ESTABLISHMENT YEAR	NUMBER OF COLLEGES	PERCENT (%)
Jadavpur University	1955	34	4.39
University of Calcutta	1857	213	27.52
The University of Burdwan	1960	198	25.58
University of Kalyani	1960	92	11.89
Rabindra Bharati University	1962	10	1.29
University of North Bengal	1962	68	8.79
Vidyasagar University	1981	100	12.92
West Bengal State University	2008	59	7.62
<b>Total</b>		<b>774</b>	<b>100</b>

- Jadavpur University: Established in 1955, Jadavpur University has 34 affiliated schools & centers, constituting approximately 4.39% of the total colleges/ schools & centers in the dataset.
- University of Calcutta: The University of Calcutta, established in 1857, has the oldest establishment year among the listed universities. With 213 affiliated colleges, it represents the largest percentage of colleges, accounting for 27.52% of the total.
- The University of Burdwan: Established in 1960, The University of Burdwan has 198 affiliated colleges, making up approximately 25.58% of the total colleges in the dataset.
- University of Kalyani: Established in the same year as Burdwan University (1960), the University of Kalyani has 92 affiliated colleges, representing about 11.89% of the total.



- Rabindra Bharati University: Established in 1962, Rabindra Bharati University has the smallest number of affiliated colleges, with 10 institutions, accounting for approximately 1.29% of the total.
- West Bengal State University: Established in 2008, West Bengal State University has 59 affiliated colleges, making up about 7.62% of the total.
- University of North Bengal: Established in 1962, the University of North Bengal has 68 affiliated colleges, representing approximately 8.79% of the total.
- Vidyasagar University: Established in 1981, Vidyasagar University has 100 affiliated colleges, accounting for about 12.92% of the total.



*Figure 7: Number of affiliated colleges for studies*

## 5.4 Status of Collections Surveyed from Libraries

Determining the quantity and diversity of a collection is an important part of surveying it. Analyzing the quantity of objects in various formats, including books, periodicals, audiovisual materials, and digital resources, is part of this process. Furthermore, evaluating the collection's diversity guarantees that a variety of topics, viewpoints, and cultural backgrounds are represented. Libraries might prioritize acquisitions by identifying areas where they may be missing subjects or media using a thorough collection size and diversity study.

*Table 6: Status of Collections Surveyed from Libraries*

Collection	JU	CU	BU	KU	RBU	WBSU	NBU	VU
TEXT BOOK	693342	1000000	277438	154361	126423	22000	278400	119780
REFERENCE BOOK	14390	37334	including	7349	including	10000	9080	including
RARE BOOK	21583	1500	1200	1398	4438	2000	648	85

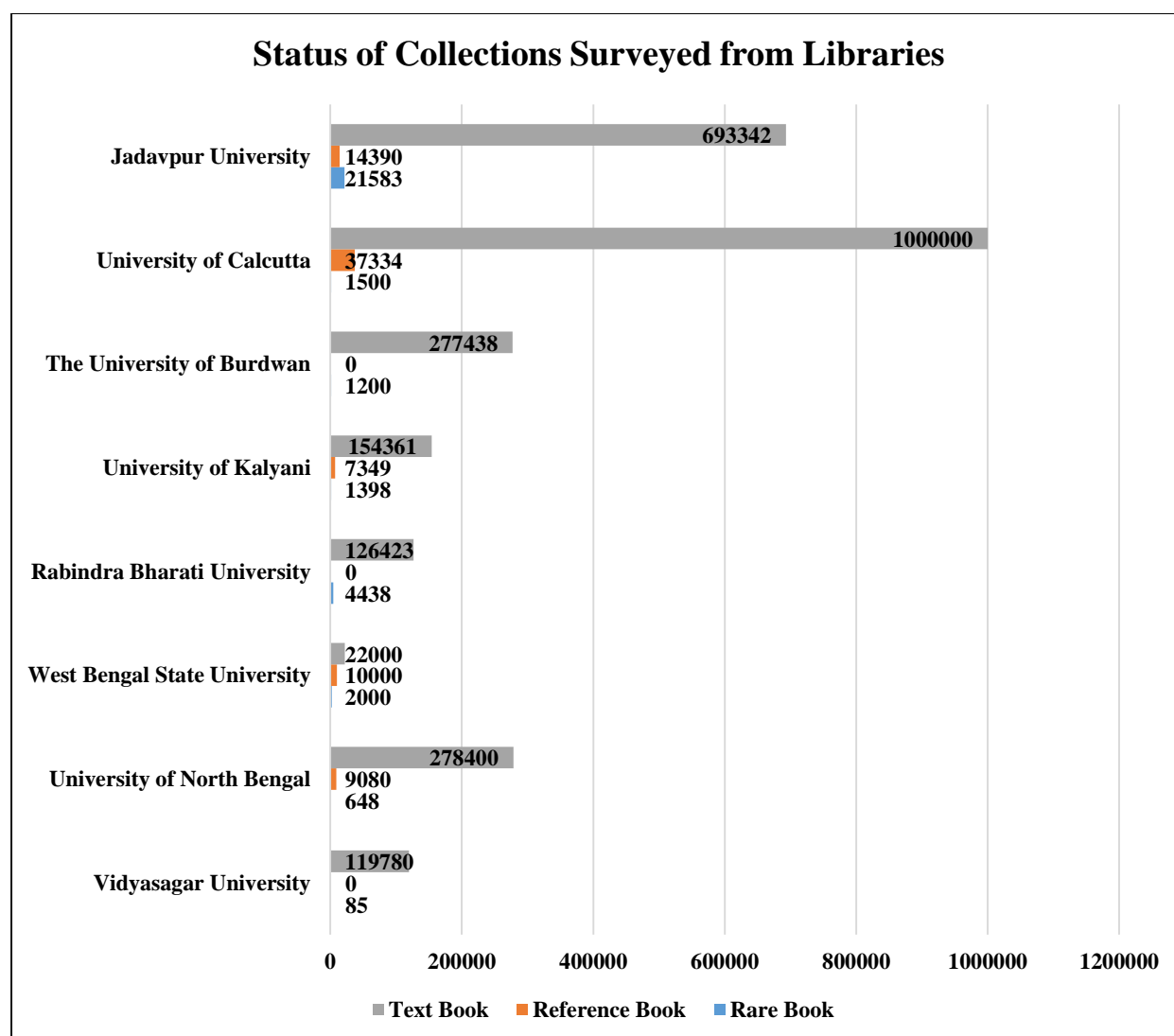
This data appears to represent the holdings of various libraries affiliated with West Bengal universities. Here's a breakdown of the information:

**Universities:** A list of eight universities in West Bengal: Jadavpur University, University of Calcutta, The University of Burdwan (likely a typo for Burdwan University), Kalyani University, Rabindra Bharati University, West Bengal State University, North Bengal University, and Vidyasagar University.

**Books:** The data seems to categorize books into three sections: Textbooks, Reference Books, and Rare Books.

- **Textbook Holdings:** Each university has a number associated with textbooks, likely representing the total number of textbooks in their collection. Jadavpur University has the most textbooks (693342), followed by the University of Calcutta (1000000), and so on.
- **Reference Book Holdings:** Like textbooks, each university has a number associated with reference books, indicating the total number they hold. The University of Calcutta again has the highest number (37334) followed by Jadavpur University (14390).
- **Rare Book Holdings:** This section is a bit different. The number seems to represent the total number of rare books, but for some universities, an additional number is included "including" another value. This might indicate that the total number of rare books (e.g., Jadavpur University - 21583). The total number of rare books in a specific category, followed by the total number including all categories (e.g., Rabindra Bharati University - 7349 including 10000).

**Overall:** This data provides a glimpse into the library collections of these West Bengal universities. The University of Calcutta appears to have the most extensive collection overall, followed by Jadavpur University.



*Figure 8: Status of Collections Surveyed from Libraries*

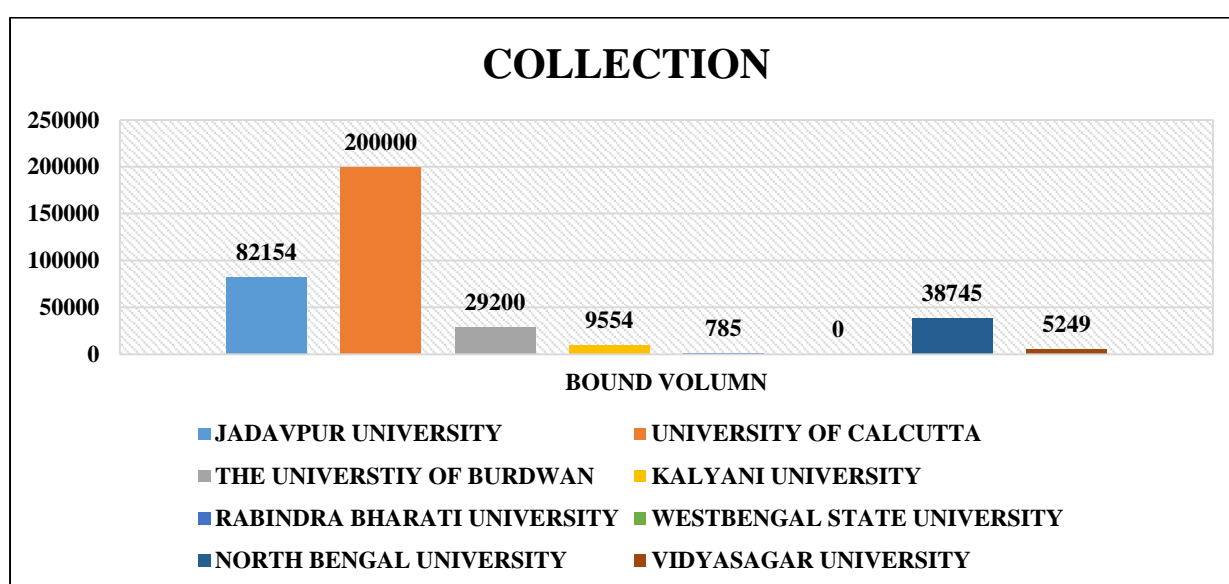
## 5.5 Journal Collections

Journal collections are important because they provide a consolidated way to access a large body of academic material. Within a particular collection, researchers can search through many journals to locate pertinent papers and remain up to date on current research trends. Because of its accessibility, academics can expand on the body of information already known in their domains and foster interdisciplinary collaboration.

*Table 7: Journal Collections*

Collection	JU	CU	BU	KU	RBU	WBSU	NBU	VU
Indian Journal								
Foreign Journal								
Bound Volume	82154	200000	29200	9554	785	Nil	38745	5249

Table 7 displays the inventory of bound volumes in the libraries associated with universities in West Bengal. The University of Calcutta possesses the highest number of bound volumes, totaling 200,000, while Jadavpur University follows with 82,154 volumes. Additionally, North Bengal University houses 38,745 bound volumes, University of Burdwan has 29,200 volumes, Kalyani University has 9,554 volumes, and Vidhyasagar University has 5,249 volumes. The lowest count is recorded at Rabindra Bharati University, which has 785 bound volumes. Notably, West Bengal State University does not have any bound volumes in its possession.

*Figure 9: Journal Collections*

## 5.6 Other Collections

The library also has several additional compilations covering a variety of topics and genres. There is literature for every reader's taste, from modern fiction to classic works. These

anthologies provide readers a thorough selection of stories, poetry, essays, and other literary works, carefully chosen to highlight the best in each category.

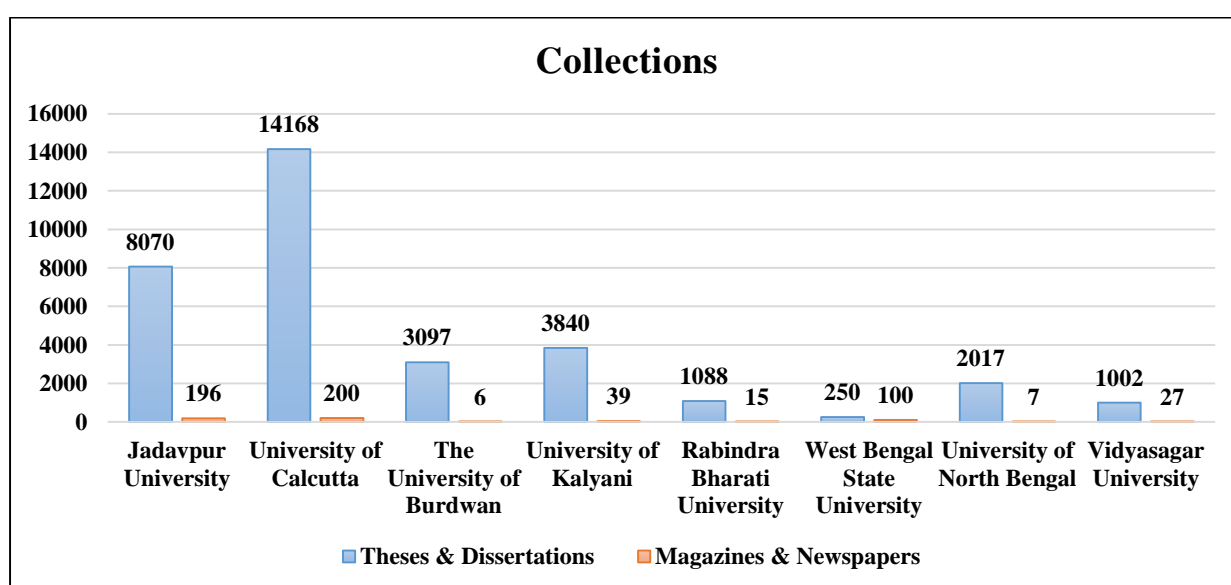
*Table 8: Other Collections*

<b>COLLECTION</b>	<b>THESIS &amp; DISSERTATION</b>	<b>MAGAZINES + NEWSPAPER (M+N)</b>	<b>PREVIOUS QUESTION PAPERS</b>
<b>Jadavpur University</b>	8070	196(M+N)	YES
<b>University of Calcutta</b>	14168	200(M+N)	YES
<b>The University of Burdwan</b>	3097	6(N)	YES
<b>University of Kalyani</b>	3840	39(M+N)	YES
<b>Rabindra Bharati University</b>	1088	15(M)	YES
<b>West Bengal State University</b>	250	100(M)	NIL
<b>University of North Bengal</b>	2017	7(N)	YES
<b>Vidyasagar University</b>	1002	27(M+N)	YES

- **Jadavpur University:** A sizable collection of 8070 documents, comprising theses, dissertations, and other resources, is housed at Jadavpur University. There are 196 periodicals and newspapers available among them. The institution also makes past exam papers available, guaranteeing important sources for scholarly research and referencing.
- **University of Calcutta:** With a total of 14168 documents, the University of Calcutta has the greatest collection out of all the listed universities. It is a comprehensive resource center for academic study and research, including 200 publications and newspapers in addition to past exam papers, much like Jadavpur University.
- **The University of Burdwan:** Even with a smaller collection than other universities, The University of Burdwan provides access to 3097 documents of various academic topics. With only six accessible, it does, however, offer a rather small variety of periodicals

and newspapers. However, having access to past exam papers might be helpful for researchers and students.

- **University of Kalyani:** A collection of 3840 materials, comprising 39 periodicals and newspapers, is kept up to date at Kalyani University. It contributes to its reputation as an inventive academic institution by offering access to past exam papers, much like the other universities.
- **Rabindra Bharati University:** A collection of 1088 documents, comprising 15 periodicals, is available from Rabindra Bharati University. Despite having a smaller library than some, it nonetheless offers excellent resources, such as past exam papers, for research and study.
- **West Bengal State University:** With only 250 items, West Bengal State University's collection is comparatively smaller and lacks periodicals and newspapers. Nonetheless, the fact that 100 theses and dissertations are accessible suggests that academic research is a priority. This university does not provide previous exam papers.
- **University of North Bengal:** A collection of materials from 2017 is available at North Bengal University, although access to periodicals and newspapers is not offered. Nonetheless, prior question papers are available for students and scholars to examine, which improves their academic experience and readiness.
- **Vidyasagar University:** There are 1002 documents in the collection of Vidyasagar University, including 27 periodicals and newspapers. It also provides access to earlier exam questions, guaranteeing thorough materials for learning.



*Figure 10: Other Collections*

## 5.7 ICT Infrastructure

The library's extensive resource collection can be managed and arranged thanks to the ICT technology. Librarians can quickly enter and update information about books, journals, and other items by using digital cataloging systems. This saves time and effort for both library employees and patrons by enabling the prompt and correct retrieval of materials upon patron request.

*Table 9: ICT Infrastructure*

Collection	Desktop	Scanner	UPS	Printer	Zerox Machine	CCTV	Barcode Reader	Projector
JADAVPUR UNIVERSITY	131	7	10	11	1	47	NIL	1
UNIVERSITY OF CALCUTTA	180	4	100	2	12	60	4	4
THE UNIVERSTIY OF BURDWAN	38	3	30	8	3	20	10	1
UNIVERSITY OF KALYANI	30	4	30	6	3	10	4	2
RABINDRA BHARATI UNIVERSITY	30	3	30	3	1	NIL	NIL	1
WESTBENGAL STATE UNIVERSITY	40	4	40	4	3	9	6	1
UNIVERSITY OF NORTH BENGAL	80	2	3	6	5	60	3	1
VIDYASAGAR UNIVERSITY	67	5	18	7	1	40	4	2

- **Jadavpur University:** Jadavpur University has a total of 131 desktop computers available, along with 7 scammer machines, 10 UPS units, 11 printers, 1 Xerox machine, and 47 CCTV cameras. However, it does not have any barcode readers or projectors. This indicates a strong emphasis on security and surveillance but lacks certain other equipment for specific tasks.

- University of Calcutta: The University of Calcutta has a larger inventory of equipment compared to Jadavpur University. It possesses 180 desktop computers, 4 scammer machines, 100 UPS units, 2 printers, 12 Xerox machines, 60 CCTV cameras, 4 barcode readers, and 4 projectors. This indicates a well-equipped environment for both academic and administrative activities.
- The University of Burdwan: The University of Burdwan has a relatively smaller inventory compared to the others. It has 38 desktop computers, 3 scammer machines, 30 UPS units, 8 printers, 3 Xerox machines, 20 CCTV cameras, 10 barcode readers, and 1 projector. Despite its smaller size, it still provides a range of equipment for various needs.
- University of Kalyani: Kalyani University's equipment inventory includes 30 desktop computers, 4 scammer machines, 30 UPS units, 6 printers, 3 Xerox machines, 10 CCTV cameras, 4 barcode readers, and 2 projectors. This suggests a moderate level of technological infrastructure to support academic and administrative activities.
- Rabindra Bharati University: Rabindra Bharati University has 30 desktop computers, 3 scammer machines, 30 UPS units, 3 printers, and 1 Xerox machine. However, it does not have CCTV cameras, barcode readers, or projectors. This indicates a simpler technological setup compared to other universities.
- West Bengal State University: West Bengal State University possesses 40 desktop computers, 4 scammer machines, 40 UPS units, 4 printers, 3 Xerox machines, 9 CCTV cameras, 6 barcode readers, and 1 projector. This suggests a decent level of equipment, though it may be lacking in some areas compared to larger universities.
- University of North Bengal: North Bengal University has 80 desktop computers, 2 scammer machines, 3 UPS units, 6 printers, 5 Xerox machines, 60 CCTV cameras, 3 barcode readers, and 1 projector. This university prioritizes security with a significant number of CCTV cameras, while also providing a range of other equipment.
- Vidyasagar University: Vidyasagar University has 67 desktop computers, 5 scammer machines, 18 UPS units, 7 printers, 1 Xerox machine, 40 CCTV cameras, 4 barcode readers, and 2 projectors. This suggests a balanced approach to technological infrastructure, catering to various academic and administrative needs.



## 5.8 ICT Infrastructure (for users services)

The hardware, software, networks, and other technological elements that facilitate the processing, storing, and transmission of information and communication inside a society or organization are referred to as information and communication technology (ICT) infrastructure. Supporting effective and efficient communication, data management, and information access, it acts as the foundation for several user services. When it comes to user services, ICT infrastructure is essential to offering people, companies, and government's access to a variety of services.

*Table 10: ICT INFRASTRUCTURE (FOR USERS SERVICES)*

SERVICES	JU	CU	BU	KU	RBU	WBSU	NBU	VU
OPAC	YES	YES	YES	YES	YES	YES	YES	YES
WI-FI	YES	YES	YES	YES	YES	YES	YES	YES
BIBLIOGRAPHIC SERVICE	YES	YES	YES	YES	YES	YES	YES	YES
CAS	YES	YES	YES	NO	YES	NO	YES	NO
DDS	NO	YES	YES	NO	NO	NO	NO	NO
INTER LIBRARY LOAN	NO	YES	YES	YES	NO	NO	NO	NO
AUDIO VISUAL SERVICE	YES	NO	YES	NO	NO	NO	YES	YES
CIRCULATION SERVICE	YES	YES	YES	YES	YES	YES	YES	YES
SDI	NO	NO	YES	NO	YES	NO	NO	NO
TRANSLATION SERVICE	NO	NO	NO	NO	NO	NO	NO	NO
MICROFILM	NO	NO	NO	NO	NO	NO	NO	NO

- OPAC (Online Public Access Catalog): All listed universities offer OPAC services, allowing users to search and access library resources online.
- Wi-Fi: Every university provides Wi-Fi services, ensuring students and faculty have access to the internet for research and study purposes.

- Bibliographic Service: Each university offers bibliographic services, facilitating access to references and citations for academic work.
- CAS (Current Awareness Service): Most universities provide CAS, except for Kalyani University, West Bengal State University, and Vidyasagar University. This service helps users stay updated with the latest developments in their fields.
- DDS (Document Delivery Service): Only University of Calcutta, The University of Burdwan, and North Bengal University offer DDS, enabling users to request documents from other libraries.
- Interlibrary Loan: University of Calcutta, The University of Burdwan, Kalyani University, and Jadavpur University offer interlibrary loan services, allowing users to borrow materials from other libraries.
- Audio Visual Service: Jadavpur University, The University of Burdwan, North Bengal University, and Vidyasagar University provide audio-visual services, enhancing teaching and learning experiences through multimedia resources.
- Circulation Service: All universities offer circulation services, allowing users to check out and return library materials.
- SDI (Selective Dissemination of Information): Only University of Burdwan offers SDI, a service that delivers customized information based on user preferences.
- Translation Service: None of the listed universities offer translation services, which may be less relevant for library services.
- Microfilm: No university in the list provides microfilm services, indicating a shift away from this older technology in favor of digital formats.

## 5.9 ICT Infrastructural Service

ICT infrastructure services are essential to contemporary society because they facilitate the information and communication flows that spur social progress, economic expansion, and innovation. For communities and organizations to effectively use technology to satisfy stakeholder demands and accomplish their goals, they must invest in a strong and dependable ICT infrastructure.

*Table 11: ICT INFRASTRUCTURAL SERVICE*

SERVICES	JU	CU	BU	KU	RBU	WBSU	NBU	VU
INTERNET	YES	YES	YES	YES	YES	YES	YES	YES
SOCIAL MEDIA	NO	NO	NO	NO	NO	YES	NO	NO
CLOUD COMPUTING	YES	YES	NO	NO	NO	YES	YES	NO
VIDEO CONFERENCING	NO	NO	NO	NO	NO	YES	NO	NO
VERBAL COMMUNICATION SYSTEM	NO	NO	NO	NO	NO	NO	NO	NO

- Internet: All listed universities provide internet access, ensuring that students and faculty can utilize online resources for academic and research purposes.
- Social Media: Jadavpur University, University of Calcutta, The University of Burdwan, Kalyani University, Rabindra Bharati University, and Vidyasagar University do not offer social media services within their library systems. However, West Bengal State University does provide access to social media, possibly for communication and outreach purposes.
- Cloud Computing: Jadavpur University, University of Calcutta, West Bengal State University, and Vidyasagar University offer cloud computing services, enabling users to store and access data remotely. The University of Burdwan, Kalyani University, and Rabindra Bharati University do not offer this service.
- Video Conferencing: Only West Bengal State University provides video conferencing services among the listed universities, likely facilitating remote meetings and collaborations.
- Verbal Communication System: None of the listed universities offer a specific verbal communication system within their library services, indicating a lack of dedicated infrastructure for real-time voice communication.

## 5.10 Status of Library Automation/ Software

Over time, library automation has changed dramatically as more and more libraries use integrated library systems (ILS) or library management systems (LMS) to improve patron services and streamline operations. Digital resource management, self-checkout kiosks, and online catalogs are just a few of the features that these systems frequently have.

*Table 12: Status of Library Automation/ Software*

<b>AUTOMATION/ SOFTWARE</b>	<b>JU</b>	<b>CU</b>	<b>BU</b>	<b>KU</b>	<b>RBU</b>	<b>WBSU</b>	<b>NBU</b>	<b>VU</b>
<b>NAME OF ILMS</b>	KOHA	SOUL	KOHA	KOHA	KOHA	KOHA	SOUL	KOHA
<b>IS FULLY AUTOMATED</b>	NO	NO	YES	NO	NO	YES	NO	NO
<b>IS PARTIALLY AUTOMATED</b>	YES	YES	NO	YES	YES	NO	YES	YES
<b>RFID FACILITY</b>	YES	YES	NO	YES	KOHA	NO	YES	NO

Name of ILMS (Integrated Library Management System): All listed universities utilize Koha or SOUL as their ILMS.

- **Is Fully Automated:** The University of Burdwan and West Bengal State University have fully automated their library systems. This means that most of their library processes, including cataloging, circulation, and acquisitions, are handled by the ILMS without manual intervention. The other universities, including Jadavpur University, University of Calcutta, Kalyani University, Rabindra Bharati University, North Bengal University, and Vidyasagar University, do not have fully automated systems.
- **Is Partially Automated:** Jadavpur University, University of Calcutta, Kalyani University, Rabindra Bharati University, North Bengal University, and Vidyasagar University have partially automated their library systems. This means that some of their library processes are automated using the ILMS, but there may still be some manual intervention required.
- **RFID Facility:** University of Calcutta, The University of Burdwan, Kalyani University, and North Bengal University have RFID (Radio Frequency Identification) facilities in

their libraries. This technology allows for efficient tracking and management of library materials. Jadavpur University, Rabindra Bharati University, West Bengal State University, and Vidyasagar University do not have RFID facilities, although it's noted that KOHA is not mentioned for the RFID facility in Rabindra Bharati University.

### 5.11 E-Resources Available in the Library

The Library provides its users with access to a large selection of electronic materials. Electronic books, electronic journals, databases, and multimedia items are all included in this category of electronic resources. The Library hopes to improve its users' research and educational experiences by making these materials accessible. Customers may study a huge variety of knowledge and information from the comfort of their own devices thanks to the ease of online access. Users' access to current and pertinent information is ensured by the provision of e-resources in the Library, which supports their intellectual and academic endeavors.

*Table 13: E-Resources Available in the Library*

<b>E-RESOURCES</b>	<b>JU</b>	<b>CU</b>	<b>BU</b>	<b>KU</b>	<b>RBU</b>	<b>WBSU</b>	<b>NBU</b>	<b>VU</b>
<b>E-JOURNALS</b>	11762	7000	8678	3575	NIL	NIL	35	7005
<b>E-BOOKS</b>	8151	54000		375	1392	NIL	81	888
<b>ONLINE DATABASE</b>	29	08	09	04	NIL	04	4	30
<b>CD</b>		1500	1215	NIL	306	NIL	250	209
<b>AUDIO VISUAL MATERIALS</b>	19	NIL	NIL	NIL	NIL	NIL	NIL	NIL

- E-Journals: University of Calcutta has the highest number of e-journals with 54000, followed by Jadavpur University (11762) and The University of Burdwan (8678). West Bengal State University, Rabindra Bharati University, and Kalyani University have no specified e-journals.
- E-Books: University of Calcutta has the highest number of e-books with 54000, followed by Jadavpur University (8151) and Vidyasagar University (888). Rabindra Bharati University and West Bengal State University have no specified e-books.

- Online Databases: University of Calcutta has the highest number of online databases with 8, followed by North Bengal University (4). West Bengal State University and Rabindra Bharati University have no specified online databases.
- CDs: University of Calcutta has the highest number of CDs with 1500, followed by North Bengal University (250). Jadavpur University and Kalyani University have no specified CDs.
- Audio-Visual Materials: Only Jadavpur University has specified audio-visual materials with 19. Other universities do not have specified audio-visual materials.

## 5.12 Library Membership

The procedure via which people join a library and acquire access to its materials and services is known as library registration. Usually, it entails completing an application, supplying identity and evidence of address, and consenting to follow the policies and guidelines of the library.

*Table 14: Library Membership*

CATAGORIES OF MEMBERS	JU	CU	BU	KU	RBU	WBSU	NBU	VU
<b>FACULTIES</b>	459	400	326	133	5	110	172	199
<b>RESEARCH SCHOLAR</b>	485	300	152	556	39	70	105	492
<b>SUTDENTS (UG/ PG)</b>	8995	4500	6215	5880	2155	1100	1839	4759
<b>NON- TEACHING STAFF</b>	379	200	14	87	308	NIL	81	108
<b>TEMPORARY MEMBERS</b>	10	200	NIL	NIL	NIL	NIL	16	NIL
<b>EX-STUDENT</b>	167	NIL	100	79	60	NIL	NIL	95
<b>EX-STAFF</b>	18	NIL	50	03	40	NIL	11	3
<b>OTHERS</b>	25	NIL	18	55	NIL	NIL	52	39

- **Faculties:** Jadavpur University has the highest number of faculties among the listed universities with 459. This indicates the university's strong emphasis on academic staff and possibly a wide range of disciplines and departments. Following closely is the University of Calcutta with 400 faculties, showcasing its substantial academic workforce. The University of Burdwan has 326 faculties, while Kalyani University has 133 faculties, indicating a moderate-sized academic staff. Rabindra Bharati University has only 5 faculties, possibly reflecting its specialized focus on arts and humanities. West Bengal State University has 110 faculties, while North Bengal University and Vidyasagar University have 172 and 199 faculties, respectively.
- **Research Scholars:** Jadavpur University leads in the number of research scholars with 485, indicating a strong research focus and active research community. Kalyani University follows with 556 research scholars, suggesting significant research activities. The University of Calcutta has 300 research scholars, while The University of Burdwan and Vidyasagar University have 152 and 492 research scholars, respectively. Rabindra Bharati University, West Bengal State University, and North Bengal University have smaller numbers of research scholars, with 39, 70, and 105, respectively.
- **Students (UG/ PG):** Jadavpur University has the highest number of students (UG/PG) among the listed universities with 8,995, indicating its large student body. The University of Burdwan follows with 6,215 students, while Kalyani University has 5,880 students. The University of Calcutta and Vidyasagar University have 4,500 and 4,759 students, respectively, reflecting their significant student populations. Rabindra Bharati University, North Bengal University, and West Bengal State University have comparatively smaller student populations, with 2,155, 1,839, and 1,100 students, respectively.
- **Non-Teaching Staff:** Jadavpur University has the highest number of non-teaching staff with 379, followed by the University of Calcutta with 200 non-teaching staff. The University of Burdwan has 14 non-teaching staff, while Kalyani University has 87 non-teaching staff. North Bengal University and Vidyasagar University have 81 and 108 non-teaching staff, respectively. Rabindra Bharati University has 308 non-teaching staff, possibly reflecting its administrative requirements.

- Temporary Members: Jadavpur University has 10 temporary members, while the University of Calcutta has 200. North Bengal University and Vidyasagar University have 16 and nil temporary members, respectively.
- Ex-Students: Jadavpur University has 167 ex-students, while The University of Burdwan and Vidyasagar University have 100 and 95 ex-students, respectively. Rabindra Bharati University and Kalyani University have 60 and 79 ex-students, respectively. Other universities have a negligible number of ex-students.
- Ex-Staff: The University of Burdwan has the highest number of ex-staff with 50, indicating a significant turnover of staff. Jadavpur University, Rabindra Bharati University, and Kalyani University have 18, 40, and 3 ex-staff members, respectively. Other universities have a negligible number of ex-staff.
- Others: Jadavpur University has 25 members categorized as "Others." The University of Burdwan, Kalyani University, and North Bengal University have 18, 55, and 52 members, respectively, categorized as "Others." Rabindra Bharati University, Vidyasagar University, and The University of Calcutta have a few members categorized as "Others." West Bengal State University has 39 members categorized as "Others."

### 5.13 Library Staff

The library is staffed by a varied team of professionals who collaborate to guarantee the efficient functioning of the facility. This team comprises librarians, library assistants, catalogers, archivists, IT specialists, maintenance staff, and administrative personnel. Every member of the library staff plays a vital part in delivering services to library users, organizing and preserving the library's collection, and overseeing the library's daily operations. Collectively, they strive to establish a hospitable and effective environment for patrons while fostering literacy, education, and community access to information.

*Table 15: Library Staff*

DESIGNATION	JU	CU	BU	KU	RBU	WBSU	NBU	VU
<b>LIBRARIAN</b>	1	01	01	02	01	01	01	-
<b>DEPUTY LIBRARIAN</b>	1	03	-	-	-	-	01	01



<b>ASSISTANT LIBRARIAN</b>	15	-	01	01	02	-	02	03
<b>LIBRARY ASSISTANT</b>	1	-	04	-	02	-	-	01
<b>TECHNICAL ASSISTANT</b>	-	-	-	-	04	-	04	-
<b>LIBRARY ATTENDENT/HELPEER</b>	01	32	01	05	02	-	10	05
<b>CONTRACTUAL STAFF</b>	-	-	02	-	-	-	07	-
<b>PEON</b>	07	09	-	-	-	-	01	-
<b>SUP.IN LIB.SERVICE</b>	04	14	-	-	-	-	-	-
<b>INF.SCIENT.</b>	-	01	01	-	-	-	01	-
<b>SORTER</b>	02	05	06	01	-	-	-	-
<b>BINDER/LABELLER</b>	02	-	-	-	-	-	-	-
<b>RECOR. SUP.</b>	02	-	-	-	-	-	-	-

- Jadavpur University: The library staff at Jadavpur University includes 1 Librarian, 1 Deputy Librarian, 15 Assistant Librarians, 1 Library Assistant, 1 Technical Assistant, 1 Library Attendant/Helper, 7 Peons, 4 Supervisors in Library Service, 2 Sorters, and 2 Binders/Labelers. They do not have contractual staff or information scientists, and the other designations are not mentioned.
- University of Calcutta: University of Calcutta has 1 Librarian, 3 Deputy Librarians, 1 Assistant Librarian, 32 Library Attendants/Helpers, 9 Peons, 14 Supervisors in Library Service, 5 Sorters, and 5 Binders/Labelers. They do not have Assistant Librarians, Technical Assistants, or contractual staff.
- The University of Burdwan: The library staff at The University of Burdwan includes 1 Librarian, 1 Deputy Librarian, 1 Assistant Librarian, 4 Library Assistants, 1 Library

Attendant/Helper, 2 Contractual Staff, 1 Peon, 1 Information Scientist, and 6 Sorters. They do not have Technical Assistants or Supervisors in Library Service.

- University of Kalyani: Kalyani University has 2 Librarians, 1 Assistant Librarian, 5 Library Attendants/Helpers, and 1 Sorter. They do not have Deputy Librarians, Library Assistants, Technical Assistants, Peons, or other designations mentioned.
- Rabindra Bharati University: Rabindra Bharati University has 1 Librarian, 2 Assistant Librarians, 2 Library Assistants, 2 Library Attendants/Helpers, and 1 Information Scientist. They do not have Deputy Librarians, Technical Assistants, Peons, or other designations mentioned.
- West Bengal State University: West Bengal State University employs 1 Librarian, 1 Deputy Librarian, 2 Technical Assistants, 10 Library Attendants/Helpers, and 7 Contractual Staff. They do not have Assistant Librarians, Library Assistants, Peons, Supervisors in Library Service, Information Scientists, Sorters, Binders/Labelers, or Record Supervisors.
- University of North Bengal: North Bengal University has 1 Librarian, 1 Deputy Librarian, 2 Technical Assistants, 1 Library Attendant/Helper, and 1 Contractual Staff. They do not have Assistant Librarians, Library Assistants, Peons, Supervisors in Library Service, Information Scientists, Sorters, Binders/Labelers, or Record Supervisors.
- Vidyasagar University: Vidyasagar University employs 1 Deputy Librarian, 3 Assistant Librarians, 1 Library Assistant, 5 Library Attendants/Helpers, and 1 Information Scientist. They do not have Librarians, Technical Assistants, Peons, Supervisors in Library Service, Sorters, Binders/Labelers, or Record Supervisors.

### **5.14 Plagiarism Software Used by the Library**

The library utilizes plagiarism detection software as a preemptive strategy to address academic dishonesty. This sophisticated technology enables the library to detect any occurrences of plagiarism promptly and accurately in the materials submitted by its users. By employing this software, the library can create a dependable and credible atmosphere for students and researchers, guaranteeing the authenticity of their work and its proper acknowledgment of relevant sources. This not only upholds the values of academic honesty but also cultivates a climate of ethical research and writing within the library's community.

*Table 16: Plagiarism Software Used by the Libraries*

SERIAL NO.	NAME OF UNIVERSITY	PLAGIARISM (NAME OF SOFTWARE)
1.	JADAVPUR UNIVERSITY	DRILLBIT
2.	UNIVERSITY OF CALCUTTA	DRILLBIT
3.	THE UNIVERSITY OF BURDWAN	URKUND
4.	UNIVERSITY OF KALYANI	TURNITIN
5.	RABINDRABHARATI UNIVERSITY	URKUND
6.	WEST BENGAL STATE UNIVERSITY	TURNITIN
7.	UNIVERSITY OF NORTH BENGAL	URKUND
8.	VIDYASAGAR UNIVERSITY	TURNITIN

The table 16 lists different universities along with the plagiarism detection software they use. DRILLBIT is used by Jadavpur University, The University of Burdwan, Rabindra Bharati University, and North Bengal University. DRILLBIT is used by the University of Calcutta. TURNITIN is used by Kalyani University, West Bengal State University, and Vidyasagar University.

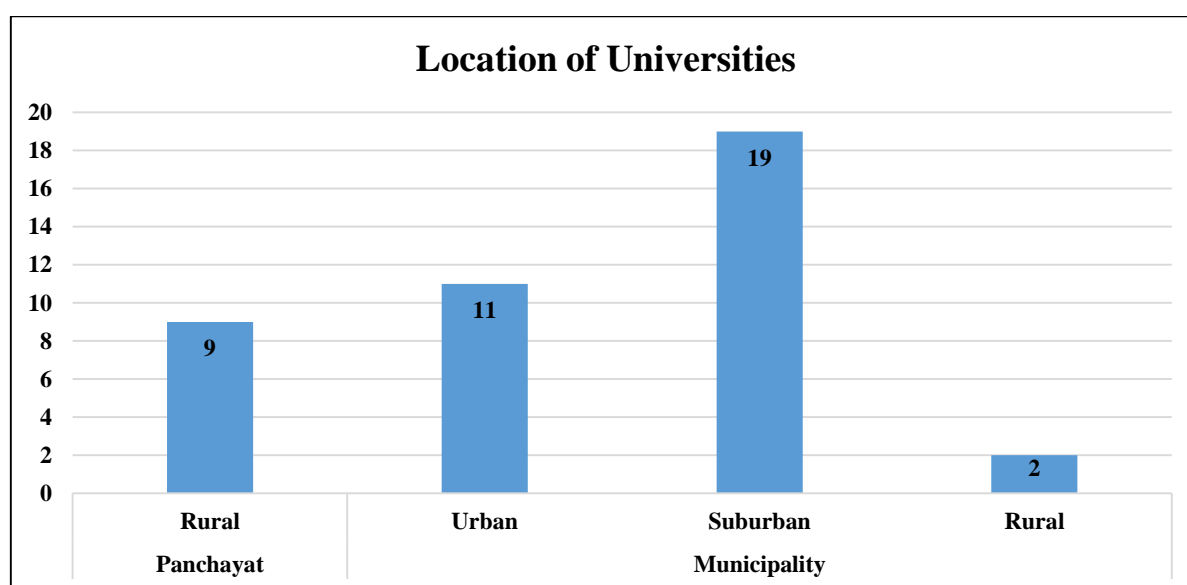
### 5.15 Location Wise Distribution

Colleges can be categorized based on their geographical location into two main groups: panchayat and municipality. These groups can further be subdivided into rural, suburban, and urban categories. The socio-economic status, transportation accessibility, literacy rates, and digital infrastructure vary significantly depending on the locality of the colleges.

*Table 17: Location of the colleges*

Location	Categories	No. of colleges	%	
Panchayat	Rural	9	22	
Municipality	Urban	11	34.37	78
	Suburban	19	59.37	
	Rural	2	6.26	

According to table 17, there are 9 colleges in rural areas under Panchayat administration, which constitutes 22% of the total. In urban areas under Municipality administration, there are 11 colleges, making up 34.37% of the total. Within the Municipality category, 78% of the colleges are in urban areas. Suburban areas under Municipality administration have the highest number of colleges, with 19 institutions, accounting for 59.37% of the total. In the Municipality category, 59.37% of the colleges are in suburban areas. There are only 2 colleges in rural areas under Municipality administration, making up 6.26% of the total.



*Figure 11: Location of Universities*

We were able to determine that most colleges are in suburban areas based on where they are. Transportation and network issues can impede the teaching and learning process in rural and partially suburban locations, as well as the use of digital media for library services.

### 5.16 Distance from Affiliated Colleges

Since West Bengal State University oversees every college I studied, I've created a table that displays the distance from the institution.

*Table 18: Distance from affiliated colleges*

Distance (in Kilometers)	No. of colleges	Percent
0 - 10	4	9.76
11 - 20 km	12	29.27
21 - 30	13	31.7

31 - 40	1	2.44
41 - 50	3	7.32
51 and above	8	19.51

Based on the data presented in table 18, it is evident that 9.76% of the colleges are located within a 10 km radius from the university. Additionally, 29.27% of the colleges are situated within a 20 km distance, while 31.70% of the colleges are within a 30 km range from the university. Furthermore, 2.44% of the colleges are located within a 40 km distance, and 7.32% of the colleges are within a 50 km distance. Lastly, it is noteworthy that 19.51% of the colleges are situated at a distance greater than 50 km from the affiliated university.

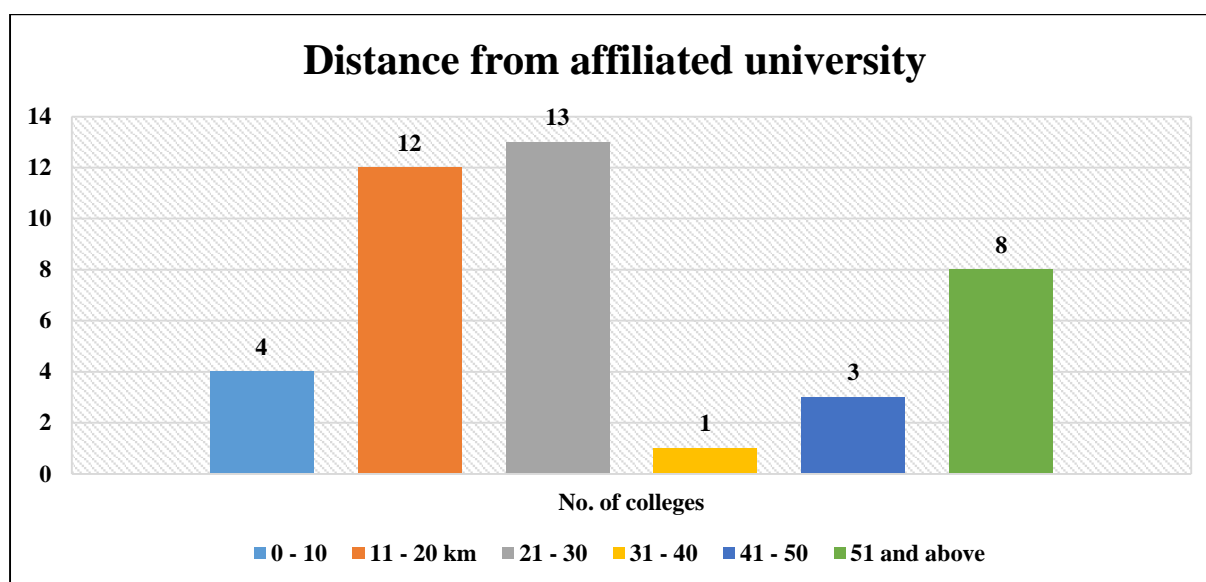


Figure 12: *Distance from affiliated university*

The university, to which these colleges are associated, is in Barasat. I have indicated the distance of each college from the university. According to the data presented in the chart, it is evident that many of the colleges are situated within a 20 km radius from the affiliated university, with nearly 20% of the colleges being located farther away from the university.

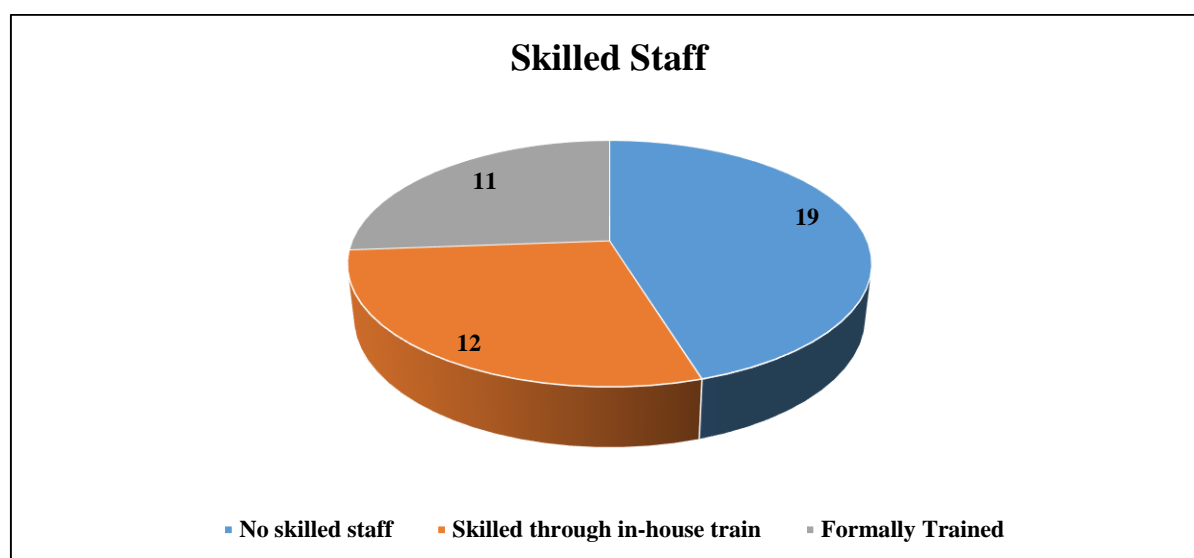
### 5.17 Staff having professional and ICT skill excluding librarian

The study focuses on the ICT infrastructure and utilization of e-resources in college libraries, highlighting the significance of both ICT skills and professional skills for librarians and other supporting staff. The accompanying table presents relevant information on this matter.

*Table 19: Staff having professional and ICT skill*

Number of staff	No. of colleges	Percent
No skilled staff	19	46
Skilled through inhouse train	12	29
Formally Trained	11	25

According to the data presented in table 19, it is evident that 46% of college libraries lack skilled and professionally trained staff. In contrast, 29% of college libraries have staff members who have acquired skills through in-house training, while only 25% of staff are professionally trained and possess the necessary skills to operate the automation software utilized in the libraries.

*Figure 13: Staff having professional and ICT skill*

The graph also unequivocally demonstrates that most college libraries have part-time and non-professional employees who help the librarian provide additional services. To provide users with contemporary services, ICT proficiency is absolutely required.

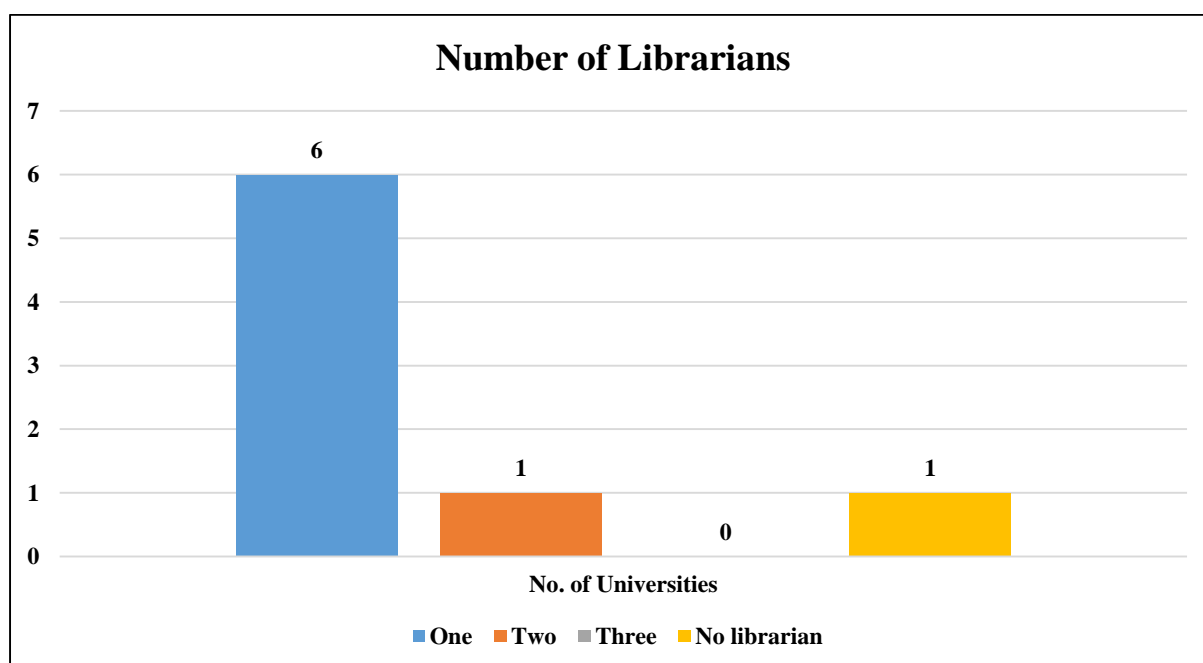
### 5.18 Number of librarians

The presence of a librarian within the library is of utmost importance as it ensures that services are delivered effectively. Librarians play a crucial role in aiding library users, managing resources, and promoting information literacy. They are trained professionals who possess a deep understanding of library systems, cataloguing, and research methodologies.

*Table 20: Number of librarians*

Number of librarians	No. of Universities	Percent
One	6	75
Two	1	12.5
Three	0	0
No librarian	1	12.5
Total	8	100

A majority of the universities (6 out of 8) have made the decision to appoint a single librarian to oversee their libraries. This choice reflects a prevailing trend of implementing a centralized library management system across these academic institutions. However, one university has taken a slightly different approach by employing two librarians. This divergence may indicate a larger library setup or a broader range of library services compared to the other universities. Interestingly, none of the universities in the dataset have three librarians, suggesting that this staffing arrangement is not commonly adopted by these institutions. Furthermore, it is worth noting that one university does not have a designated librarian responsible for overseeing its library services. This absence could be attributed to various factors, such as financial limitations or administrative decisions.

*Figure 14: Number of librarians*

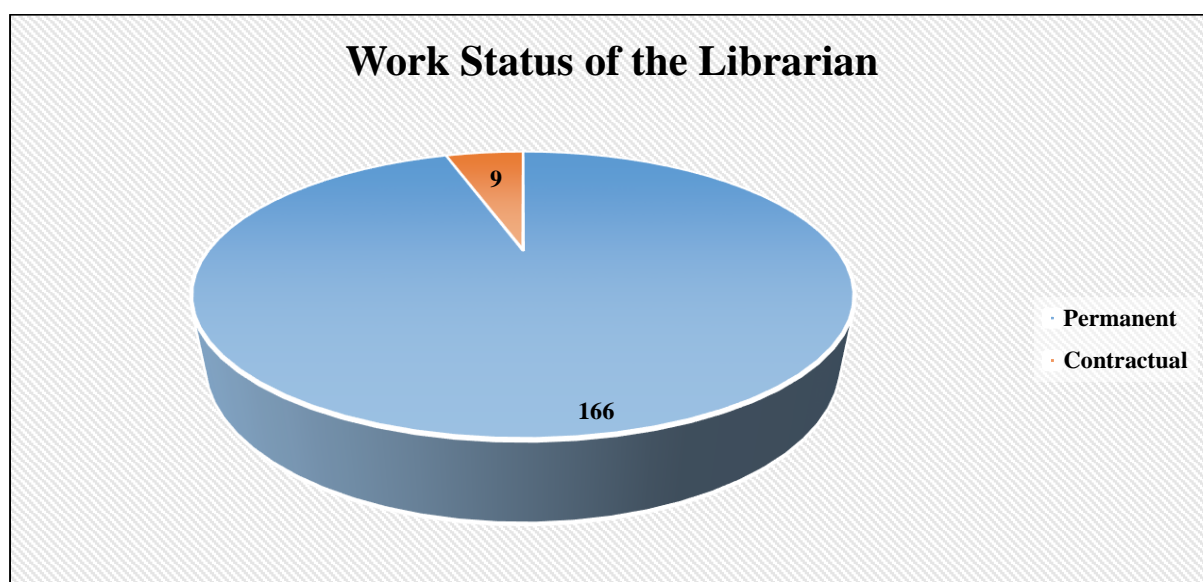
### 5.19 Work Status of librarian staffs

The type of library and its funding determine the employment status of its workers. While some library personnel could be temporary or part-time workers, others might be full-time employees with benefits. Furthermore, a combination of paraprofessional employees, support staff, and professional librarians may work at some libraries.

*Table 21: Work Status of the Librarian*

	Frequency	Percent
<b>Permanent</b>	166	95.0
<b>Contractual</b>	9	5.0
<b>Total</b>	175	100.0

95.0% of the total number, or 166 librarians, are permanent employees. This suggests that a sizable fraction of the workforce, or most librarians in the sample, are permanent employees. Nine librarians work on a contract basis, making up 5.0% of the total. This shows that fewer librarians work under contract, suggesting that some libraries might use temporary or part-time employees to supplement their permanent personnel.



*Figure 15: Work Status of the Librarian*

This data emphasizes that many librarians in the sample are engaged in permanent employment, while only a minor portion are employed on a contractual basis.



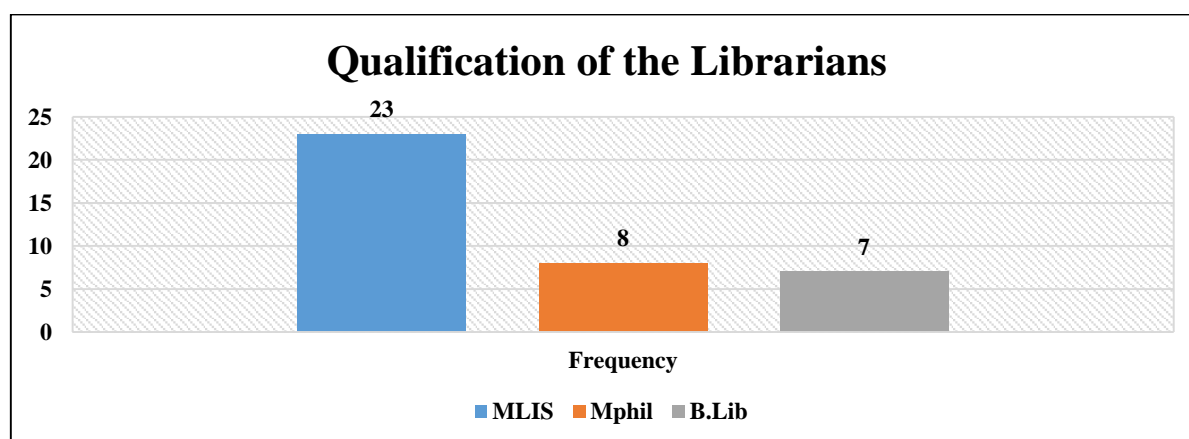
## 5.20 Qualification of Librarian

Librarians may guarantee that their staff members possess the skills and knowledge needed to deliver excellent services to users and support the library's success by certifying them. Furthermore, qualifications support the upholding of professionalism and competency requirements in the library profession.

*Table 22: Qualification of the librarians*

	Frequency	Percent
<b>MLIS</b>	23	60.52
<b>Mphil</b>	8	21.05
<b>BLIS</b>	7	18.42
<b>Total</b>	38	100

According to the data presented in table 22 regarding the qualifications of librarians, it is evident that 60.52% of the total population possess a Master of Library and Information Science degree. This statistic implies that a considerable number of individuals within the group have successfully completed a specialized graduate-level program in library and information science. Additionally, 21.05% of the total population hold a Master of Philosophy degree, indicating that a significant proportion of the group has engaged in advanced study and research within their respective field. Furthermore, 18.42% of the total population hold a Bachelor of Library Science (B.Lib) degree. This indicates that a portion of the group has completed undergraduate-level education specifically focused on library science, which is a common qualification for entry-level positions in libraries.



*Figure 16: Qualification of the Librarians*

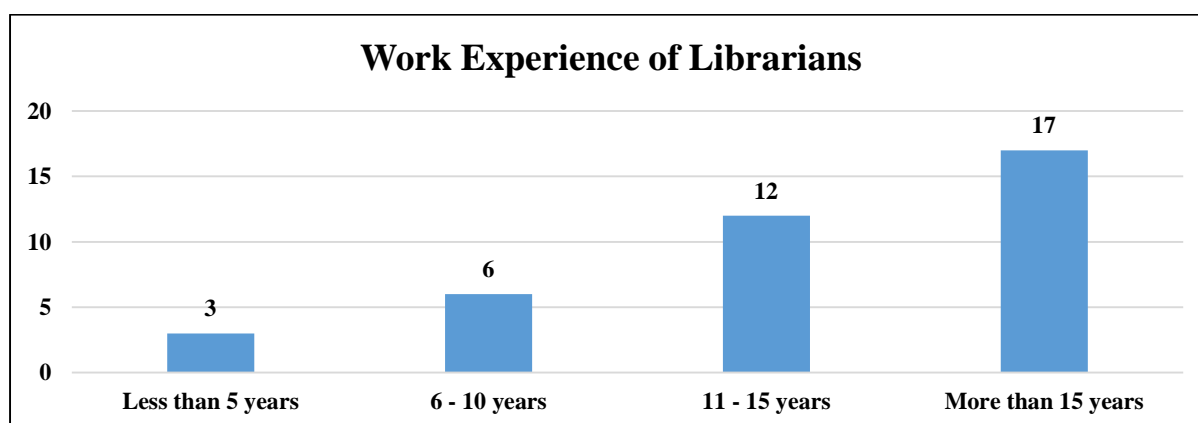
## 5.21 Work Experience of Librarian

A librarian's professional history includes a wide range of abilities, know-how, and experiences that are necessary for efficiently overseeing and granting access to library information resources.

*Table 23: Work Experience of Librarian*

	Frequency	Percent
<b>Less than 5 years</b>	3	7.89
<b>6 - 10 years</b>	6	15.79
<b>11 - 15 years</b>	12	31.58
<b>More than 15 years</b>	17	44.74
<b>Total</b>	38	100

The data in table 23 provided shows the years of experience of librarians working in a library. 3 individuals, accounting for a small portion of the group, have less than 5 years of experience. This suggests that only a few individuals are relatively new to the field. 6 individuals, representing another small portion of the group, have between 6 and 10 years of experience. This indicates that a slightly larger number of individuals have gained some experience in the field but are still relatively early in their careers. 12 individuals, comprising a significant portion of the group, have between 11 and 15 years of experience. This suggests that a considerable number of individuals have been working in the field for a moderate amount of time and likely have a solid level of expertise. 17 individuals, representing the largest portion of the group, have more than 15 years of experience. This indicates that a substantial number of individuals are seasoned professionals with extensive experience in the field.



*Figure 17: Work experience of Librarians*

This data suggests that the group of individuals has a diverse range of experience levels, with a significant number of both seasoned professionals and those with moderate experience.

## 5.22 Collection of Books

The collection of literary works may include modern works that address present societal challenges and trends in addition to classic works from many eras and civilizations. Through the exploration of many genres and writing styles provided by this varied selection, readers can broaden their literary horizons and enhance their comprehension of the human condition.

*Table 24: Collection of Books*

University	Collections	Percent
Jadavpur University	646296	20.94
University of Calcutta	1200000	38.88
The University of Burdwan	504570	16.35
University of Kalyani	151000	4.89
Rabindra Bharati University	120500	3.90
West Bengal State University	28000	0.91
University of North Bengal	309724	10.04
Vidyasagar University	126306	4.09
<b>Total</b>	<b>3086396</b>	<b>100</b>

Jadavpur University possesses an extensive assortment of books, surpassing the count of half a million volumes, which specifically amounts to 646,296. This impressive collection exemplifies the university's position as one of the prominent educational institutions in West Bengal. On the other hand, the Book Collection of the University of Calcutta stands at 1,200,000, proudly claiming the largest collection among the universities mentioned, exceeding one million volumes. Being one of the oldest and most esteemed universities in India, this vast collection provides vital support for a diverse array of academic disciplines. Similarly, the University of Burdwan's book collection surpasses half a million volumes, totaling 504,570 books, serving as a testament to its dedication to academic brilliance and research across various fields. Although Kalyani University's collection is comparatively smaller with approximately 151,000 books, it still offers a significant and valuable resource base for both its students and faculty members. Rabindra Bharati University possesses a vast assortment of around 120,500 books, which aptly aligns with its emphasis on arts, humanities,

and cultural studies. In contrast, West Bengal State University's library houses a smaller collection of 28,000 books; however, it undoubtedly encompasses indispensable resources that are crucial for its academic endeavors and research pursuits. On the other hand, North Bengal University boasts a substantial compilation of 309,724 books, meticulously curated to cater to the educational requirements of its students and faculty within the region. Similarly, Vidyasagar University's library accommodates approximately 126,306 books, serving as a valuable repository for its academic programs, primarily focusing on humanities, social sciences, and natural sciences.

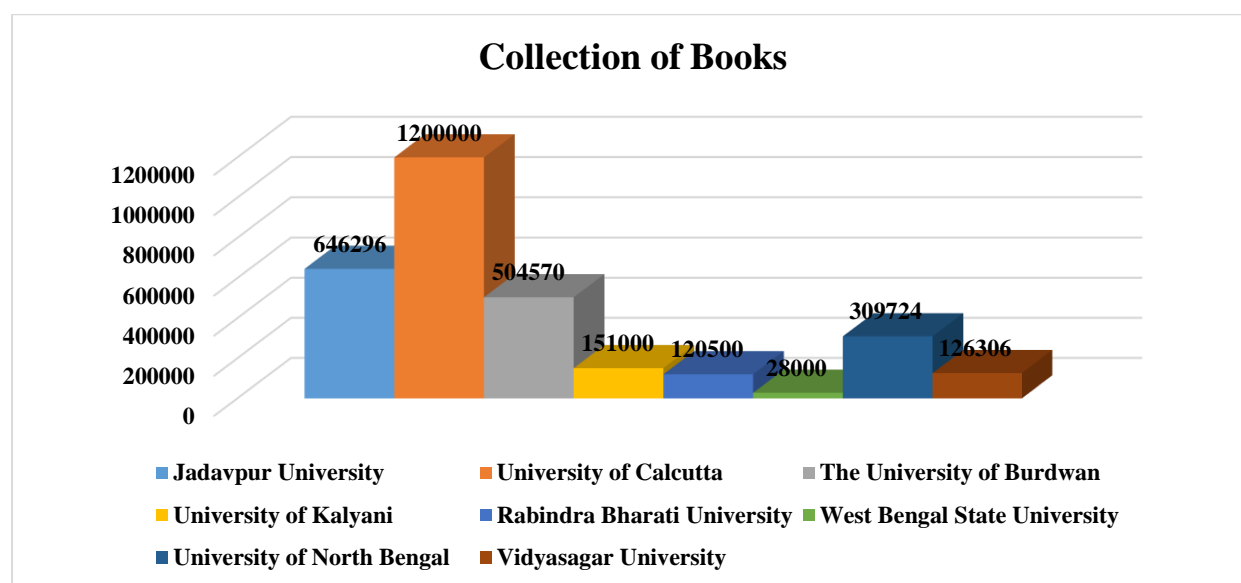


Figure 18: Collection of Books

### 5.23 Collection of printed journals

The presence of printed journals holds significant importance for college library users, especially during this transitional phase from print to e-media. It is worth noting that many university libraries have not yet been able to fully subscribe to e-resources to meet the needs of their users. The table below provides an overview of the collection of printed journals available in university libraries.

Table 25: Collection of Printed Journals

Name of University	Collection of Printed Journals	Percent
Jadavpur University	82154	22.31
University of Calcutta	200000	54.31
The University of Burdwan	29200	7.93

<b>University of Kalyani</b>	9554	2.59
<b>Rabindra Bharati University</b>	2550	0.69
<b>West Bengal State University</b>	793	0.22
<b>University of North Bengal</b>	38745	10.52
<b>Vidyasagar University</b>	5249	1.43
<b>Total</b>	368245	100

Jadavpur University possesses a considerable collection of 82,154 printed journals, surpassing the 80,000 mark. This demonstrates a strong dedication to research and academic collaboration within the institution. The University of Calcutta leads with a collection of 200,000 printed journals, the largest among the universities mentioned. This vast assortment showcases the university's commitment to offering comprehensive resources for research and learning. The University of Burdwan maintains a notable collection of 29,200 printed journals, highlighting an emphasis on scholarly exchange and academic research within the university community. In comparison, Kalyani University's collection of 9,554 printed journals is relatively smaller, yet it still provides essential resources for academic and research purposes. Rabindra Bharati University possesses a relatively small assortment of printed journals, numbering 2,550, which predominantly encompasses subjects related to arts, humanities, and cultural studies. In contrast, West Bengal State University maintains a smaller collection of 793 printed journals; however, it is likely to encompass significant publications that are pertinent to its academic programs and research areas. On the other hand, North Bengal University boasts a substantial collection of 38,745 printed journals, which caters to the diverse academic requirements of its students and faculty within the region. Lastly, Vidyasagar University's collection of 5,249 printed journals is considered moderate and primarily focuses on resources related to humanities, social sciences, and natural sciences.

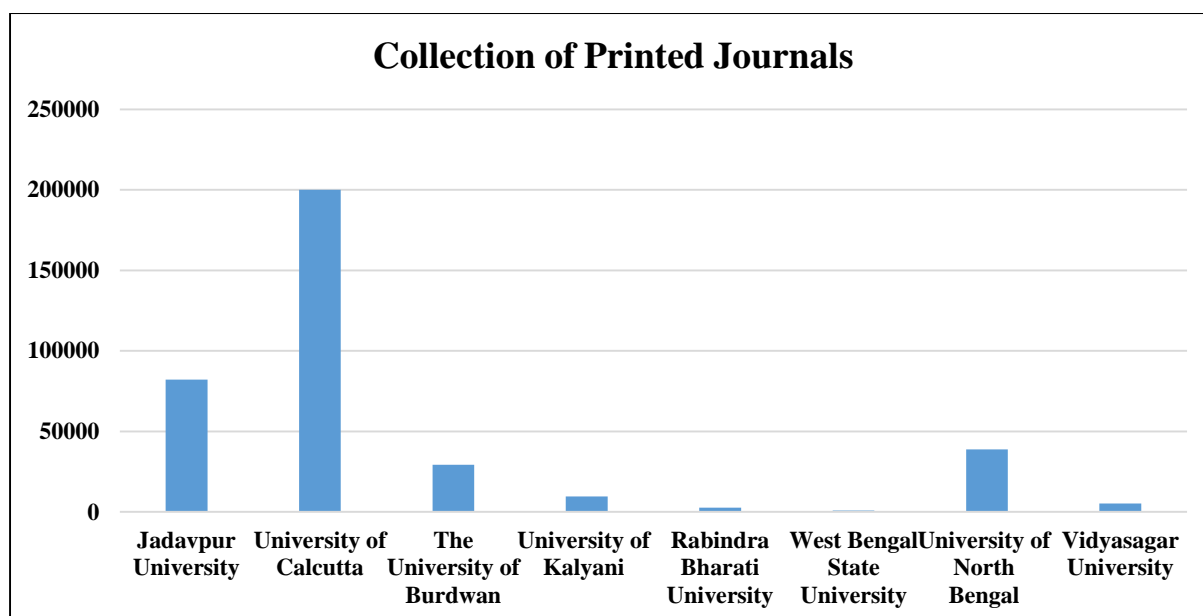


Figure 19: Collection of Printed Journals

## 5.24 Total Number of students

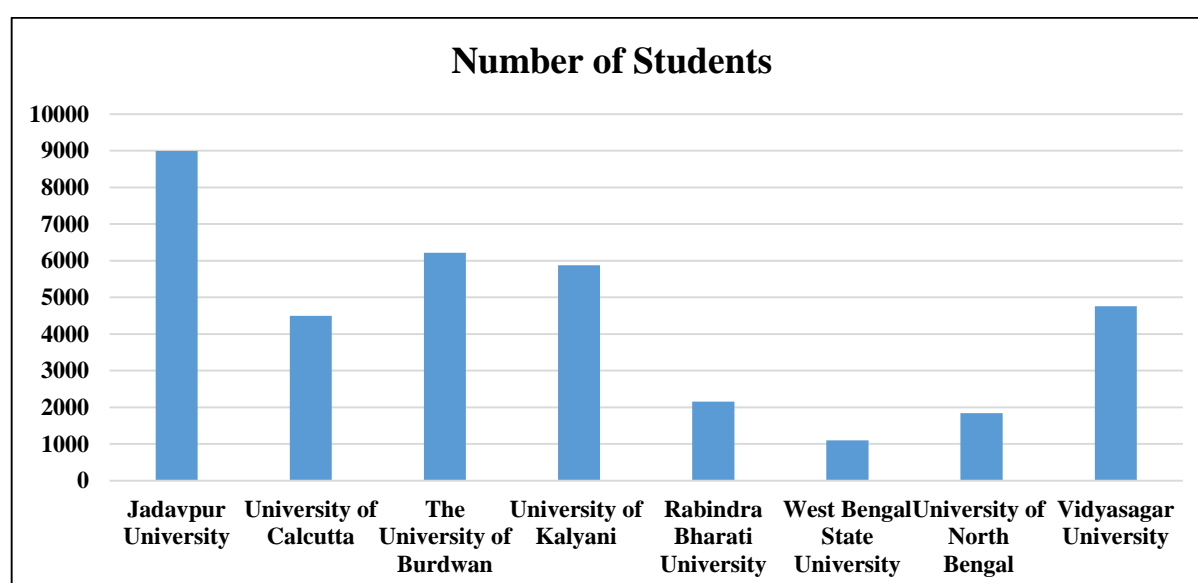
The table below provides a visual representation of the enrolment numbers of various colleges.

Table 26: Total Number of Students

Name of University	Number of Students	Percent
Jadavpur University	8995	25.38
University of Calcutta	4500	12.70
The University of Burdwan	6215	17.54
University of Kalyani	5880	16.59
Rabindra Bharati University	2155	6.08
West Bengal State University	1100	3.10
University of North Bengal	1839	5.19
Vidyasagar University	4759	13.43
<b>TOTAL</b>	<b>35443</b>	<b>100</b>

Jadavpur University has the highest percentage of total students with 25.38 % among the listed universities, indicating its significant presence in higher education in West Bengal. The University of Calcutta, despite being one of the oldest and prestigious universities,

represents around 12.70% of the total student population. The University of Burdwan accounts for approximately 17.54% of the total students, showing its substantial share in higher education in the region. Kalyani University represents around 16.59% of the total student population, indicating its significant contribution to higher education in West Bengal. Rabindra Bharati University has a smaller share of the total student population, with around 6.08%, reflecting its specialized focus on arts, humanities, and cultural studies. West Bengal State University has a relatively smaller percentage of total students, representing approximately 3.10% of the total. North Bengal University accounts for around 5.19% of the total student population, serving students in the northern region of West Bengal. Vidyasagar University represents around 13.43% of the total students, making it a significant contributor to higher education in the state.



*Figure 20: Total number of students*

These percentages illustrate the distribution of students across different universities in West Bengal, highlighting their respective roles and influence in the higher education landscape.

## 5.25 Opportunity for professional development by library

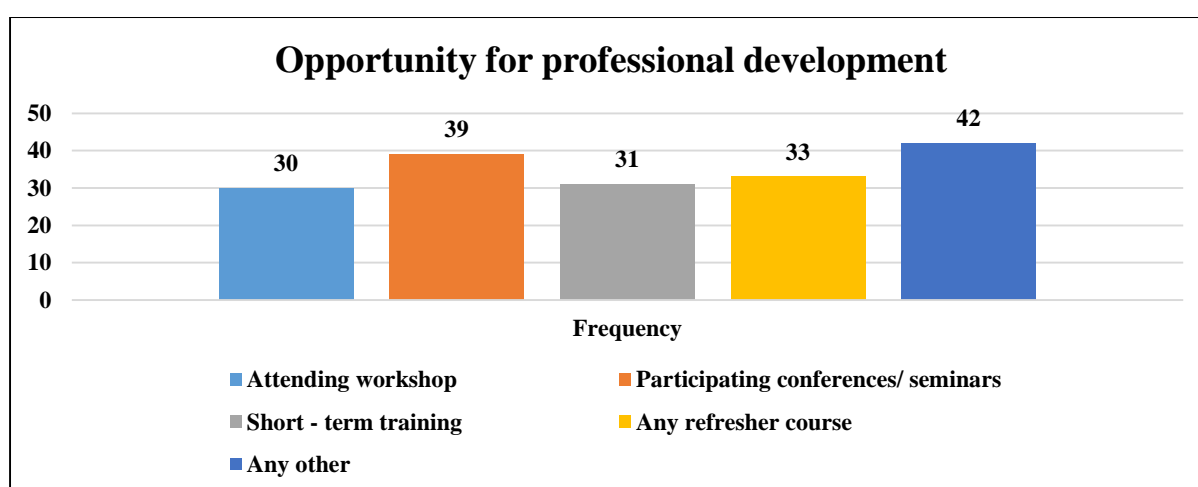
Libraries have also become community hubs, offering meeting spaces, study rooms, and programming for all ages. They serve as a place for people to gather, learn, and connect with others in their community. Overall, libraries continue to evolve and adapt to meet the diverse needs of their patrons, while remaining a vital resource for information and education.

Conventional services provided by college libraries are included and the responses of the staff is mentioned in table 23 below.

*Table 27: Opportunity for professional development by library*

	Frequency	Percent
<b>Attending workshop</b>	30	17
<b>Participating conferences/ seminars</b>	39	22
<b>Short - term training</b>	31	18
<b>Any refresher course</b>	33	19
<b>Any other</b>	42	24
<b>Total</b>	175	100

- Attending Workshop: 30 individuals, representing 17% of the total respondents, reported attending workshops as a form of professional development.
- Participating in Conferences/Seminars: 39 individuals, accounting for 22% of the total respondents, reported participating in conferences or seminars.
- Short-term Training: 31 individuals, comprising 18% of the total respondents, reported undergoing short-term training programs.
- Any Refresher Course: 33 individuals, representing 19% of the total respondents, reported taking any refresher course to enhance their professional skills or knowledge.
- Any other: 42 individuals, making up 24% of the total respondents, reported engaging in other forms of professional development activities not specified in the given categories.



*Figure 21: Opportunity for professional development*



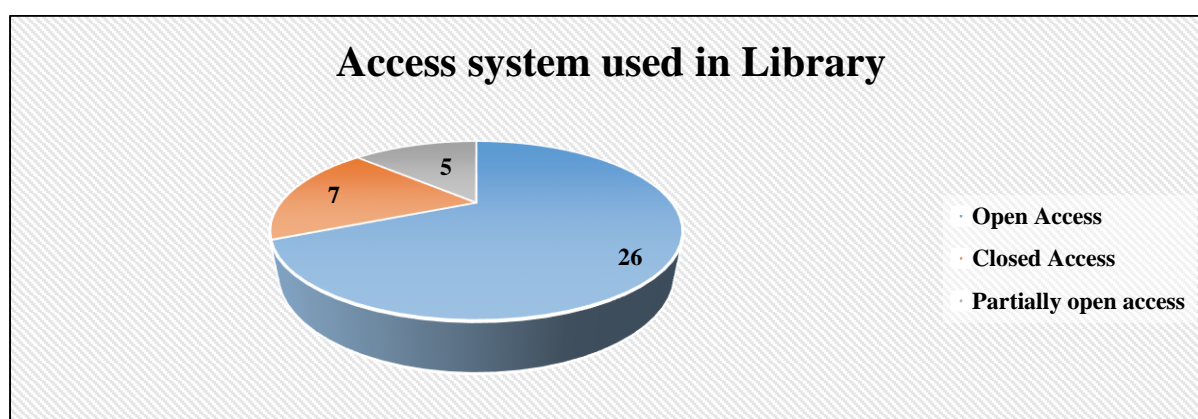
## 5.26 Access system used in Library as per librarian

Accessing online resources, scheduling study rooms, checking out and returning books, and managing library accounts are all made simple for users of the library's access system. This approach makes sure that customers can quickly locate and obtain the goods they require while also streamlining the loan procedure. Features like self-checkout kiosks, online catalog search functions, and tailored suggestions based on readers' past reading choices could also be included in the access system.

*Table 28: Access system used in Library*

	No. of counts	Percent
<b>Open Access</b>	26	68.42
<b>Closed Access</b>	7	18.42
<b>Partially open access</b>	5	13.16
<b>Total</b>	38	100

Table 28 shows that 68.42% of research articles are accessible through open access, meaning that a sizeable amount of the information is freely available to everybody without the need for purchase or a membership. A significant portion of research papers—18.42%—are limited to subscribers or institutions only, implying that access to these articles requires payment. Research publications that are partially open access comprise 13.16% of all publications; this means that while some content is publicly accessible, other portions could need to be paid for or subscribed to. Overall, the data indicates that the majority of research publications in this dataset are available through open access, with a smaller proportion being closed access and partially open access.



*Figure 22: Access system used in Library*

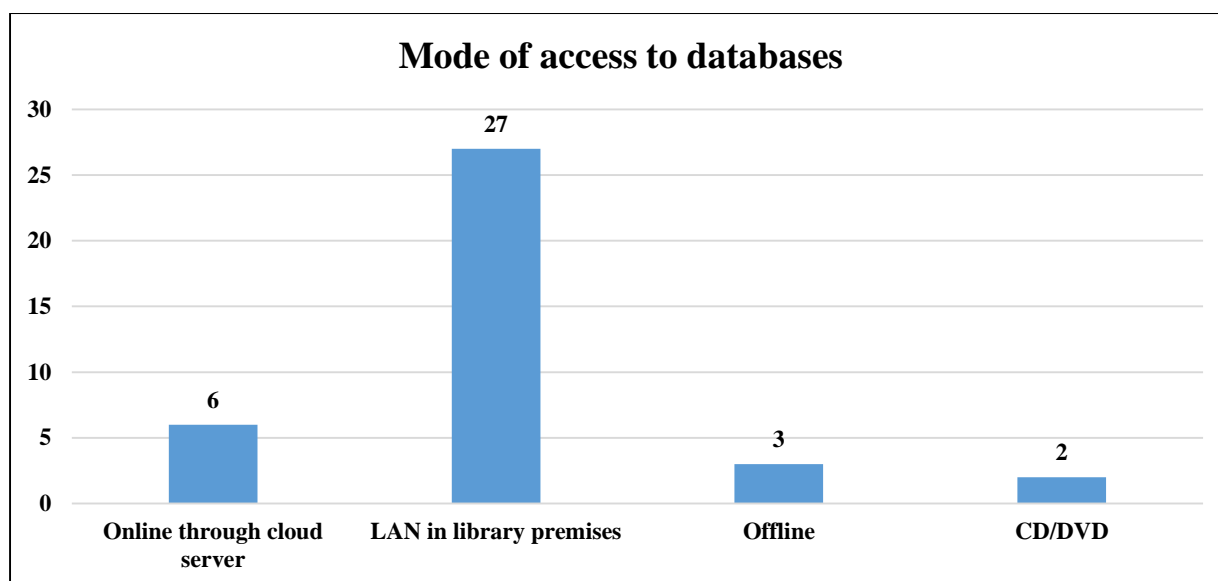
## 5.27 Mode of access to bibliographic databases

Using internet resources or library resources, bibliographic databases are accessible for the purpose of searching and retrieving information about scholarly publications, including books, journal articles, conference papers, and other scholarly materials. By giving users access to a vast array of sources across multiple fields, these databases enable professionals, students, and researchers to locate pertinent literature for their projects. By keywords, authors, or specific subjects, readers can find pertinent publications fast and obtain full-text articles or abstracts to aid in their academic work and study.

*Table 29: Mode of access to bibliographic databases as per librarian*

Mode of access to databases	No. of counts	Percent
Online through cloud server	6	15.79
LAN in library premises	27	71.05
Offline	3	7.89
CD/DVD	2	5.26
Total	38	100.00

Table 29 displays the various modes of access to bibliographic databases, as reported by librarians. It includes the count and percentage distribution for each mode. Online access through Cloud Server is one mode, accounting for 6 out of 38 counts, or approximately 15.79% of the total. This data indicates that only a small fraction of the databases are accessed online via cloud servers. The most common mode of access within the library premises is through the local area network (LAN), with 27 counts out of 38, representing approximately 71.05% of the total. This suggests that most of the database access occurs within the library premises using the LAN. Offline access, which accounts for 3 counts or approximately 7.89% of the total, indicates that some databases are accessed offline, possibly through local storage or other means. Access via CD/DVD is reported for 2 counts out of 38, representing approximately 5.26% of the total. This suggests that a small portion of databases is accessed through physical media such as CDs or DVDs.



*Figure 23: Mode of access to bibliographic databases*

## 5.28 Usage of bibliographic services

The utilization of bibliographic services encompasses a wide range of applications and is characterized by its diverse and multifaceted nature. These services play a crucial role in facilitating research, scholarship, teaching, and learning within academic institutions and across various disciplines.

*Table 30: Usage of bibliographic services as per librarian*

	Frequency	Percent
<b>Once in a week</b>	13	34.21
<b>Once in a fortnight</b>	12	31.58
<b>Once in a month</b>	6	15.79
<b>Twice in a week</b>	7	18.42
<b>Total</b>	38	100.00

Table 30 displays the utilization of bibliographic services as documented by librarians, encompassing the frequency of usage and the percentage distribution. According to the report, 13 librarians stated that bibliographic services are utilized once per week, constituting 34.21% of the total responses. Additionally, 12 librarians reported using these services once every two weeks (fortnightly), accounting for 31.58% of the total responses. Furthermore, 6 librarians

mentioned that bibliographic services are employed once a month, representing 15.79% of the total responses. Moreover, 7 librarians reported utilizing these services twice a week, which corresponds to 18.42% of the total responses.

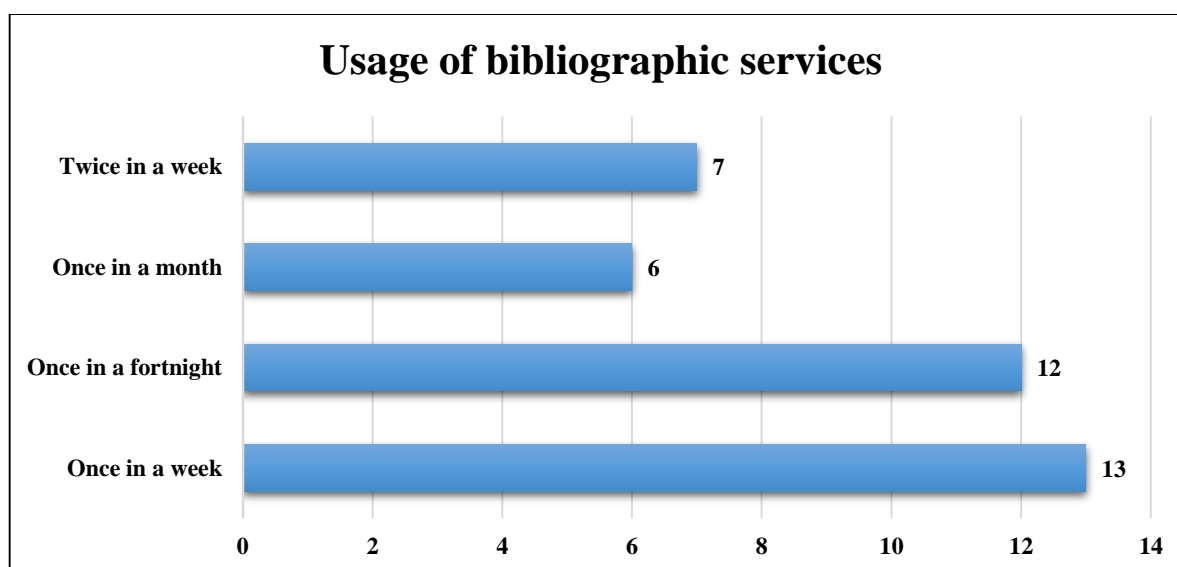


Figure 24: Usage of bibliographic services

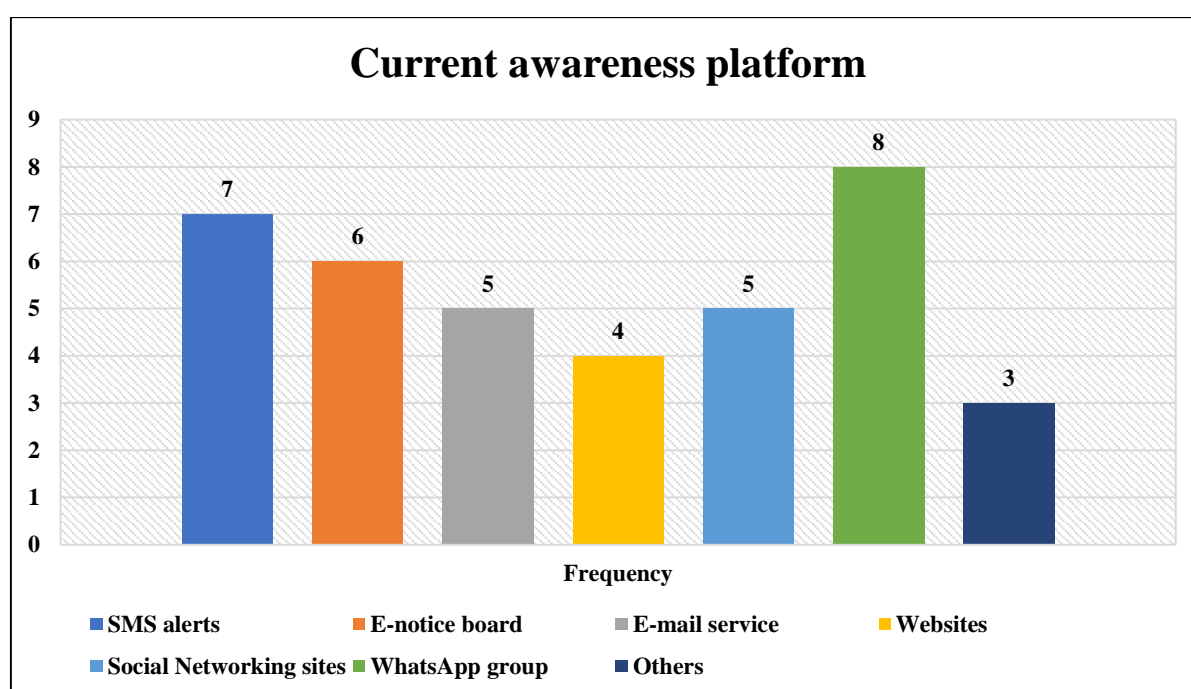
## 5.29 Current awareness platform

An application or service that keeps users informed about the most recent findings, analysis, findings, and innovations in their areas of interest is known as a current awareness platform. These platforms compile content from multiple sources and provide it to users quickly and easily.

Table 31: Current awareness platform

	Frequency	Percent
SMS alerts	7	18.0
E-notice board	6	16.0
E-mail service	5	13.0
Websites	4	10.0
Social Networking sites	5	13.0
WhatsApp group	8	21.0
Others	3	9.0
Total	38	100.0

Table 31 displays the utilization of current awareness platforms as reported by participants, along with the corresponding frequency of usage. Out of the total responses, 7 participants reported using SMS alerts as a current awareness platform, accounting for 18.0%. Additionally, 6 participants reported utilizing e-notice boards, representing 16.0% of the total responses. Moreover, 5 participants reported employing e-mail services for current awareness, which constituted 13.0% of the total responses. Furthermore, 4 participants reported utilizing websites as a current awareness platform, accounting for 10.0% of the total responses. Similarly, 5 participants reported using social networking sites, such as Twitter or LinkedIn, for current awareness, representing 13.0% of the total responses. Notably, WhatsApp groups emerged as the most frequently reported platform, with 8 participants utilizing it for current awareness, which accounted for 21.0% of the total responses. Additionally, 3 participants reported using other platforms not specified in the given categories, representing 9.0% of the total responses. Overall, the data suggests that WhatsApp groups are the most employed current awareness platform among the participants, followed by SMS alerts and e-notice boards. E-mail services, websites, and social networking sites are also utilized, albeit to a lesser extent.



*Figure 25: Current awareness platform*

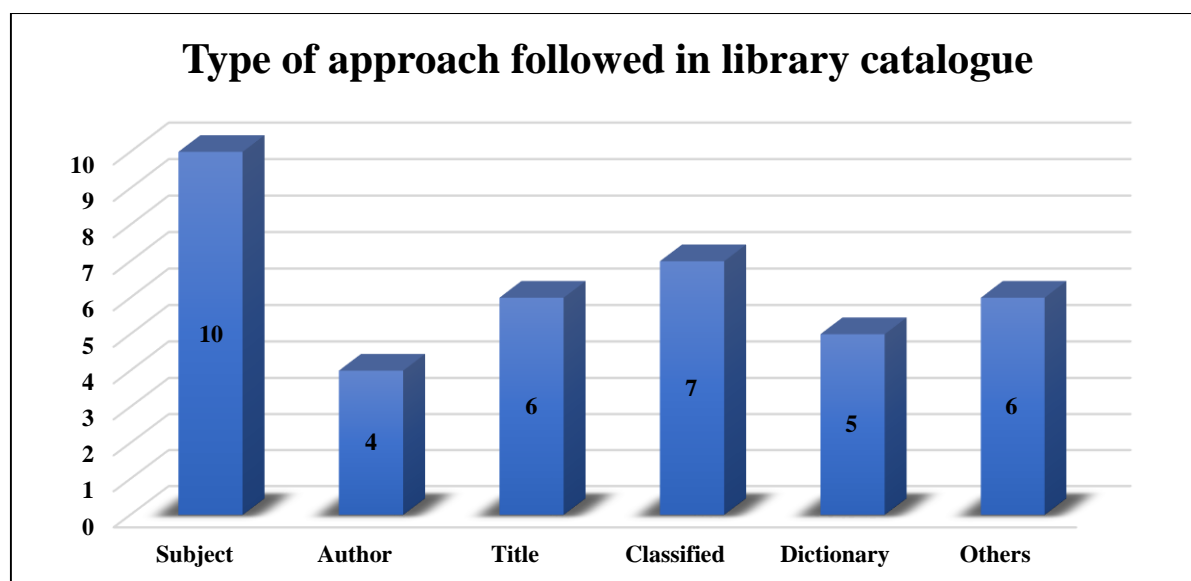
### 5.30 Type of approach followed in library catalogue

Depending on the strategy chosen, many methodologies may be used in a library catalogue. Libraries have a variety of options for structuring and classifying their holdings, each with its unique methods. The alphabetical approach is a popular method that involves cataloging and organizing resources according to their titles or the last names of the writers. Smaller libraries and collections with mostly book-based content frequently employ this practice. By looking through the alphabetical arrangement, users may find materials with ease.

*Table 32: Type of approach followed in library catalogue as per librarian*

	Frequency	Percent
<b>Subject</b>	10	26.32
<b>Author</b>	4	10.53
<b>Title</b>	6	15.79
<b>Classified</b>	7	18.42
<b>Dictionary</b>	5	13.16
<b>Others</b>	6	15.79
<b>Total</b>	38	100.00

The data provided in table 32 shows the types of approaches followed in library cataloging as per librarians. Subject approach is the most utilized method, making up 26.32% of the total cataloging approaches. This approach focuses on arranging materials based on their subject matter, facilitating users in locating resources related to specific topics. Author approach, which accounts for 10.53% of cataloging methods, categorizes materials according to the author's name. This method is beneficial for users seeking works by a particular author. Cataloging by title, comprising 15.79% of approaches, entails organizing materials alphabetically by their titles. This method proves to be advantageous when users are searching for a specific book or resource by its title. Classified approach, representing 18.42%, involves organizing materials based on a classification system such as Dewey Decimal or Library of Congress classification. Dictionary method, making up 13.16%, arranges materials alphabetically by dictionary-like entries, which may include keywords, subjects, or terms used to describe the resources. The others category, accounting for 15.79%, encompasses various cataloging approaches not explicitly mentioned in the provided data. This category could include methods like chronological or geographic organization, or any other unique system employed by the library.



*Figure 26: Type of approach followed in library catalogue*

### 5.31 Software used for digital preservation work for library under ICT application

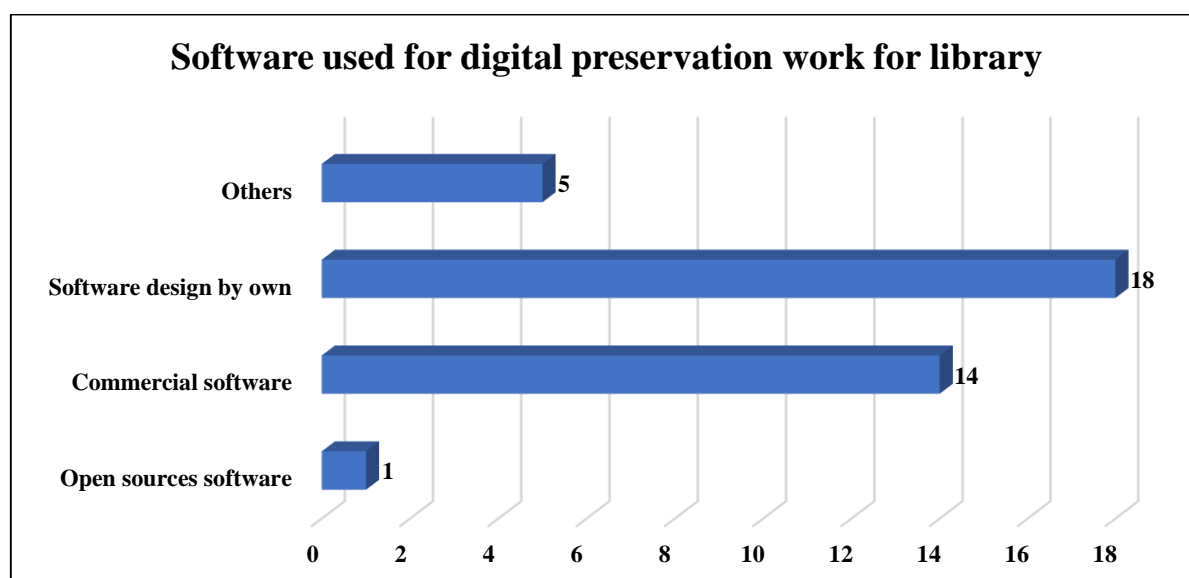
The information and communication technology (ICT) application is a complex system that uses a variety of software tools to carry out duties related to digital preservation for the library in an efficient and effective manner. Digital materials, including electronic books, journals, manuscripts, images, audio files, and videos, among others, should always be accessible, usable, and intact. This application is made to guarantee these qualities.

*Table 33: Software used for digital preservation work for library*

	Frequency	Percent
<b>Open sources software</b>	1	2.63
<b>Commercial software</b>	14	36.84
<b>Software design by own</b>	18	47.37
<b>Others</b>	5	13.16
<b>Total</b>	38	100.00

Table 33 illustrates the software utilized for digital preservation tasks in libraries, along with their corresponding frequencies. Merely 2.63% of libraries opt for open-source software for digital preservation. The majority, accounting for 36.84% of libraries, depend on commercial software solutions for digital preservation. A notable portion, totaling 47.37% of

libraries, have crafted their own software tailored for digital preservation purposes. This indicates that these libraries have fine-tuned their digital preservation procedures to suit their specific requirements or preferences. Furthermore, 13.16% of libraries utilize software falling under the "Others" category. This classification may encompass proprietary software not explicitly categorized as commercial, or conceivably a blend of various software solutions.



*Figure 27: Software used for digital preservation work for library under ICT application*

According to the data, a significant portion of libraries would rather create their own digital preservation software, perhaps to customize it to meet needs or overcome certain obstacles.

### 5.32 Standards uses in digital preservation work under ICT application

Standards are important for maintaining the integrity and validity of digital content. The content is kept safe and impenetrable using standards for digital signatures and encryption. These standards offer methods for confirming the legitimacy of digital assets and identifying any potential modifications or adjustments.

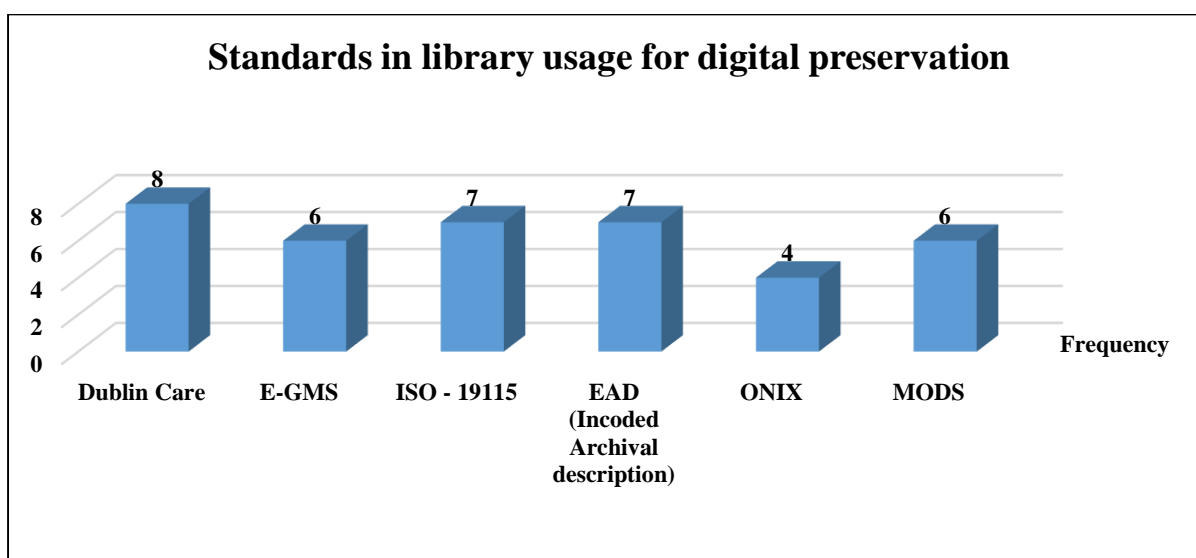
*Table 34: Standards used in digital preservation work under ICT application*

	Frequency	Percent
Dublin Core	8	21.05
E-GMS	6	15.79
ISO - 19115	7	18.42
EAD (Incoded Archival description)	7	18.42



<b>ONIX</b>	4	10.53
<b>MODS</b>	6	15.79
<b>Total</b>	38	100.00

Table 34 lists the standards and frequency that are applied in digital preservation work under ICT applications. Dublin Core is used by 21.05% of libraries. Dublin Core is frequently used to describe materials in an easy-to-use and adaptable way, which makes it ideal for digital archives and libraries. 15.79% of libraries use the Electronic Government Metadata Standard, or E-GMS. It gives government organizations a uniform means of describing their electronic resources, promoting information sharing and interoperability. 18.42% of libraries follow ISO-19115 guidelines. By defining metadata for geographic data, this standard ensures compatibility and consistency when representing geographical data. Finding aids for archive resources are encoded in XML format using EAD (Encoded archive Description), which is utilized at 18.42%. It improves access and discovery by offering a uniform means of describing archive collections. ONIX is mostly used by 10.53% of libraries as a standard for expressing and sharing product information related to the book industry. It is applied to metadata related to publications such as books. 15% of libraries use MODS (Metadata Object Description Schema). It offers a bibliographic system for characterizing library resources, including digital content.



*Figure 28: Standards in library usage for digital preservation*

The data points to a wide variety of standards that are applied in digital preservation projects overall. The most widely used standards are Dublin Core and ISO-19115, which

emphasize, respectively, geographic information and general resource descriptions. EAD is noteworthy as well, demonstrating how crucial archive description is to efforts aimed at digital preservation. Specific demands like government metadata, book business information, and thorough bibliographic descriptions are covered by other standards like E-GMS, ONIX, and MODS, respectively.

### **5.33 Analysis of data collected from the response of university students**

The practice of methodically employing logical and/or statistical tools to describe and show, summarize, and assess, and otherwise work with data is known as data analysis. The signal, or the event of interest, can be distinguished from the noise, or statistical fluctuations, contained in the data by using a variety of analytical techniques, according to Shamoo and Resnik (2003). In fact, during the whole data collection process, researchers typically look for patterns in the observations they make (Savenye, Robinson, 2004). The investigator conducted a research project on the Usage of Information and Communication Technology (ICT) resources and services of University Libraries among students in West Bengal.

The survey was conducted among students from all 8 universities to gather information on their utilization of both library resources and e-resources. Utilizing a random sampling method, 400 questionnaires were distributed to student members who are regular library users, as most universities are encouraging the use of e-resources among students. Out of the 400 questionnaires distributed, 380 were completed and returned, providing valuable data for analysis. The total student count is 35,443. The sample size is calculated using the confidence level of 95% and error margin of 5%. The recommended sample size is 381 which is bounded by the responses obtained through questionnaire accordingly.

What margin of error can you accept?	<input type="text" value="5"/>	%
What confidence level do you need?	<input type="text" value="95"/>	%
What is the population size?	<input type="text" value="35443"/>	
What is the response distribution?	<input type="text" value="50"/>	%
Your recommended sample size is:	<b>381</b>	

*Figure 29: Sample size calculator*

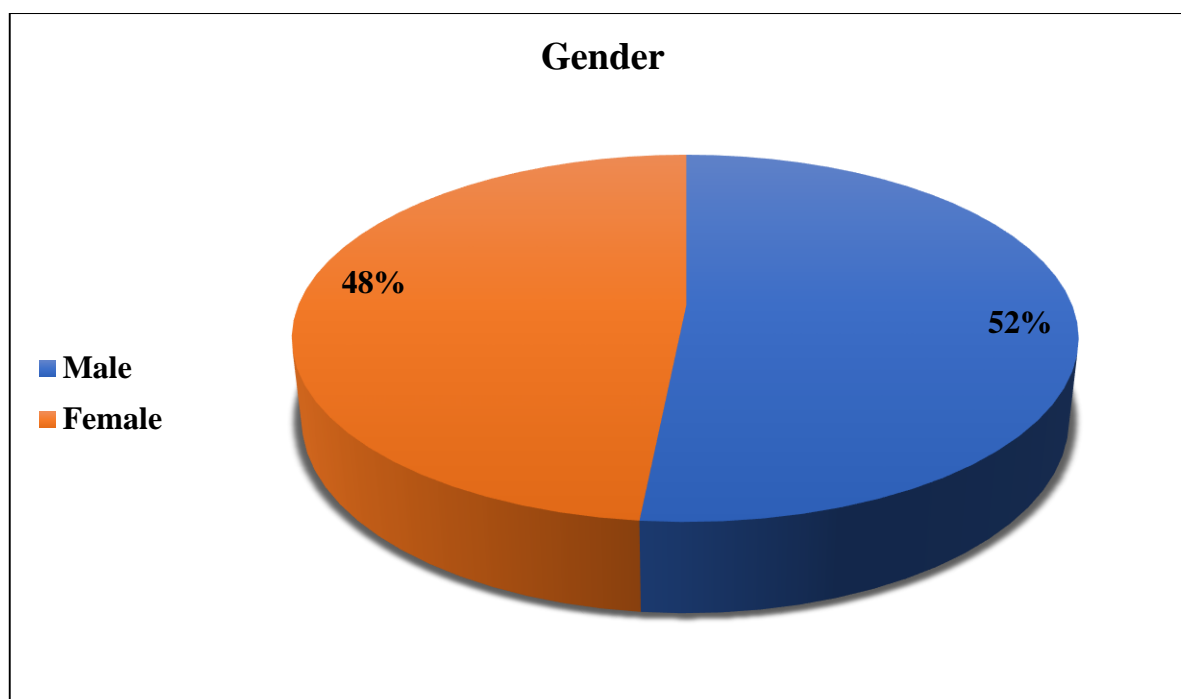
### 5.34 Gender wise categorization

The categorizing of people or groups according to their gender is known as gender-based classification. Numerous facets of society, such as social conventions and education, exhibit this grouping.

*Table 35: Gender of the participants*

	No. of response	Percent
<b>Male</b>	196	51.6
<b>Female</b>	184	48.4
<b>Total</b>	380	100.0

Table 35 provides a breakdown of responses by gender. 51.6% of the respondents identified as male, with a total of 196 responses and 48.4% of the respondents identified as female, with a total of 184 responses. This distribution points to a somewhat higher representation of men than women, but overall, equal engagement from both genders.



*Figure 30: Gender of the participant*

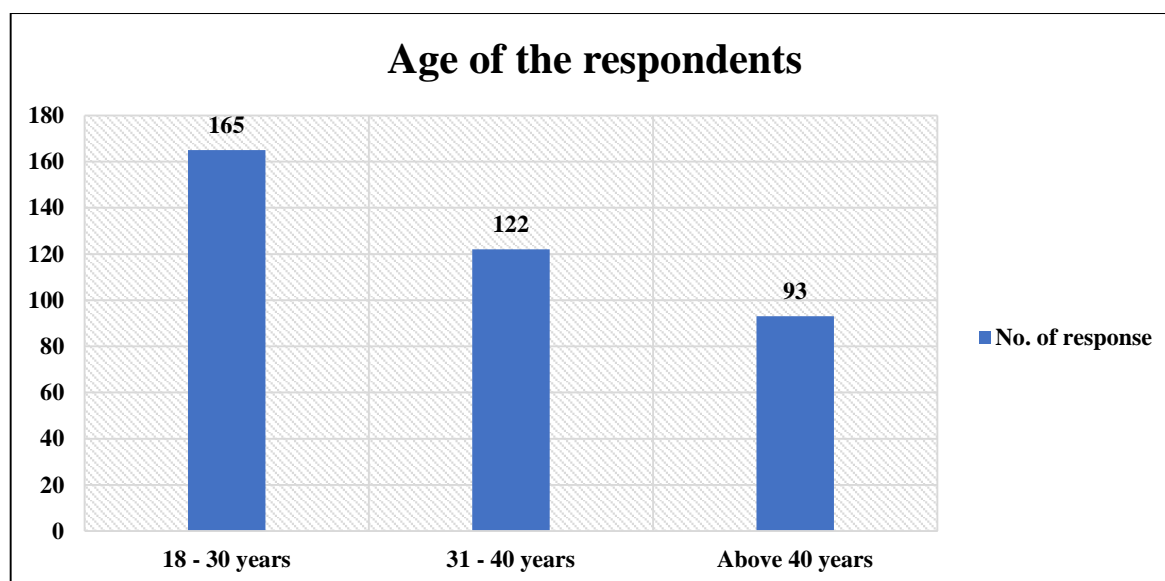
### 5.35 Age wise categorization

Age-based categorization is used to group students together based on their age and addressing the diverse nature of individuals. A table that displays the age distribution of a population or sample shows how many people in each age group there are. A summary of the participants in each age group is included in the table along with other pertinent data.

*Table 36: Age of the participants*

	No. of response	Percent
<b>18 - 30 years</b>	165	43.4
<b>31 - 40 years</b>	122	32.1
<b>Above 40 years</b>	93	24.5
<b>Total</b>	380	100.0

The age of the respondents is grouped into three categories: 18 - 30 years age group respondents' accounts for 43.4% of the total participants. 31 - 40 years respondents comprised 32.1% of the total. Above 40 years respondents, make up 24.5% of the population. From this breakdown, it's evident that the majority of participants are below 30 years old, followed by those aged between 31 and 40. The smallest group consists of participants above 40 years old.



*Figure 31: Age of the respondents*

### 5.36 Subject wise categorization

Subject-based classification is the process of grouping items, information, or data based on their subject matter or content. Libraries, archives, and databases frequently employ this kind of classification to make it simple for users to find and access pertinent content. The subject-wise categorization of the students in their general area of study, is displayed in the following table.

*Table 37: Subject wise distribution of students*

Subject	No. of response	Percent
Arts	122	32.1
Science	171	45.0
Commerce	87	22.9
Total	380	100.0

Table 37 indicates that scientific students make up the largest group of responders, at 45.0%. This can be a sign of a keen interest in or enrollment in science-related courses like mathematics, physics, chemistry, or biology. 32.1% percent of the responders are students studying the arts. Students pursuing coursework in the fine arts, philosophy, languages, literature, or history may fall under this category. Students studying commerce make up the smallest group of responders with 22.9%. The percentage represents a lower but no less noteworthy portion of students who are pursuing careers or studies related to trade.

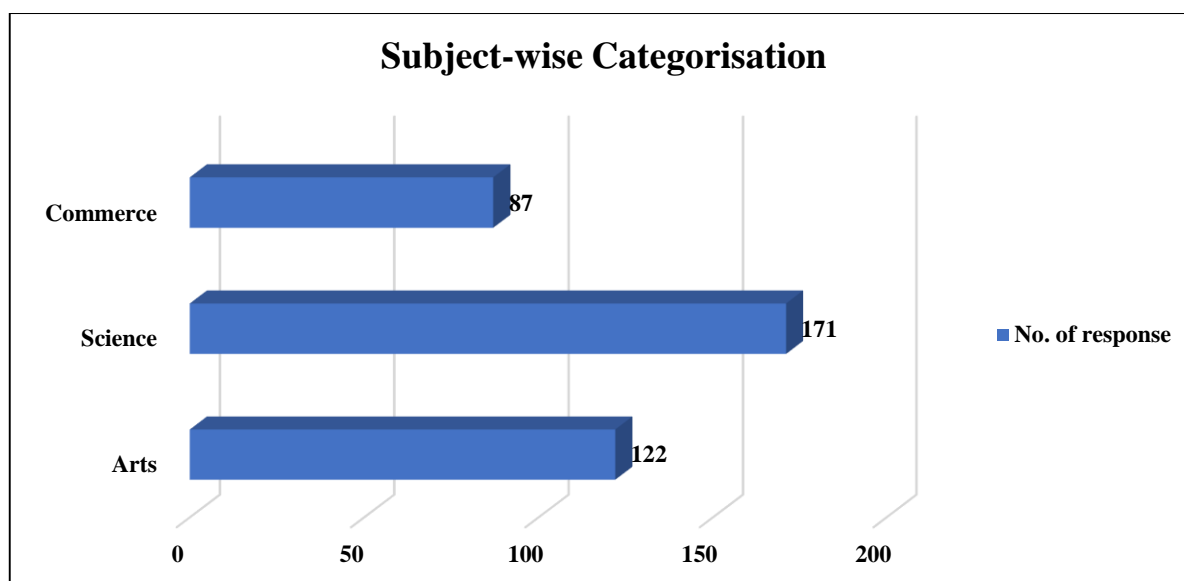


Figure 32: *Subject-wise categorization*

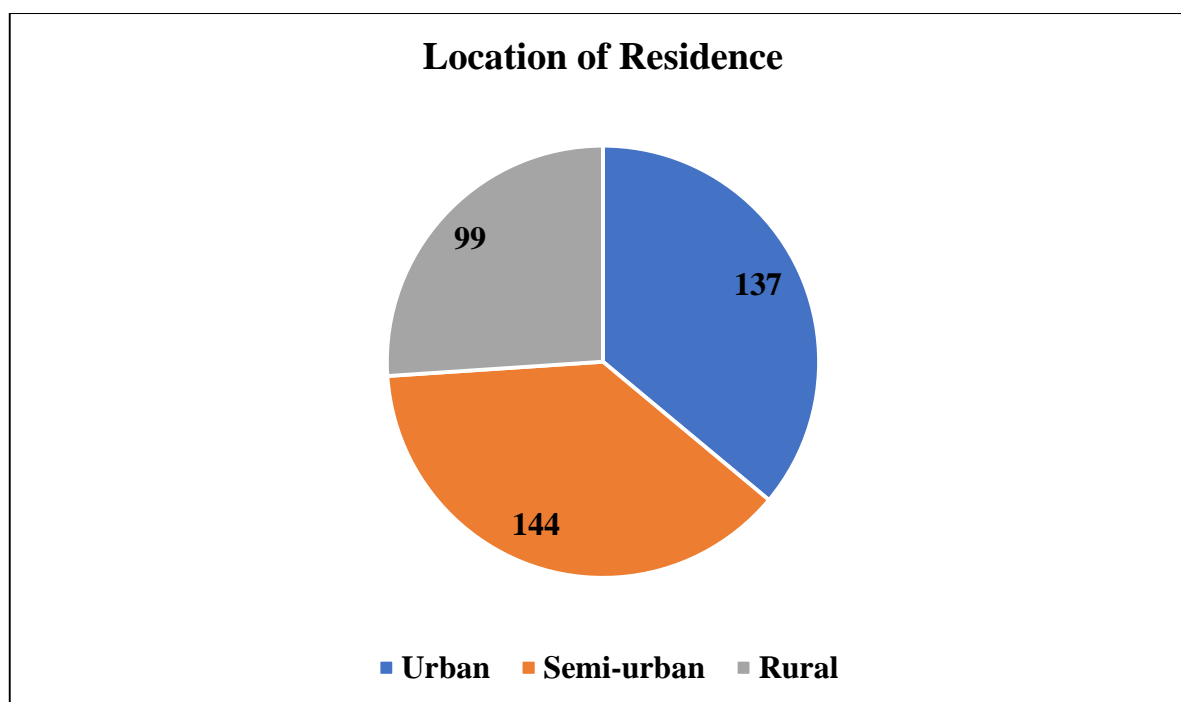
### 5.37 Location of residence for students

The place where students remain while enrolled in school or a university is referred to as their "place of residence." Depending on several factors, individual preferences, and economical constraints, the students' location of residence may change.

Table 38: *Location of residence*

	No. of students	Percent
<b>Urban</b>	137	36.1
<b>Semi-urban</b>	144	37.9
<b>Rural</b>	99	26.1
<b>Total</b>	380	100.0

As per table 38, majority of students—37.9%—come from semi-urban regions. This implies that a considerable number of students live in places that are neither totally urban nor totally rural. 36.1% of the respondents are urban students. This suggests that there are a lot of students from cities, which usually have denser populations and better-developed infrastructure. The lowest percentage of students—26.1%—come from rural regions. This implies that while students from rural origins do attend these schools, their numbers are comparatively lower



*Figure 33: Location of residence*

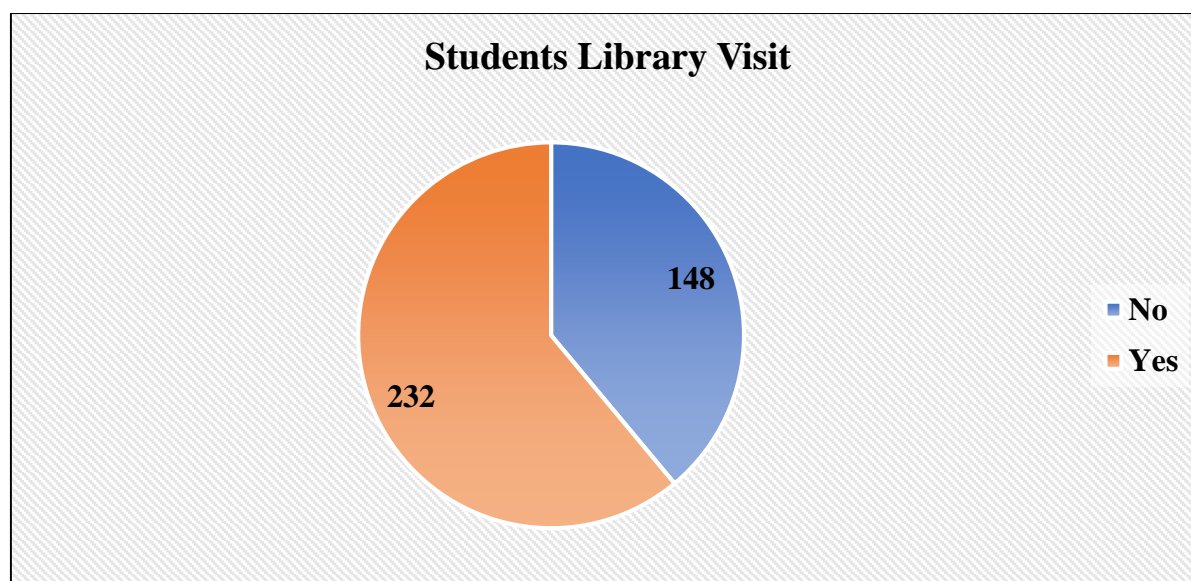
### 5.38 Students Visiting University Library

Students can delve into a wide range of information and resources by exploring the University Library, which is a rewarding and enlightening experience. The following table describes students who are visiting the university library.

*Table 39: Students visiting university library*

	No. of responses	Percent
<b>No</b>	148	38.9
<b>Yes</b>	232	61.1
<b>Total</b>	380	100.0

According to table 39, Sixty-one percent of students visit the university library, meaning a sizable fraction of the student body makes use of this resource. This implies that students actively use the university library for research, study, and other academic needs. On the other hand, 38.9% of students never go to the campus library. This could be the result of several factors, including using internet resources exclusively, studying off campus, or getting information from different sources.



*Figure 34: Students Visiting Library*

### 5.39 Member Registration in Library

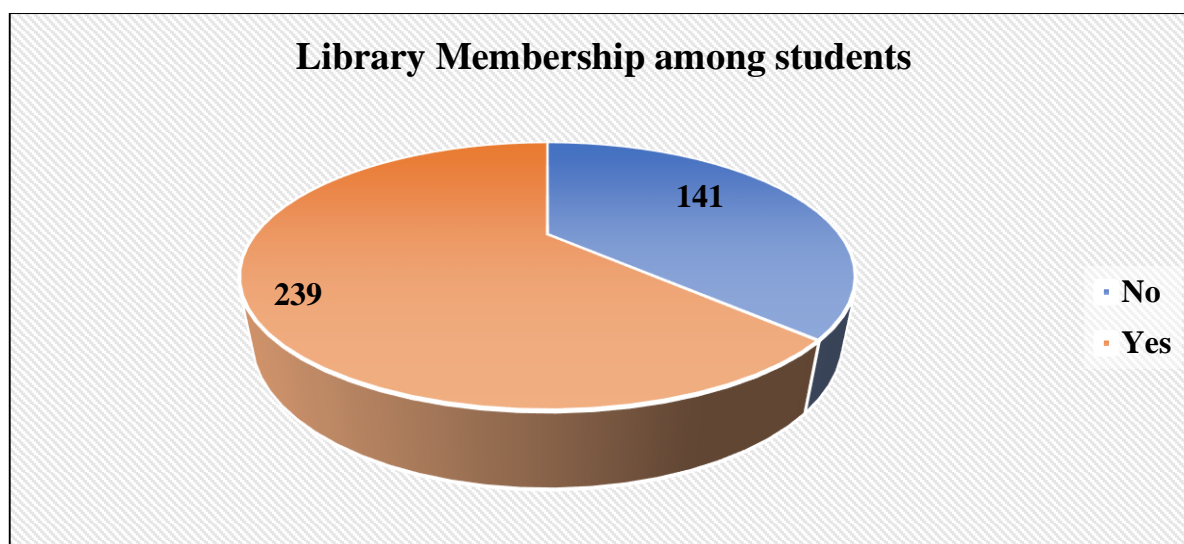
The procedure via which people formally join a library and acquire access to its materials and services is known as library membership registration. Usually, this process includes completing an application, supplying the required documentation and contact details, and consenting to follow the policies and guidelines of the library. Table 37 discusses the student's registration with their respective library.

*Table 40: Library Membership registration*

	No. of responses	Percent
<b>No</b>	141	37.1
<b>Yes</b>	239	62.9
<b>Total</b>	380	100.0

Table 40 proposes that a significant proportion of participants (62.9%) have signed up for library membership, suggesting that a sizeable segment of the populace participates actively in university library by becoming members. This implies a keen interest in making use of the materials and assistance provided by the library. On the other hand, 37.1% of those surveyed did not register as library members. This could be the result of several factors, including a lack of interest in using the library's services or a preference for other resources.





*Figure 35: Library Membership among students*

#### 5.40 Frequency of library visit

The frequency of library visits might vary substantially based on several variables, including time constraints, geography, and access to additional resources. While some people might visit the library weekly, others might only do so once a month or even less frequently. In the end, how often student visit the library is a decision that they make on a personal level that is impacted by a few variables. Table 38 details the information of the study sample.

*Table 41: Frequency of library visit*

	No. of responses	Percent
<b>Daily</b>	104	27.4
<b>Weekly</b>	165	43.4
<b>Monthly</b>	111	29.2
<b>Total</b>	380	100.0

A sizable percentage of respondents, according to the statistics in table 41, routinely visit the library. Many respondents (43.4%) go to the library once a week. This shows that a significant portion of students likely use the library as a regular place to study to access materials, study areas, or take part in class-related activities. Of the respondents, 27.4% go to the library every day. This suggests a committed student body that uses the library's resources—like books, periodicals, and computers—on a regular basis to meet their academic

demands. Though less frequently, 29.2% of respondents said they visit the library once a month, showing that they are committed to using it for their academic work.

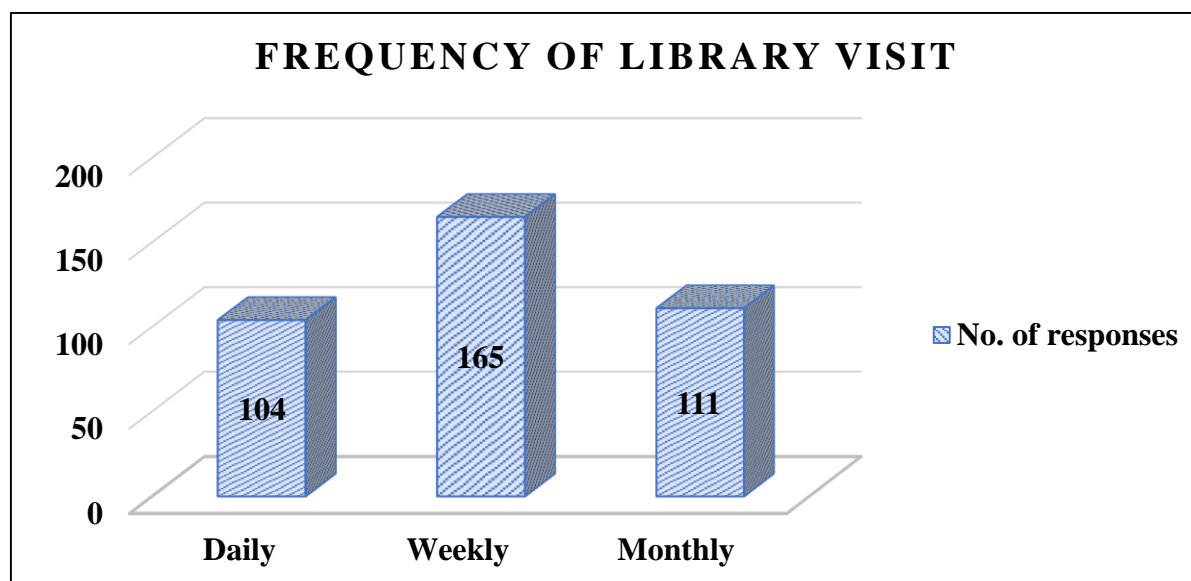


Figure 36: *Frequency of Library visit*

#### 5.41 Time spent in the library

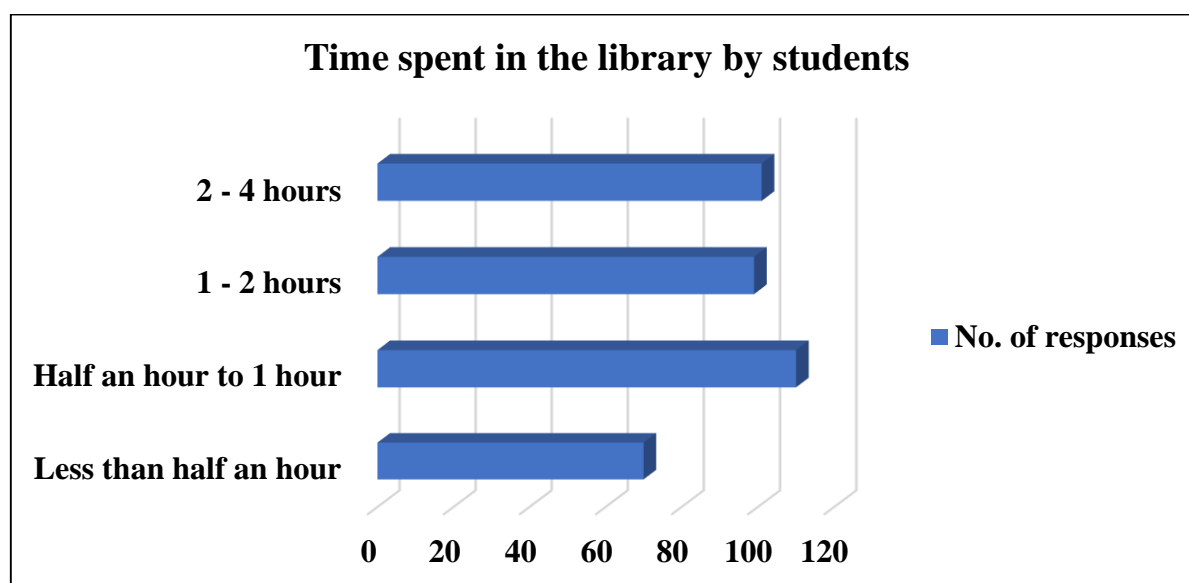
The amount of time spent in a library might vary widely based on personal requirements and interests. It is possible that some people visit the library only a few times a week, mostly for short research projects or book borrowing. Table 39 discusses the time spent by students in library.

Table 42: *Time spent in the library by students*

	No. of responses	Percent
Less than half an hour	70	18.4
Half an hour to 1 hour	110	28.9
1 - 2 hours	99	26.1
2 - 4 hours	101	26.6
<b>Total</b>	<b>380</b>	<b>100.0</b>

Less than thirty minutes is how long 18.4% of respondents spent in the library by students in this survey. This implies that some students might visit the library for brief periods of time to obtain resources or to check out books. In the library, 28.9% of respondents say they spend 30 to 60 minutes there. This suggests a greater proportion of students who visit the library for brief periods of time, probably to access materials or conduct fast study sessions. One to

two hours are spent in libraries, according to 26.1% of survey participants. This group dedicates a modest amount of time, perhaps to more concentrated study sessions, research, or the use of other library resources. In the library, 26.6% of respondents said they spend two to four hours a day. This suggests a significant portion of students invest a substantial amount of time in the library, possibly engaging in research, or collaborative work.



*Figure 37: Time spent in library*

#### 5.42 Level of satisfaction about the services provided by the library

There are several ways to assess the degree of satisfaction with the services provided by the library. First, feedback forms are used to gauge the general level of satisfaction among library patrons. These can be given to library users, asking them to score their encounters with various elements of the library's offerings, including the accessibility of materials, the staff's helpfulness, the availability of resources, and the general ambiance of the library.

*Table 43: Level of satisfaction about the services provided by the library*

Circulation		
	No. of responses	Percent
Strongly Dissatisfied	29	7.6
Dissatisfied	75	19.7
Neutral	100	26.3

<b>Satisfied</b>	114	30.0
<b>Fully Satisfied</b>	62	16.3
<b>Total</b>	380	100.0
<b>Reference Service</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>Strongly Dissatisfied</b>	27	7.1
<b>Dissatisfied</b>	60	15.8
<b>Neutral</b>	97	25.5
<b>Satisfied</b>	125	32.9
<b>Fully Satisfied</b>	71	18.7
<b>Total</b>	380	100.0
<b>CAS</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>Strongly Dissatisfied</b>	24	6.3
<b>Dissatisfied</b>	52	13.7
<b>Neutral</b>	86	22.6
<b>Satisfied</b>	127	33.4
<b>Fully Satisfied</b>	91	23.9
<b>Total</b>	380	100.0
<b>Online Public Access</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>Strongly Dissatisfied</b>	34	8.9
<b>Dissatisfied</b>	81	21.3
<b>Neutral</b>	97	25.5
<b>Satisfied</b>	109	28.7
<b>Fully Satisfied</b>	59	15.5
<b>Total</b>	380	100.0
<b>Catalogue</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>Strongly Dissatisfied</b>	21	5.5

<b>Dissatisfied</b>	28	7.4
<b>Neutral</b>	77	20.3
<b>Satisfied</b>	115	30.3
<b>Fully Satisfied</b>	139	36.6
<b>Total</b>	380	100.0
<b>Internet</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>Strongly Dissatisfied</b>	15	3.9
<b>Dissatisfied</b>	27	7.1
<b>Neutral</b>	30	7.9
<b>Satisfied</b>	118	31.1
<b>Fully Satisfied</b>	190	50.0
<b>Total</b>	380	100.0
<b>Referral Service</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>Strongly Dissatisfied</b>	9	2.4
<b>Dissatisfied</b>	23	6.1
<b>Neutral</b>	29	7.6
<b>Satisfied</b>	157	41.3
<b>Fully Satisfied</b>	162	42.6
<b>Total</b>	380	100.0
<b>Translation Service</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>Strongly Dissatisfied</b>	9	2.4
<b>Dissatisfied</b>	23	6.1
<b>Neutral</b>	58	15.3
<b>Satisfied</b>	105	27.6
<b>Fully Satisfied</b>	185	48.7
<b>Total</b>	380	100.0

The information in Table 43 emphasizes the value of a library's services and points out potential areas for development to raise student satisfaction.

**Circulation:** Merely 7.6% of those surveyed said they were extremely dissatisfied with the library's circulation services. Many respondents—nearly one-fifth (19.7%)—are not happy with the circulation services. Nearly respondents, or 26.3%, were neither firmly in favor of nor against the circulation services offered. Thirty percent of the respondent's express satisfaction with the circulation services. 16.3% of those surveyed said they are very happy with the circulation services. This suggests that a significant percentage of students think the circulation services provided by the library are outstanding and either meet or surpass their expectations.

**Reference Service:** 7.1% of respondents, a modest percentage, are extremely dissatisfied with the reference services the library offers. 15.8% of respondents, or nearly one-sixth, are not happy with the reference services. In terms of the reference services offered, many respondents—25.5%—do not strongly agree nor disapprove. 32.9% of respondents, a sizable number, expressed satisfaction with the reference services. The reference services have received complete satisfaction from 18.7% of the respondents.

**CAS (Computer-Assisted Services):** A small proportion of 6.3% of respondents are extremely dissatisfied with the CAS that the library offers. This suggests that there are serious problems or deficiency in the provided computer-assisted services, like availability, dependability, or functionality. 13.7% of respondents, or nearly one-seventh, expressed dissatisfaction with the CAS, suggesting that there may be some perceived flaws in the system. Because they may have had differing experiences, many respondents—22.6%—did not strongly agree or disagree with the CAS that was offered. A sizable percentage of participants (33.4%) express satisfaction with the CAS. They are happy with the computer-assisted services the library offers. Of the respondents, almost one-fourth (23.9%) are completely happy with the CAS.

**Online Public Access:** 8.9% of respondents fell into strongly dissatisfied category, indicating a small but notable portion of users who are highly dissatisfied with the online public access. 21.3% expressed dissatisfaction, suggesting a significant portion of users who are not satisfied with the current system. 25.5% of respondents are neutral, indicating that they neither have strong positive nor negative feelings about the online public access. 28.7% of respondents reported satisfaction, indicating that a considerable portion of users are content with the current system. 15.5% of respondents are fully satisfied, indicating a smaller but still significant

portion of users who are highly pleased with the online public access. It is important to understand what aspects contribute to their satisfaction to replicate and enhance them.

**Catalogue:** A tiny but significant portion of users are extremely displeased with the catalogue, as indicated by the 5.5% of respondents that fall into the strongly displeased category. 7.4% of users voiced dissatisfaction indicating that there is still a subset of students who are not happy with the present catalog system. 20.3% of respondents expressed neutral opinion, meaning they had no strong feelings for or against the catalogue. According to 30.3% of respondents, the existing catalogue system is satisfactory for a considerable fraction of consumers. 36.6% of respondents, by far, are completely happy with the catalogue system

**Internet service:** Merely 3.9% of participants express extreme dissatisfaction with the Internet service, suggesting a tiny minority with noteworthy complaints. 7.1% of respondents expressed dissatisfaction, indicating that there is a little percentage of users who are not happy with the way the Internet is now provided. 7.9% of respondents are indifferent, meaning they have no strong feelings for or against the Internet service. This category can stand for people who are neutral or have not made up their minds. A sizable majority of users are satisfied with the existing Internet service, as seen by the 31.1% of respondents who reported being satisfied. 50.0% of respondents are very happy with the Internet service.

**Referral service:** A relatively small number of respondents—just 2.4%—strongly disapprove of the Referral Service, suggesting serious problems. 6.1% of respondents expressed dissatisfaction, indicating that there may be a smaller number of users that have issues with the Referral Service. 7.6% of respondents are indifferent, meaning they have no strong feelings for or against the Referral Service. A sizable percentage of users are happy with the Referral Service, as indicated by the 41.3% of respondents who expressed pleasure. 42.6% of respondents, the greatest percentage, said they are very happy with the referral service.

**Translation service:** Merely 2.4% of participants express extreme dissatisfaction with the Translation Service, suggesting that a relatively small fraction faces serious problems. 6.1% of respondents expressed dissatisfaction, indicating that there is still a tiny percentage of users that have problems with the translation service. 15.3% of participants expressed neutrality, meaning they had no strong feelings for or against the Translation Service. A considerable proportion of consumers are satisfied with the Translation Service, as evidenced by the 27.6% of respondents who expressed satisfaction. 48.7% of respondents, by far, are very happy with the translation service.

### 5.43 Level of satisfaction about library amenities

The extent to which patrons feel pleased and content with the amenities provided by the library is discussed in table 44.

*Table 44: Satisfaction about library amenities*

Library Atmosphere		
	No. of responses	Percent
Strongly Dissatisfied	2	.5
Dissatisfied	12	3.2
Neutral	26	6.8
Satisfied	135	35.5
Fully Satisfied	205	53.9
Total	380	100.0
Library Cleanliness		
	No. of responses	Percent
Strongly Dissatisfied	5	1.3
Dissatisfied	15	3.9
Neutral	73	19.2
Satisfied	175	46.1
Fully Satisfied	112	29.5
Total	380	100.0
Electricity		
	No. of responses	Percent
Strongly Dissatisfied	2	.5
Dissatisfied	17	4.5
Neutral	28	7.4
Satisfied	109	28.7
Fully Satisfied	224	58.9
Total	380	100.0
Lavatory		
	No. of responses	Percent



<b>Strongly Dissatisfied</b>	9	2.4
<b>Dissatisfied</b>	28	7.4
<b>Neutral</b>	30	7.9
<b>Satisfied</b>	92	24.2
<b>Fully Satisfied</b>	221	58.2
<b>Total</b>	380	100.0
<b>Drinking Water</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>Strongly Dissatisfied</b>	5	1.3
<b>Dissatisfied</b>	8	2.1
<b>Neutral</b>	65	17.1
<b>Satisfied</b>	97	25.5
<b>Fully Satisfied</b>	205	53.9
<b>Total</b>	380	100.0
<b>Seat Comfort</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>Strongly Dissatisfied</b>	14	3.7
<b>Dissatisfied</b>	22	5.8
<b>Neutral</b>	76	20.0
<b>Satisfied</b>	186	48.9
<b>Fully Satisfied</b>	82	21.6
<b>Total</b>	380	100.0

**Library Atmosphere:** The percentage of respondents who are severely dissatisfied with the library atmosphere is just 0.5%, meaning that only a very small fraction has serious problems. 3.2% of respondents expressed dissatisfaction, indicating that there is still a little percentage of users who are not totally content with the library's atmosphere. 6.8% of respondents are indifferent, meaning they do not feel strongly either way about the library atmosphere. A considerable proportion of student's express satisfaction with the library atmosphere, as seen by the 35.5% of respondents who expressed satisfaction. 53.9% of those surveyed said they are completely happy with the library's atmosphere.

**Library Cleanliness:** A relatively tiny minority of respondents—1.3%—strongly disagree with the cleanliness of the library, showing serious worries about cleanliness. 3.9% of respondents expressed dissatisfaction, indicating that there is still a little percentage of library patrons who have concerns about the facility's cleanliness. 19.2% of respondents are indifferent, meaning they don't feel strongly about how clean the library is. 46.1% of respondents said they were satisfied, showing that a sizable majority of patrons are happy with the library's level of cleanliness. Of those surveyed, 29.5% are quite happy with how clean the library is. This suggests that a significant proportion of consumers express great satisfaction with the cleanliness.

**Electricity service:** The percentage of respondents who are severely dissatisfied with the electricity service is just 0.5%, meaning that only a very small minority have serious issues. A further little percentage of respondents—4.5%—are not totally satisfied with the electricity service, indicating that they are not entirely happy with it. 7.4% of respondents are indifferent, meaning they have no strong feelings for or against the electricity service. A considerable proportion of users are satisfied with the Electricity service, as seen by the 28.7% of respondents who expressed satisfaction. 58.9% of respondents are very happy with the electricity service. This suggests that a sizable majority of customers are happy with the services.

**Lavatory:** 2.4% of respondents are extremely unhappy with the restroom, which is a tiny but significant percentage with serious complaints. 7.4% of respondents expressed dissatisfaction, indicating that there is still a tiny percentage of people who have some complaints about the restroom. 7.9% of respondents are indifferent, meaning they have no strong feelings for or against the restroom. A sizable majority of consumers are satisfied with the restroom, as seen by the 24.2% of respondents who expressed satisfaction. 58.2% of respondents said they are very happy with the restroom. This suggests that a sizable majority of users are quite happy with restroom facility.

**Drinking Water:** A small percentage of respondents—1.3%—have serious complaints about the Drinking Water service, showing a lack of satisfaction. A further little percentage of respondents—2.1%—are not totally satisfied with the Drinking Water service, indicating that they are not entirely delighted with the product. 17.1% of participants expressed neutrality, meaning they had no strong feelings for or against the Drinking Water service. A considerable proportion of users are satisfied with the Drinking Water service, as seen by the 25.5% of

respondents who expressed satisfaction. 53.9% of respondents are very happy with the drinking water service. This suggests that a sizable majority of customers are happy with the services.

**Seat Comfort:** A modest but noticeable number of respondents—3.7%—are extremely unhappy with the Seat Comfort, raising serious concerns. 5.8% of respondents expressed dissatisfaction, indicating that there is still a tiny percentage of people who are not completely content with Seat Comfort. 20.0% of the respondents are indifferent, meaning they have no strong feelings for or against the Seat Comfort. A sizable percentage of customers are happy with the Seat Comfort, as indicated by the 48.9% of respondents who expressed pleasure. A significant proportion of users express great satisfaction with the comfort of their seats, as evidenced by the 21.6% of respondents who are entirely satisfied with the seat comfort.

#### 5.44 Attitude and skill of library staff towards users

The attitude and knowledge of library staff members have a big influence on the connection between the library and its patrons. A pleasant demeanor fosters a friendly atmosphere, and people with a variety of skills can assist with research, handle collections efficiently, give correct information, and present educational programs. Precise knowledge coupled with a warm demeanor guarantees that kids receive excellent care. Table 45 discusses the precise information.

*Table 45: Attitude and skill of library staffs*

<b>Helpful Attitude</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>Strongly Dissatisfied</b>	1	.3
<b>Dissatisfied</b>	46	12.1
<b>Neutral</b>	95	25.0
<b>Satisfied</b>	171	45.0
<b>Fully Satisfied</b>	67	17.6
<b>Total</b>	380	100.0
<b>Pleasant behavior</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>Strongly Dissatisfied</b>	4	1.1
<b>Dissatisfied</b>	47	12.4
<b>Neutral</b>	123	32.4
<b>Satisfied</b>	154	40.5

<b>Fully Satisfied</b>	52	13.7
<b>Total</b>	380	100.0
<b>Skillfulness' of the staff</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>Strongly Dissatisfied</b>	16	4.2
<b>Dissatisfied</b>	19	5.0
<b>Neutral</b>	34	8.9
<b>Satisfied</b>	86	22.6
<b>Fully Satisfied</b>	225	59.2
<b>Total</b>	380	100.0
<b>Communication with right answer</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>Strongly Dissatisfied</b>	8	2.1
<b>Dissatisfied</b>	52	13.7
<b>Neutral</b>	89	23.4
<b>Satisfied</b>	127	33.4
<b>Fully Satisfied</b>	104	27.4
<b>Total</b>	380	100.0

**Helpful Attitude:** Only 0.3% of respondents are strongly dissatisfied with the Helpful Attitude, indicating a very small minority with significant concerns about the helpfulness of the service. 12.1% of respondents are dissatisfied, suggesting another portion of users who are not entirely happy with the helpful attitude. 25.0% of respondents are neutral, indicating that they neither strongly like nor dislike the helpful attitude. 45.0% of respondents reported satisfaction, indicating a significant portion of users are content with the helpful attitude. 17.6% of respondents are fully satisfied with the Helpful Attitude.

**Pleasant behaviour:** A minuscule but discernible minority of respondents—1.1%—are extremely unhappy with the pleasant behavior, reflecting serious concerns about the conduct of employees or service providers. 12.4% of respondents expressed dissatisfaction, indicating that some users are not totally content with the conduct they encounter. Indicating that they do not particularly appreciate or detest the behavior they encounter, 32.4% of respondents are neutral. 40.5% of respondents said they were satisfied, showing that a sizable percentage of consumers are happy with the agreeable conduct they encounter. 13.7% of those surveyed say they are very happy with the pleasant behavior.

**Skillfulness' of the staff:** 4.2% of respondents are very unsatisfied with the staff's competence level, showing a tiny but significant minority that has serious doubts about the staff's ability. 5.0% of respondents expressed dissatisfaction, indicating that some users are not totally satisfied with the staff's level of ability. 8.9% of respondents are indifferent, meaning they do not really appreciate or dislike the staff's level of ability. 22.6% of respondents said they were satisfied, suggesting that some users are happy with the staff's level of expertise. A large percentage of responders (59.2%) are extremely happy with the staff's level of expertise. This suggests that a substantial majority of users are quite happy with the staff's abilities.

**Communication with right answer:** A modest but significant minority of respondents—2.1%—are extremely unhappy with the communication that supplied the correct answers, showing serious doubts about the veracity of the information given. 13.7% of respondents expressed dissatisfaction, indicating that some users are not totally satisfied with the accuracy of the responses given. Of the respondents, 23.4% are neutral, meaning they have no strong feelings either way about the communication that provides the correct answers. A proportion of users are satisfied with the correctness of the information presented, as indicated by the 33.4% of respondents who expressed satisfaction. Of the responders, 27.4% are completely satisfied with the communication that provided the correct answers. This suggests that a significant proportion of users express great satisfaction with the preciseness of the information offered.

### 5.45 Purpose of visiting the library

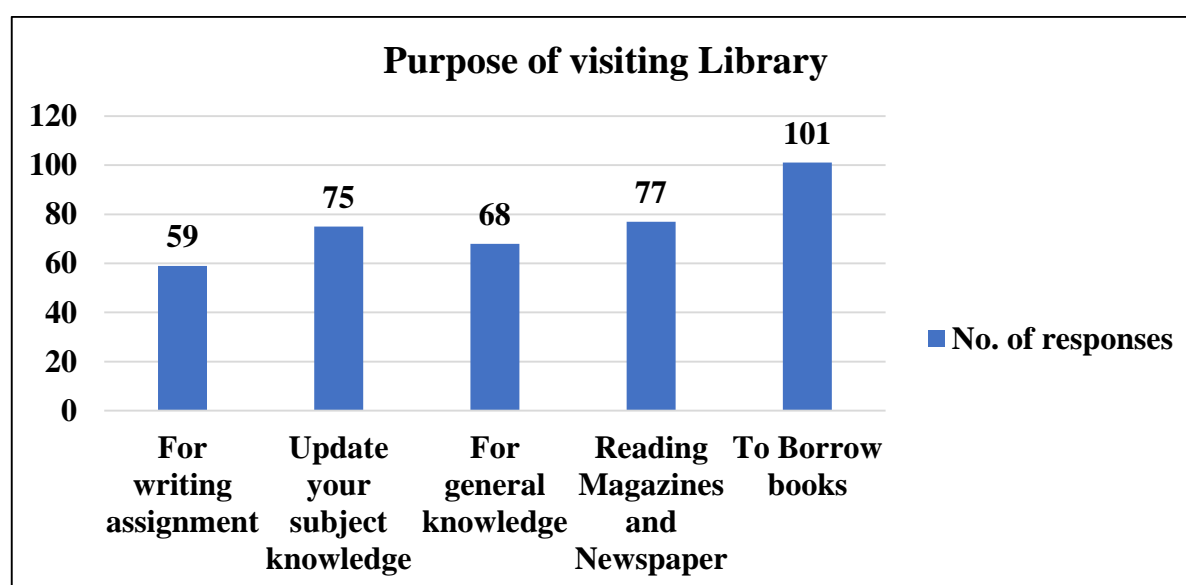
The library serves as a valuable resource for students to support their academic endeavors, whether it be through research, study, collaboration, or access to materials and technology. The purpose of the students' visits to the library is covered in the following table 46.

*Table 46: Purpose of visiting the library*

	No. of responses	Percent
<b>For writing assignment</b>	59	15.5
<b>Update your subject knowledge</b>	75	19.7
<b>For general knowledge</b>	68	17.9
<b>Reading Magazines and Newspaper</b>	77	20.3
<b>To Borrow books</b>	101	26.6

<b>Total</b>	380	100.0
--------------	-----	-------

Table 46 shows that 15.5% of respondents use the library to complete writing projects. This suggests that a significant percentage of users use the library's services for work-related or professional tasks like research and writing assignments. 19.7% of respondents said they go to the library to stay current on their subject matter. 17.9% of those surveyed say they go to the library to get general knowledge. 20.3% of those surveyed said they read newspapers and magazines at the library. 26.6% of those surveyed said they check out books from the library. This suggests that the main reason people visit libraries these days is still to borrow books.



*Figure 38: Purpose of visiting the library*

#### **5.46 Opinion regarding satisfaction with following library collection in respective library**

Analyzing how satisfied students are overall with the variety, caliber, and applicability of the resources available for loan or reference at the library entails evaluating their level of happiness with the collection. This assessment procedure attempts to determine areas that require modification or enhancement as well as the degree of satisfaction that library users have with the collection.

*Table 47: Opinions regarding satisfaction of library collections*

<b>Text Book</b>		
	<b>No. of responses</b>	<b>Percent</b>

<b>No Comments</b>	71	18.7
<b>Dissatisfied</b>	100	26.3
<b>Satisfied</b>	104	27.4
<b>Very satisfied</b>	105	27.6
<b>Total</b>	380	100.0
<b>Reference Book</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>No Comments</b>	84	22.1
<b>Dissatisfied</b>	89	23.4
<b>Satisfied</b>	117	30.8
<b>Very satisfied</b>	90	23.7
<b>Total</b>	380	100.0
<b>Periodicals</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>No Comments</b>	80	21.1
<b>Dissatisfied</b>	86	22.6
<b>Satisfied</b>	121	31.8
<b>Very satisfied</b>	93	24.5
<b>Total</b>	380	100.0
<b>Newspaper/ Magazines</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>No Comments</b>	70	18.4
<b>Dissatisfied</b>	82	21.6
<b>Satisfied</b>	123	32.4
<b>Very satisfied</b>	105	27.6
<b>Total</b>	380	100.0
<b>Thesis and Dissertation</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>No Comments</b>	86	22.6
<b>Dissatisfied</b>	79	20.8
<b>Satisfied</b>	115	30.3
<b>Very satisfied</b>	100	26.3

<b>Total</b>	380	100.0
<b>Electronic Resources</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>No Comments</b>	76	20.0
<b>Dissatisfied</b>	75	19.7
<b>Satisfied</b>	112	29.5
<b>Very satisfied</b>	117	30.8
<b>Total</b>	380	100.0
<b>CD ROM</b>		
	<b>No. of responses</b>	<b>Percent</b>
<b>No Comments</b>	84	22.1
<b>Dissatisfied</b>	88	23.2
<b>Satisfied</b>	110	28.9
<b>Very satisfied</b>	98	25.8
<b>Total</b>	380	100.0

The given data in table 47 represents responses to a question or statement about textbooks in library, with respondents categorizing their satisfaction levels.

**Text Book:** In regards to the textbook, 18.7% of the students declined to comment. Of those surveyed, 26.3% said they were not happy with the textbook. Of those surveyed, 27.4% said they were happy with the textbook. The percentage of students who said they were extremely satisfied with the library's textbook was 27.6%. This shows that the textbook satisfied their needs and beyond their expectations, indicating a high level of approbation.

**Reference Book:** Of the respondents that provided feedback on their satisfaction levels with a reference book, 22.1% did not have anything to say about it. 23.4% of pupils said they were not happy with the reference book. This implies that there might be some areas in need of improvement. Regarding the reference book, 30.8% of pupils expressed satisfaction. The percentage of pupils who expressed high satisfaction with the reference book was 23.7%.

**Periodicals:** In analyzing the data about respondents' satisfaction with magazines, it was found that 21.1% of students had no feedback to share about them. The percentage of responders who were unhappy with the periodicals was 22.6%. This suggests that several features of the magazines fell short of their requirements or expectations. Of those surveyed, 31.8% said they



were happy with the publications. Of the pupils, 24.5% said they were really happy with the periodicals.

**Newspapers/ Magazines:** 18.4% of respondents did not provide any feedback about newspapers or magazines, according to the statistics interpreting respondents' satisfaction levels with newspapers and magazines. Students who were unhappy with newspapers or magazines made up 21.6% of the student body. A total of 32.4% of participants expressed contentment with newspapers or magazines. A significant proportion of students, 27.6%, expressed great satisfaction with newspapers or magazines.

**Electronic Resources:** Analysis of the data pertaining to respondents' satisfaction levels with electronic resources revealed that 20.0% of students had no feedback to share. 19.7% of those surveyed said they were not happy using the electronic materials. Students' pleasure with electronic resources was reported by 29.5% of them. The use of electronic resources was rated as extremely satisfactory by 30.8% of respondents.

**CD-ROMS:** Based on the analysis of respondents' satisfaction scores with CD-ROMs, it was found that 22.1% of students had no feedback at all. Of those surveyed, 23.2% said they were unhappy with CD-ROMs. Students who were satisfied with CD-ROMs were 28.9% of the sample. CD-ROMs were rated as extremely satisfactory by 25.8% of respondents.

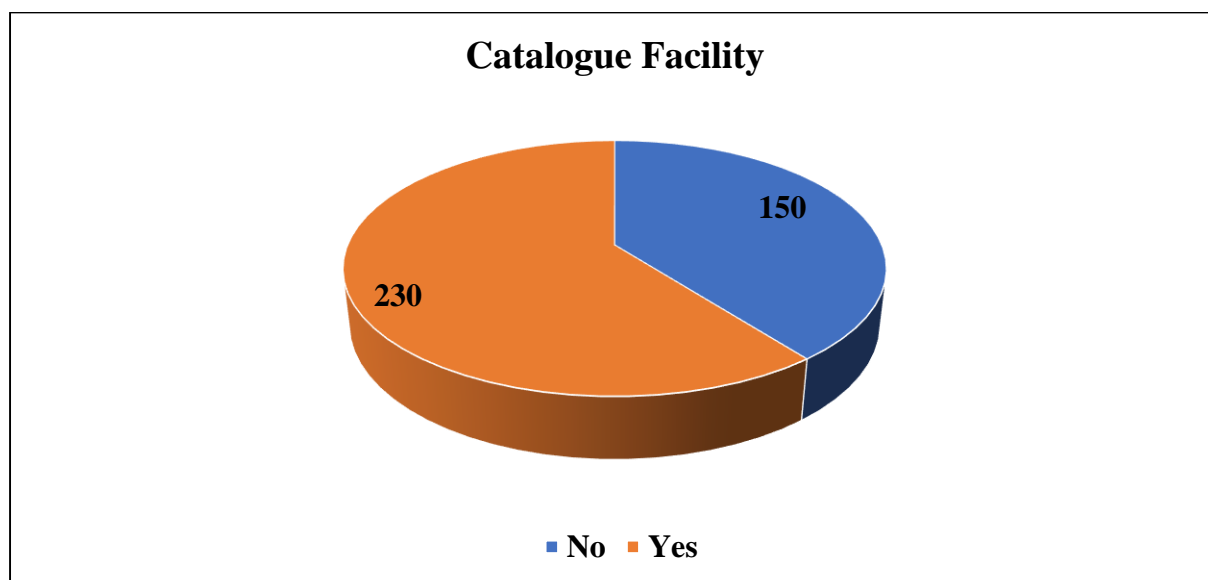
### 5.47 Catalogue facility

A cataloging facility's main goal is to offer an organized, methodical way to manage and arrange objects or data. Users can quickly find and retrieve certain objects, keep track of their availability or status, and obtain insights into the collection by cataloguing their belongings. Moreover, cataloging facilitates effective resource sharing, preservation, and inventory management, which makes it a crucial part of numerous businesses and sectors. Table 48 discusses the details.

*Table 48: Catalogue Facility*

Is the catalogue facility available in your library to local the reading materials?		
	No. of responses	Percent
No	150	39.5
Yes	230	60.5
Total	380	100.0

39.5% of respondents indicated that the catalogue facility is not available in their library. 60.5% of students reported that the catalogue facility is available in their library. This indicates that many respondents have access to a catalogue system for locating reading materials.



*Figure 39: Catalogue facility*

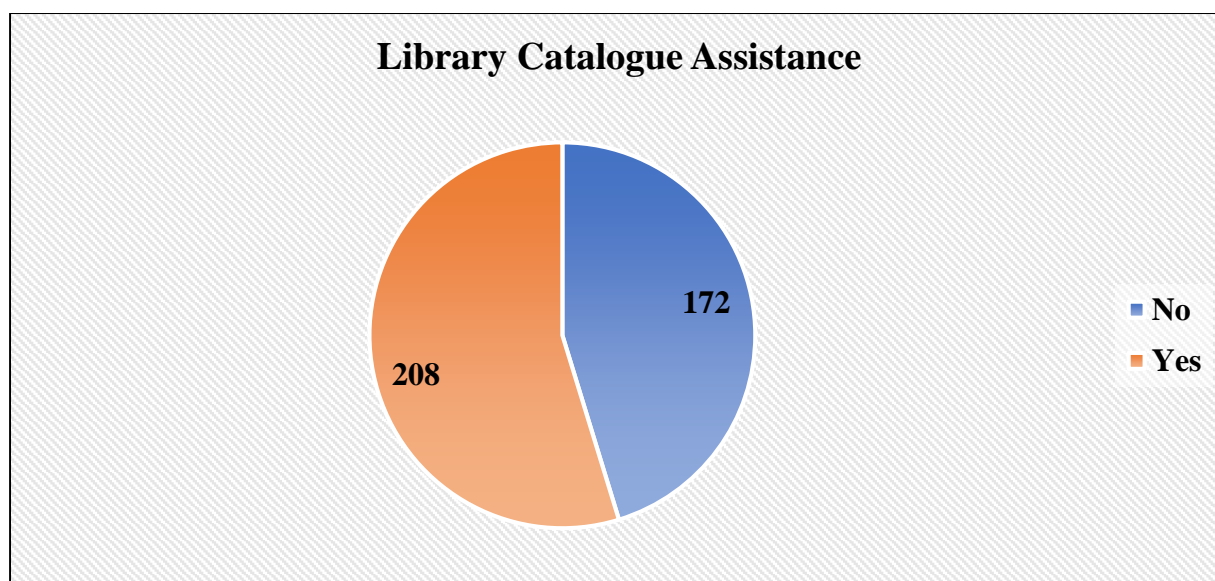
#### 5.48 Library Catalogue Assistance

Information is electronically kept in a digital cataloging facility and is accessible and searchable via a computer or internet platform. The following table details information.

*Table 49: Library Catalogue Assistance*

	No. of responses	Percent
<b>No</b>	172	45.3
<b>Yes</b>	208	54.7
<b>Total</b>	380	100.0

Interpreting the data on the availability of a certain feature of library catalogue based on responses, 45.3% of students indicated that the feature in question is not available. 54.7% of respondents reported that the feature is available.



*Figure 40: Library Catalogue Assistance*

#### 5.49 University wise Student Distribution

Examining the student population distribution in various university libraries yields important information on how libraries are used, how resources are distributed, and how well services are provided. Individuals can decide where to distribute funds, how to customize marketing plans, and what upgrades might be required to draw and keep students by looking at the student distribution among these universities.

*Table 50: University wise Student Distribution*

NAME OF UNIVERSITY	Frequency	Percentage
Jadavpur University	96	25.26
University of Calcutta	48	12.63
The University of Burdwan	67	17.63
University of Kalyani	63	16.58
Rabindra Bharati University	23	6.05
West Bengal State University	12	3.16
University of North Bengal	20	5.26
Vidyasagar University	51	13.42
<b>Total</b>	<b>380</b>	<b>100.00</b>

Table 50 presents a clear picture of how different university populations use their libraries based on the distribution of students throughout those universities, as demonstrated

by the percentages of library users. With 25.26% of all student visits, Jadavpur University leads by a wide margin, suggesting that the library is well regarded and extensively used, maybe because of its wealth of resources, welcoming study spaces, or engaging engagement initiatives. The University of Burdwan and the University of Kalyani have noteworthy percentages of 17.63% and 16.58%, respectively, after Jadavpur University. This significant involvement implies that these colleges also provide reputable library services that successfully address the demands of their students.

13.42% and 12.63% of student visits are attributed to Vidyasagar University and University of Calcutta, respectively. These numbers show moderate library use, which is consistent with the institution's balanced approach to resource allocation and student interaction with the space. The rates at Rabindra Bharati University and University of North Bengal are lower, with 5.26% and 6.05%, respectively. This may indicate a lack of funding, ineffective outreach, or other constraints on student use. With a proportion of 3.16%, West Bengal State University has the lowest usage of libraries overall. This could indicate that there are significant potential to improve library services and increase student engagement.

## 5.50 Descriptive Statistics

Descriptive statistics is a statistical discipline that focuses on summarizing and describing data in a concise and informative manner. It encompasses a range of techniques and measures that help in understanding the central tendencies, variability, and distribution of a dataset. Measures such as mean, median, and mode provide insights into the average or typical value of a dataset, while measures of dispersion like range, variance, and standard deviation indicate the spread or variability of the data points. By employing descriptive statistics, researchers and analysts can effectively communicate the key characteristics of a dataset, facilitating better comprehension and decision-making.

*Table 51: Descriptive Statistics - Level of satisfaction about the services provided by the library*

	Mean	Std. Error	Std. Deviation
<b>Circulation</b>	3.28	0.060	1.176
<b>Reference Service</b>	3.40	0.060	1.166
<b>CAS</b>	3.55	0.060	1.176
<b>Online Public Access</b>	3.21	0.062	1.200

<b>Catalogue</b>	3.85	0.059	1.158
<b>Internet</b>	4.16	0.056	1.094
<b>Referral Service</b>	4.16	0.050	0.967
<b>Translation Service</b>	4.14	0.053	1.038

The data provided in table 51 gives a statistical overview of various library services, including circulation, reference service, CAS (Current Awareness Service), online public access, catalogue, internet, referral service, and translation service. Each service is assessed in terms of mean satisfaction scores, standard errors, and standard deviations. Circulation services have a mean score of 3.28 with a standard error of 0.060 and a standard deviation of 1.176, indicating moderate user satisfaction with a relatively consistent response pattern. Reference services show a slightly higher mean score of 3.40, with similar consistency (standard error of 0.060 and standard deviation of 1.166). CAS has a mean satisfaction score of 3.55, matching circulation in terms of standard error (0.060) and standard deviation (1.176).

Online public access services received a mean score of 3.21, the lowest among the services evaluated, with a standard error of 0.062 and a standard deviation of 1.200, suggesting greater variability in user satisfaction. The catalogue service scored higher with a mean of 3.85, a standard error of 0.059, and a standard deviation of 1.158, indicating relatively high and consistent satisfaction. Internet services and referral services both received high mean scores of 4.16. The internet service's standard error was 0.056 and the standard deviation was 1.094, showing a high level of satisfaction with moderate variability. Referral services had the lowest standard deviation (0.967) and a standard error of 0.050, indicating the most consistent and high user satisfaction among all services evaluated.

Translation services also had a high mean score of 4.14, with a standard error of 0.053 and a standard deviation of 1.038, reflecting high user satisfaction and consistency. Overall, referral and internet services emerged as the most highly rated and consistently satisfying services, whereas online public access services were the least satisfying with the highest variability in user responses.

*Table 52: Descriptive statistics - Level of satisfaction about the library amenities*

	<b>Mean</b>	<b>Std. Error</b>	<b>Std. Deviation</b>
<b>Library Atmosphere</b>	4.39	0.041	0.793
<b>Library Cleanliness</b>	3.98	0.045	0.875

<b>Electricity</b>	4.41	0.044	0.850
<b>Lavatory</b>	4.28	0.054	1.044
<b>Drinking Water</b>	4.29	0.047	0.913
<b>Seat Comfort</b>	3.79	0.050	0.968

The statistical data provided offers insights into various aspects of the library environment, including atmosphere, cleanliness, electricity, lavatory facilities, drinking water, and seat comfort, evaluated based on mean satisfaction scores, standard errors, and standard deviations. The library atmosphere received a high mean satisfaction score of 4.39, with a standard error of 0.041 and a standard deviation of 0.793, indicating very positive and consistent user feedback. Library cleanliness was rated slightly lower with a mean score of 3.98, a standard error of 0.045, and a standard deviation of 0.875, reflecting good but slightly more variable satisfaction.

Electricity services in the library were rated the highest with a mean score of 4.41, and a standard error of 0.044, while the standard deviation was 0.850, indicating very high user satisfaction and consistent responses. Lavatory facilities received a mean score of 4.28 with a standard error of 0.054 and a standard deviation of 1.044, showing high satisfaction but with greater variability in user opinions compared to other services. The lavatory facilities received a mean score of 4.28, with a standard error of 0.054 and a higher standard deviation of 1.044. This higher standard deviation indicates more variability in user experiences, suggesting that while many users are satisfied with the lavatory facilities, there are a notable number of users who had less satisfactory experiences.

Drinking water availability also scored well, with a mean satisfaction score of 4.29, a standard error of 0.047, and a standard deviation of 0.913. This indicates that most users find the drinking water facilities to be adequate and satisfactory, with moderate consistency in their experiences. Lastly, seat comfort received the lowest satisfaction rating, with a mean score of 3.79, a standard error of 0.050, and a standard deviation of 0.968. The relatively lower mean score and higher standard deviation indicate that users find the seating less comfortable than other amenities, with considerable variation in their experiences.

### 5.51 Opinion about the attitude and skill of library staff towards users

Assessing the disposition and proficiency of library personnel towards patrons offers significant perspectives on the caliber of customer assistance and general contentment. The attitude of the staff, which reflects their friendliness, assistance readiness, and approachability, is vital to fostering a warm and encouraging workplace. Since it makes users feel appreciated and valued, a good attitude from staff members frequently translates into higher user satisfaction.

*Table 53: Descriptive statistics - Opinion about the attitude and skill of library staff towards users*

	Mean	Std. Error	Std. Deviation
<b>Helpful Attitude</b>	3.68	0.047	0.912
<b>Pleasant behaviour</b>	3.53	0.047	0.914
<b>Skillfulness of the staff</b>	4.28	0.056	1.090
<b>Communication with right answer</b>	3.70	0.055	1.077

Several important insights are revealed by evaluating the attitudes and abilities of library workers toward patrons. The staff's friendly attitude was rated 3.68 on average, with a standard deviation of 0.912 and a standard error of 0.047. This suggests that customers have a generally positive opinion, although there is still space for development. Although many users believe the personnel to be helpful, the replies vary, indicating that user experiences are inconsistent. The feature with the lowest rating among those evaluated was pleasant behaviour, with a mean score of 3.53, a standard error of 0.047, and a standard deviation of 0.914. This lower mean score indicates that staff friendliness and approachability need to be improved. The fact that helpful attitude has a similar standard deviation suggests that users' experiences with staff behaviour are likewise not entirely consistent.

The staff's skilfulness, on the other hand, had a significantly higher mean score of 4.28, with a standard deviation of 1.090 and a standard error of 0.056. This high rating indicates that users have a great deal of faith in the skills and expertise of the personnel. While many users regard the personnel to be very talented, the higher standard deviation suggests that there may be more diversity in user opinions, meaning that some users may not have had as positive of an experience. The mean score for communication that provided the correct response was 3.70,

with a standard deviation of 1.077 and a standard error of 0.055. This indicates that although there is noticeable variation in satisfaction, users typically view the staff's communication to be accurate and effective. While many users obtain accurate and clear information, others may suffer problems, as indicated by the greater standard deviation, which highlights variations in individual experiences.

### 5.52 One sample t-test for Amenities, Services and Attitude

To conduct a one-sample t-test on the amenities, services, and attitude data, we will evaluate the sample mean for each category in comparison to a hypothetical population mean. In this analysis, we will consider the hypothetical population mean to be 4, which is a widely accepted benchmark for satisfaction scales, where a rating of 4 signifies a "satisfactory" level. The mean value concerning Level of satisfaction in Library amenities, Services and Attitude of library staffs is considered. The detailed table 50 discusses the data.

*Table 54: One-Sample Statistics*

Test Value = 4					
	Mean	Std. Deviation	Std. Error Mean	t value	p-value
<b>Amenities</b>	4.191	0.616	0.032	6.048	.000
<b>Services</b>	3.718	0.595	0.031	-9.241	.000
<b>Attitude</b>	3.797	0.592	0.030	-6.667	.000

The results of the one-sample t-test in table 54, comparing the mean satisfaction scores of Amenities, Services, and Attitude against a hypothesized population mean of 4, provide significant insights into user satisfaction.

- For Amenities, the mean satisfaction score is 4.191, with a standard deviation of 0.616 and a standard error of 0.032. The t-value for this category is 6.048 with a p-value of 0.000. Since the p-value is less than 0.05, it indicates that the mean satisfaction score for Amenities is significantly higher than the hypothesized mean of 4. This suggests that users are generally more satisfied with the amenities provided by the library.
- In the case of Services, the mean satisfaction score is 3.718, with a standard deviation of 0.595 and a standard error of 0.031. The t-value here is -9.241 with a p-value of 0.000. The negative t-value indicates that the mean satisfaction score for Services is



significantly lower than the hypothesized mean of 4. This result points to a general satisfaction among users regarding the services provided by the library.

- For Attitude, the mean satisfaction score is 3.797, with a standard deviation of 0.592 and a standard error of 0.030. The t-value is -6.667 with a p-value of 0.000. Like Services, the negative t-value signifies that the mean satisfaction score for Attitude is also significantly lower than the hypothesized mean of 4, indicating that users are satisfied with the attitude of the library staff towards users.

### 5.53 t-test: Gender and frequency of Library document use between online and offline modes

The t-test is used to analyze the difference between gender and frequency of library documents which is online and offline modes. The independent-samples t-test compares the means between two unrelated groups on the dependent variable.

H2: There is a significant difference in the frequency of Library document use between online and offline modes.

*Table 55: Group statistics - Gender and frequency of resource documents used between online and offline modes*

	Gender of the Respondent	N	Mean	Std. Deviation	Std. Error Mean
<b>Which type of resources do you use the most?</b>	<b>Male</b>	196	1.52	0.501	0.036
	<b>Female</b>	184	1.41	0.494	0.037

The information shows that male and female respondents use different kinds of resources more frequently. With a standard deviation of 0.501 and a standard error of 0.036, the mean score for men is 1.52, on a scale where lower values probably correspond to kinds of resources. The average score for females is 1.41, with a 0.037 standard error and a 0.494 standard deviation. This shows that the preferred resource categories of males and females are slightly different, with males often using a distinct set of resources more frequently than females. These means are trustworthy approximations of the population means, as shown by the tiny standard errors.

**Table 56: Independent sample t-test for Gender and frequency of resource documents used between online and offline modes**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Which type of resources do you use the most?	Equal variances assumed	5.120	0.024	2.103	378	0.036*	1.107	0.051	0.007	0.208
	Equal variances not assumed			2.104	377.09	0.036*	1.107	0.051	0.007	0.208

Note: \* denotes Significance at 5% level

The group means are statistically significantly different because the p-value is 0.043 which is less than 0.05 according to table 56. Hence, by rejecting the null hypothesis it is concluded that there is significant difference between frequency of repayment and respondents who are unable to repay the loan.

### 5.54 Chi-square: Location and time spend in the library

H5: There are significant differences in Location of students and time spent in the library.

**Table 57: Crosstabs**

Location of the residence * Time spent in the library by students Cross tabulation						
		Time spent in the library by students				Total
		Less than half an hour	Half an hour to 1 hour	1 - 2 hours	2 - 4 hours	
Location of the residence	Urban	24	36	40	37	137
	Semi-urban	21	42	39	42	144
	Rural	25	32	20	22	99

Total	70	110	99	101	380
-------	----	-----	----	-----	-----

Table 57 is the crosstabs table and it provides information that is useful for interpreting the chi-square test result. The row total and column total are described on basis of variables taken: Location of students and time spent in the library.

*Table 58: Chi-square tests*

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.408 <sup>a</sup>	6	0.285
Likelihood Ratio	7.353	6	0.289
Linear-by-Linear Association	2.937	1	0.087
N of Valid Cases	380		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 18.24.			

The chi square statistic appears in the value column immediately to the right of “Pearson Chi-Square”. In this analysis, the value of chi-square statistic is 7.408. The p-value 0.285 appears in the same row in the “Asymptotic Significance (2-sided)” column. The result is not significant if this value is more than the designated alpha level of 0.05. To put it simply, the result is not significant – the data suggests that the variables Location of students and time spent in the library are not associated with each other.

## **Chapter 6: Findings**

## **Chapter 6: Findings**

### **6. Findings of the Study**

#### **6.1 General Overview**

This chapter gives the overall findings for the following criteria such as university librarians, infrastructure based on ICT application, university library depends on e-resources, ICT related information use by the librarian and ICT related information use by the students.

#### **6.2 General information related to the University Librarians**

The library is staffed by a varied team of professionals who collaborate to guarantee the efficient functioning of the facility. This team comprises librarians, library assistants, catalogers, archivists, IT specialists, maintenance staff, and administrative personnel. Every member of the library staff plays a vital part in delivering services to library users, organizing and preserving the library's collection, and overseeing the library's daily operations. Collectively, they strive to establish a hospitable and effective environment for patrons while fostering literacy, education, and community access to information.

From the Library Staff table (15), it has been found that with 15 Assistant Librarians, Jadavpur University has the most diverse staff, including Peons, Supervisors, Sorters, Binders, and Record Supervisors. There are a lot of Library Attendants/Helpers (32) and Supervisors in the Library Service (14) at University of Calcutta. There were four Library Assistants and six Sorters at the University of Burdwan. There are only two librarians at Kalyani University, as well as five library attendants and helpers, along with a limited number of other staff members. 2 Assistant Librarians and 4 Technical Assistants are key roles at Rabindra Bharati University. In addition to the Library Attendants/Helpers (10), West Bengal State University also uses Contractual Staff (7). There are four Technical Assistants and seven Contractual Staff at North Bengal University, which is similar to the staffing structure of other smaller universities. There is no librarian at Vidyasagar University, but there are three assistant librarians and five library attendants/helpers.

#### **6.3 Universities libraries infrastructure based on ICT Application**

The hardware, software, networks, and other technological elements that facilitate the processing, storing, and transmission of information and communication inside a society or

organization are referred to as information and communication technology (ICT) infrastructure. Supporting effective and efficient communication, data management, and information access, it acts as the foundation for several user services. When it comes to user services, ICT infrastructure is essential to offering people, companies, and government's access to a variety of services.

From ICT Infrastructure (for users services) table (10), it has been found that all listed universities offer OPAC services, allowing users to search and access library resources online. Every university provides Wi-Fi services, ensuring students and faculty have access to the internet for research and study purposes. Each university offers bibliographic services, facilitating access to references and citations for academic work. Most universities provide CAS, except for Kalyani University, West Bengal State University, and Vidyasagar University. This service helps users stay updated with the latest developments in their fields. Only University of Calcutta, The University of Burdwan, and North Bengal University offer DDS, enabling users to request documents from other libraries. University of Calcutta, The University of Burdwan, Kalyani University, and Jadavpur University offer interlibrary loan services, allowing users to borrow materials from other libraries. Jadavpur University, The University of Burdwan, North Bengal University, and Vidyasagar University provide audio-visual services, enhancing teaching and learning experiences through multimedia resources. All universities offer circulation services, allowing users to check out and return library materials. Only University of Burdwan offers SDI, a service that delivers customized information based on user preferences. None of the listed universities offer translation services, which may be less relevant for library services. No university in the list provides microfilm services, indicating a shift away from this older technology in favor of digital formats.

From ICT Infrastructural service table (11), it has been found that all listed universities provide internet access, ensuring that students and faculty can utilize online resources for academic and research purposes. Jadavpur University, University of Calcutta, The University of Burdwan, Kalyani University, Rabindra Bharati University, and Vidyasagar University do not offer social media services within their library systems. However, West Bengal State University does provide access to social media, possibly for communication and outreach purposes. Jadavpur University, University of Calcutta, West Bengal State University, and Vidyasagar University offer cloud computing services, enabling users to store and access data remotely. The University of Burdwan, Kalyani University, and Rabindra Bharati University do not offer this service. Only West Bengal State University provides video conferencing services among the

listed universities, likely facilitating remote meetings and collaborations. None of the listed universities offer a specific verbal communication system within their library services, indicating a lack of dedicated infrastructure for real-time voice communication.

#### **6.4 University library depend on E-resources**

The Library provides its users with access to a large selection of electronic materials. Electronic books, electronic journals, databases, and multimedia items are all included in this category of electronic resources. The Library hopes to improve its users' research and educational experiences by making these materials accessible. Customers may study a huge variety of knowledge and information from the comfort of their own devices thanks to the ease of online access. Users' access to current and pertinent information is ensured by the provision of e-resources in the Library, which supports their intellectual and academic endeavors.

From E-Resources Available in The Library table (13), it has been found that University of Calcutta has the highest number of e-journals with 54000, followed by Jadavpur University (11762) and The University of Burdwan (8678). West Bengal State University, Rabindra Bharati University, and Kalyani University have no specified e-journals. University of Calcutta has the highest number of e-books with 54000, followed by Jadavpur University (8151) and Vidyasagar University (888). Rabindra Bharati University and West Bengal State University have no specified e-books. University of Calcutta has the highest number of online databases with 8, followed by North Bengal University (4). West Bengal State University and Rabindra Bharati University have no specified online databases. University of Calcutta has the highest number of CDs with 1500, followed by North Bengal University (250). Jadavpur University and Kalyani University have no specified CDs. Only Jadavpur University has specified audio-visual materials with 19. Other universities do not have specified audio-visual materials.

ICT infrastructure services are essential to contemporary society because they facilitate the information and communication flows that spur social progress, economic expansion, and innovation. For communities and organizations to effectively use technology to satisfy stakeholder demands and accomplish their goals, they must invest in a strong and dependable ICT infrastructure.

From ICT Infrastructural service table (11), it has been found that academics and researchers at all listed universities have access to the internet. Several universities do not provide social media services in their libraries, including Jadavpur University, University of Calcutta, The

University of Burdwan, Kalyani University, Rabindra Bharati University, and Vidyasagar University. It is an exception that West Bengal State University offers social media access for outreach and communication. There are cloud computing services available at the Universities of Jadavpur, Calcutta, West Bengal State, and Vidyasagar, but not at The University of Burdwan, Kalyani, or Rabindra Bharati. Among the institutions listed, West Bengal State University is the only one that offers video conferencing services. There is no dedicated verbal communication system within the library services offered by any of these universities.

## **6.5 ICT related information use by the librarian**

Using internet resources or library resources, bibliographic databases are accessible for the purpose of searching and retrieving information about scholarly publications, including books, journal articles, conference papers, and other scholarly materials. By giving users access to a vast array of sources across multiple fields, these databases enable professionals, students, and researchers to locate pertinent literature for their projects. By keywords, authors, or specific subjects, readers can find pertinent publications fast and obtain full-text articles or abstracts to aid in their academic work and study.

From Mode of access to bibliographic databases as per librarian table (29), it has been found that online access through Cloud Server is one mode, accounting for 6 out of 38 counts, or approximately 15.79% of the total. This data indicates that only a small fraction of the databases is accessed online via cloud servers. The most common mode of access within the library premises is through the local area network (LAN), with 27 counts out of 38, representing approximately 71.05% of the total. This suggests that most of the database access occurs within the library premises using the LAN. Offline access, which accounts for 3 counts or approximately 7.89% of the total, indicates that some databases are accessed offline, possibly through local storage or other means. Access via CD/DVD is reported for 2 counts out of 38, representing approximately 5.26% of the total. This suggests that a small portion of databases is accessed through physical media such as CDs or DVDs.

The utilization of bibliographic services encompasses a wide range of applications and is characterized by its diverse and multifaceted nature. These services play a crucial role in facilitating research, scholarship, teaching, and learning within academic institutions and across various disciplines.



From Usage of bibliographic services as per librarian table (30), it has been found that 13 librarians stated that bibliographic services are utilized once per week, constituting 34.21% of the total responses. Additionally, 12 librarians reported using these services once every two weeks (fortnightly), accounting for 31.58% of the total responses. Furthermore, 6 librarians mentioned that bibliographic services are employed once a month, representing 15.79% of the total responses. Moreover, 7 librarians reported utilizing these services twice a week, which corresponds to 18.42% of the total responses.

The information and communication technology (ICT) application is a complex system that uses a variety of software tools to carry out duties related to digital preservation for the library in an efficient and effective manner. Digital materials, including electronic books, journals, manuscripts, images, audio files, and videos, among others, should always be accessible, usable, and intact. This application is made to guarantee these qualities.

From Software used for digital preservation work for library table (33), it has been found that 2.63% of libraries opt for open-source software for digital preservation. The majority, accounting for 36.84% of libraries, depend on commercial software solutions for digital preservation. A notable portion, totaling 47.37% of libraries, have crafted their own software tailored for digital preservation purposes. This indicates that these libraries have fine-tuned their digital preservation procedures to suit their specific requirements or preferences. Furthermore, 13.16% of libraries utilize software falling under the "Others" category. This classification may encompass proprietary software not explicitly categorized as commercial, or conceivably a blend of various software solutions.

Standards are important for maintaining the integrity and validity of digital content. The content is kept safe and impenetrable using standards for digital signatures and encryption. These standards offer methods for confirming the legitimacy of digital assets and identifying any potential modifications or adjustments.

From Standards used in digital preservation work under ICT application table (34), it has been found that Dublin Core is used by 21.05% of libraries. 15.79% of libraries use the Electronic Government Metadata Standard, or E-GMS. 18.42% of libraries follow ISO-19115 guidelines. By defining metadata for geographic data, this standard ensures compatibility and consistency when representing geographical data. Finding aids for archive resources are encoded in XML format using EAD (Encoded archive Description), which is utilized at 18.42%. It improves access and discovery by offering a uniform means of describing archive collections. ONIX is

mostly used by 10.53% of libraries as a standard for expressing and sharing product information related to the book industry. It is applied to metadata related to publications such as books. 15% of libraries use MODS (Metadata Object Description Schema). It offers a bibliographic system for characterizing library resources, including digital content.

## **6.6 ICT related information use by the students**

There are several ways to assess the degree of satisfaction with the services provided by the library. First, feedback forms are used to gauge the general level of satisfaction among library patrons. These can be given to library users, asking them to score their encounters with various elements of the library's offerings, including the accessibility of materials, the staff's helpfulness, the availability of resources, and the general ambiance of the library.

From the data analysis of Level of satisfaction about the services provided by the library table (43), it has been found that merely 7.6% of those surveyed said they were extremely dissatisfied with the library's circulation services. Many respondents—nearly one-fifth (19.7%)—are not happy with the circulation services. Nearly respondents, or 26.3%, were neither firmly in favor of nor against the circulation services offered. Thirty percent of the respondent's express satisfaction with the circulation services. 16.3% of those surveyed said they are very happy with the circulation services. This suggests that a significant percentage of students think the circulation services provided by the library are outstanding and either meet or surpass their expectations. 7.1% of respondents, a modest percentage, are extremely dissatisfied with the reference services the library offers. 15.8% of respondents, or nearly one-sixth, are not happy with the reference services. In terms of the reference services offered, many respondents—25.5%—do not strongly agree nor disapprove. 32.9% of respondents, a sizable number, expressed satisfaction with the reference services. The reference services have received complete satisfaction from 18.7% of the respondents.

A small proportion of 6.3% of respondents are extremely dissatisfied with the CAS that the library offers. This suggests that there are serious problems or deficiency in the provided computer-assisted services, like availability, dependability, or functionality. 13.7% of respondents, or nearly one-seventh, expressed dissatisfaction with the CAS, suggesting that there may be some perceived flaws in the system. Because they may have had differing experiences, many respondents—22.6%—did not strongly agree or disagree with the CAS that

was offered. A sizable percentage of participants (33.4%) express satisfaction with the CAS. They are happy with the computer-assisted services the library offers. Of the respondents, almost one-fourth (23.9%) are completely happy with the CAS.

8.9% of respondents fell into strongly dissatisfied category, indicating a small but notable portion of users who are highly dissatisfied with the online public access. 21.3% expressed dissatisfaction, suggesting a significant portion of users who are not satisfied with the current system. 25.5% of respondents are neutral, indicating that they neither have strong positive nor negative feelings about the online public access. 28.7% of respondents reported satisfaction, indicating that a considerable portion of users are content with the current system. 15.5% of respondents are fully satisfied, indicating a smaller but still significant portion of users who are highly pleased with the online public access. It is important to understand what aspects contribute to their satisfaction to replicate and enhance them. A tiny but significant portion of users are extremely displeased with the catalogue, as indicated by the 5.5% of respondents that fall into the strongly displeased category. 7.4% of users voiced dissatisfaction indicating that there is still a subset of students who are not happy with the present catalog system. 20.3% of respondents expressed neutral opinion, meaning they had no strong feelings for or against the catalogue. According to 30.3% of respondents, the existing catalogue system is satisfactory for a considerable fraction of consumers. 36.6% of respondents, by far, are completely happy with the catalogue system

Merely 3.9% of participants express extreme dissatisfaction with the Internet service, suggesting a tiny minority with noteworthy complaints. 7.1% of respondents expressed dissatisfaction, indicating that there is a little percentage of users who are not happy with the way the Internet is now provided. 7.9% of respondents are indifferent, meaning they have no strong feelings for or against the Internet service. This category can stand for people who are neutral or have not made up their minds. A sizable majority of users are satisfied with the existing Internet service, as seen by the 31.1% of respondents who reported being satisfied. 50.0% of respondents are very happy with the Internet service.

A relatively small number of respondents—just 2.4%—strongly disapprove of the Referral Service, suggesting serious problems. 6.1% of respondents expressed dissatisfaction, indicating that there may be a smaller number of users that have issues with the Referral Service. 7.6% of respondents are indifferent, meaning they have no strong feelings for or against the Referral Service. A sizable percentage of users are happy with the Referral Service,

as indicated by the 41.3% of respondents who expressed pleasure. 42.6% of respondents, the greatest percentage, said they are very happy with the referral service.

Merely 2.4% of participants express extreme dissatisfaction with the Translation Service, suggesting that a relatively small fraction faces serious problems. 6.1% of respondents expressed dissatisfaction, indicating that there is still a tiny percentage of users that have problems with the translation service. 15.3% of participants expressed neutrality, meaning they had no strong feelings for or against the Translation Service. A considerable proportion of consumers are satisfied with the Translation Service, as evidenced by the 27.6% of respondents who expressed satisfaction. 48.7% of respondents, by far, are very happy with the translation service.

Therefore, it has been found that the highest satisfaction levels are found in Internet, Referral, and Translation services. A moderate level of satisfaction is reported for CAS, Reference Service, and Catalogue. Low levels of satisfaction are seen in the circulation and the online public access areas, highlighting areas that may be improved.

## **Chapter 7: Suggestions/ Recommendations and Conclusion**

## **Chapter 7: Suggestions/ Recommendations and Conclusion**

### **7. Suggestions/ Recommendations and Conclusion**

#### **7.1 Suggestions/ Recommendations**

- Technological Infrastructure should be upgraded in library services.
- Rare book holdings should be enhanced in order to improve academic resources in Library Services.
- E-Resources and open access should be enhanced in all the university libraries.
- Library Staffing must be improved as well professional training should be given.
- Plagiarism Detection have to be regulated in the university library.
- Geographical Disparities must be addressed in library management.
- Resource Allocation, Research Activities, Digital Services, Technological Integration have to be expanded.
- Centralized Library Management needs to be promoted in all the universities.
- Library Membership and Usage have to be encouraged in the library management.
- Satisfaction Levels should be monitored regularly and must be improved as well.
- Facility and Staff Satisfaction, Service Satisfaction, Resource Availability should be focused in library services.
- In order to increase accessibility and better data storage and Cloud computing services should be increased in all universities.
- For academic activities and remote collaboration video conferencing facilities must be enhanced.

## 7.2 Conclusion

Data on universities in West Bengal, including the establishment, affiliated colleges, and library holdings, is provided in this study. There are two university libraries that rise to the top of the list in terms of holdings and affiliated colleges: the University of Calcutta and Jadavpur University. Among West Bengal's leading institutions for academic research and education, their extensive collections and resources are a testament to their importance. However, smaller universities still contribute a significant amount to the academic landscape, each with its own library collections and affiliated colleges.

University resources and capabilities in West Bengal are comprehensively explored, highlighting their importance to higher education and research. Despite some universities leading in specific areas, data suggests a collective effort across all institutions to help students succeed academically. With their physical and digital resources, both Jadavpur University and the University of Calcutta provide comprehensive support for educational and research activities. Both North Bengal University and The University of Burdwan are also well-equipped in terms of library services and technology. WBSU focuses on modern communication tools while lagging behind in some traditional library equipment and services. Even if their resources are limited, other universities still contribute significantly to academic environments, each with its own strengths and weaknesses.

To ensure that all universities can provide comprehensive, high-quality academic support to their communities, they must enhance staff training, improve technological infrastructure, standardize library services, and increase resource accessibility. In addition to strong library management, staff training, technological integration, and user satisfaction, West Bengal universities have a number of areas that can be improved. The comprehensive addressing of these areas across the region will contribute to improving user-friendliness and effectiveness of libraries. These key findings and recommendations can assist West Bengal universities in strengthening their library services, fostering a more inclusive academic environment, and providing better support to students from diverse backgrounds. In order to improve the students' success and overall educational outcomes, this proactive approach will be used.

By highlighting both areas needing improvement and strengths, library services of West Bengal universities portrayed in this study. Using this data, library operations can be viewed holistically, incorporating resource availability, user engagement, and service satisfaction. Various levels of utilization and availability revealed through the assessment of infrastructural facilities in all West Bengal universities. A number of gaps in essential resources are identified, like physical amenities and catalog systems, highlighting the necessity for targeted investments to expand infrastructure and support academic pursuits. Analysis of library operations is conducted to determine the level of automation and professional staff competency.

Consequently, it emphasizes the importance of integrating advanced technologies into processes such as cataloging, circulation, and digital preservation as well as enriching the skills and efficiency of staff through continuous professional development. As a result of the evaluation of user satisfaction levels, areas of strength are identified, such as staff competence and digital resources, as well as areas of challenge, such as physical comfort and access to services. Automating housekeeping operations improves performance, resource utilization, and service delivery, as recommended by recommendations for a framework to optimize housekeeping operations. Study findings suggest that automating housekeeping operations can save time, money, and improve data quality.

Overall, the study proposes a comprehensive framework to enhance library services in West Bengal universities by enhancing infrastructure, adopting automation, training staff, and improving user-centric functions. A university's library ecosystem can be strengthened, its academic communities can be better served, and a conducive learning-research environment can be cultivated if it addresses these objectives.

### **7.3 Scope for the further research**

A comprehensive overview of the present situation and valuable areas for improvement in university libraries in West Bengal provided in this study. The results of this foundational research suggest a number of avenues for further exploring in order to increase the user satisfaction, effectiveness and efficiency of library services in the future. In library management, using machine learning (ML) and artificial intelligence (AI) can be explored in future research. To manage and



protect digital resources, block chain technology uses, also their accessibility and integrity may be examined in further studies.

In order to assess engagement levels, usage patterns and user feedback in libraries, data analytics can be used to customize their services more effectively for the needs of customers in future. In order to reduce library operations environmental impact and highlight sustainable practices, green libraries can be explored in further research.

Developing new skills and taking on new responsibilities can be explored by future studies about how librarians can support digital literacy and information management through the use of emerging technologies. It will be possible to assess the impact of library programs and events on user engagement and community building through future research. A comprehensive evaluation of library services that integrate ICT can be undertaken in the future through the development of comprehensive metrics. Future studies will benefit library services in an ever-evolving digital era by keeping them relevant, effective and user-centered. To achieve this goal, the library environment should not only support academic success but also foster an innovative, inclusive and vibrant academic culture.

## References

1. Abels, E. G., & Boll, M. (2018). Evaluating the Impact of Library Facilities and Services on User Satisfaction. *Library Hi Tech*, 36(2), 307-327.
2. Adekoya, C. O. (2018). Research Skills, ICT Application and Sustainable Library Development. *Library Philosophy & Practice*.
3. Ajayi, O. G. (2003). National Infrastructure and Support for a Virtual Library. *Retrieved from*, 10(28), 2006.<http://www.nitda.gov.ng/docs/papers/nitdavirtlib.pp>.
4. Akintunde, O. T., & Adeyemo, S. A. (2021). A Review of Automation and Digitization of Library Services in Academic Libraries. *Information and Knowledge Management*, 11(3), 9-19.
5. Ali, S., & Sreenivasarao, V. (2019). Challenges and Issues in Library Housekeeping Operations: A Case Study. *DESIDOC Journal of Library & Information Technology*, 39(2), 107-113.
6. Association of College, Research Libraries, & American Library Association. (2000). *Information literacy competency standards for higher education*. ACRL. from <http://www.ala.org/acrl/ilintro.html>.
7. Barathi, S., Loganathan, G., & Rajan, V. R. (2017). Emerging technological innovations in library knowledge management and services. *Advances in Computational Sciences and Technology*, 10(5), 1479-1486.
8. Bhatt, R. K. (2010). University libraries in India: issues and challenges. *Journal of Library and Information Science*, 35(1), 51.
9. Bhoi, N. K. (2017). Use of information communication technology (ICT) and library operation: An overview.
10. Biswas, R. (2020). Use of Customized MARC Framework for Recording Books in KOHA: With Special References to Public Libraries of West Bengal. *Library Philosophy and Practice*, 1-15.
11. Brahma, G. (1998). Surfing waves of technology. *Human capital*. 1 (12).
12. Bukowitz Wendi R, & Williams Ruth L. (2000). *The Knowledge Management Fieldbook*.
13. Census of India. (2011). Retrieved from [http://www.censusindia.gov.in/2011-provresults/prov\\_results\\_paper1\\_india.html](http://www.censusindia.gov.in/2011-provresults/prov_results_paper1_india.html)

14. Central Universities. (2018). Retrieved from <http://www.ugc.ac.in/centraluniversity.aspx>
15. Chandandeep, K. (2018). Digitizing libraries to be in pace with changing trends. *The Times of India: Education Times*, p2.
16. Chandramouli, C. (2011). *Census of India 2011*. New Delhi: Office of the Registrar General and Census Commissioner, India.
17. Chauhan, A. (2018). At Amity our passion for nurturing future ready leaders is what drive us. *The Economic Times: The Game Changer*, p3.
18. Chauhan, S. K., & Murthy, T. A. V. (2004). *Application of Information and Communication Technology (ICT) in Information Management*.
19. Chegoni, R. K. (2016). Use of eResources by students and faculty members of Kamineni Institute of Medical Services and Kamineni Institute of Dental Sciences: A study of Andhra Pradesh. *Professional journal of library & information technology*, 6 (1), 16-24.
20. Cheng, Y. C., & Ng, W. L. (2020). User Satisfaction with Library Facilities and Services: A Review of Literature. *Library Management*, 41(8/9), 639-655.
21. Chisenga, J., & Machila, S. (2021). Towards a Smart Library: A Review of the Use of Artificial Intelligence and Emerging Technologies in Libraries. *Journal of Librarianship and Information Science*, 53(2), 491-507.
22. Chiu, Y. T. H., & Cheng, Y. C. (2019). Examining User Satisfaction in Library Spaces: A Review of Literature. *The Journal of Academic Librarianship*, 45(4), 102049
23. Chow, A. S., & Rich, M. (2018). The ideal qualities and tasks of library leaders: Perspectives of academic, public, school, and special library administrators. *Synergy*, 16(2).
24. Clayton, M. (2018). *Managing library automation*. Routledge.
25. Cooper, H. M. (1988). Organizing knowledge syntheses: A taxonomy of literature reviews. *Knowledge in society*, 1(1), 104.
26. Das Majumder, P., & Jana, P. K. (2020). *Designing and Development of a standard for school Library in West Bengal* (Doctoral dissertation, Department of Library and Information Science, Vidyasagar University, Midnapore, West Bengal, India).
27. Deegan, M., & Tanner, S. (2002). The digital dark ages: digital preservation. *Library+ Information Update*, 1(PART 2), 42-43.

28. Deodhar, J. K., & Jatkari, M. G. (2020). Service Quality and User Satisfaction in Libraries: A Review of Literature. *International Journal of Library Science*, 9(2), 15-23.
29. Duarah, K. (2016). Need of Training for Continuing Professional Development of Professional Staff Working in University Libraries. Retrieved from <http://ir.inflibnet.ac.in/bitstream/1944/2021/1/17.pdf>.
30. E-books. (2010). Amar Ujala- Udaan, p.3.
31. Edwards, M. E. (2019). Library Environments and Their Impact on Satisfaction: A Systematic Review of the Literature. *Journal of Library Administration*, 59(7), 697-727.
32. Ekoja, I. (2007). Information and communication technology (ICT): Librarians knowledge, use and skills in Nigerian university libraries. *Journal of Library and Information Science*, 9(1), 1-16.
33. Enwerem, E. E., ENVULUANZA, M. A., & USUKA, E. I. (2020). The special library as a repository of knowledge: challenges and prospects. *Journal of Applied Information Science and Technology*, 13(2), 235-242.
34. Evans, P. B., & Wurster, T. S. (1997). Strategy and the new economics of information. *Harvard business review*, 75(5), 70-83.
35. Fink, A. (2019). *Conducting research literature reviews: From the internet to paper*. Sage publications.
36. Francis, A. T. (2012). Evaluation of use of consortium of e-resources in agriculture in context of Kerala Agricultural University. *DESIDOC Journal of Library & Information Technology*, 32(1), 38-44.
37. Francis, A. T., & Humayoon Kabir, S. (2008). Re-engineering the management of human resources in university libraries.
38. Gasiorowski-Denis, E. (2019). Digital object identifier (DOI) becomes an ISO standard. Retrieved from <http://www.iso.org/iso/news.htm?refid=Ref1561>
39. Ghosh, A. (1965). A guide to Nalanda. New Delhi: Archeological Survey of India.
40. Grant, M. J., & Zeeman, L. (2020). Users' Experiences and Expectations of Library Space: A Systematic Review and Qualitative Synthesis. *Journal of Academic Librarianship*, 46(6), 102241.
41. Gul, S., & Bano, S. (2019). Smart libraries: an emerging and innovative technological habitat of 21st century. *The Electronic Library*, 37(5), 764-783.
42. Hart, C. (2018). Doing a literature review: Releasing the research imagination.

43. Heim, K. (2018). Automation and Robotics in Libraries. *Journal of Library Administration*, 58(8), 789-804.
44. Hornby, A. S. (2003). Oxford advanced Learner's Dictionary. New York.
45. Huvila, I., Holmberg, K., & Ek, S. (2020). Cleaning Matters: The Materiality of Library Housekeeping. *Journal of Documentation*, 76(4), 978-994.
46. IIMs. Retrieved from <http://mhrd.gov.in/iims>
47. IISc Bangalore and IISERs. Retrieved from <http://mhrd.gov.in/iisc-bangalore-iisers>
48. IITs. Retrieved from <http://mhrd.gov.in/iits>
49. Ikoja, O. (2006). Integrating ICTs into LIS curriculum in Uganda: A paper presented at the IFLA Workshop on Integrating ICTs in LIS curriculum in Africa. 21-23 November, 2006 at Safari Court Hotel. Windhoek, Namibia. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.50.86&rep&type=pdf>.
50. India, S. Y. B. (2018). Ministry of statistics and programme implementation. *Government of India*. Retrieved from [mospi.nic.in/sites/default/files/statistical\\_year\\_book\\_india\\_2015/Table%2029.1.xlsx](https://mospi.nic.in/sites/default/files/statistical_year_book_india_2015/Table%2029.1.xlsx)
51. Jabeen, S., Hussain, S., & Ganaie, S. A. (2020). An Outline on Practicing Integrated Library System (KOHA)(special Emphasis on College Libraries). *Library Philosophy and Practice*, 1-10.
52. Jayamma, K. V., & Krishnamurthy, M. (2017). Perspectives of library automation in developing countries: a review. *Asian Journal of Information Science and Technology*, 7(2), 39-46.
53. Kajberg, L., & Hertzum, M. (2019). User Satisfaction with the Library: A Survey of Intended Users. *Information Research*, 24(4).
54. Kaul, H. K. (2015). Brainstorming on library and information services. *Delnet Newsletter*, 22 (1-2), 6-18.
55. Kaul, H.K. (2015). International symposium of digital knowledge repositories. *Delnet Newsletter*, 22 (1-2), 26-34.
56. Kaul, S. (2012). Transcending the boundaries of vision. *Delnet Newsletter*, 19 (1-2), 7-10. 62
57. Kaur, A. (2012). Academics' attitudes towards use of electronic journals: A case study of Punjab and Chandigarh. *The International Information & Library Review*, 44(4), 182-193.

58. Kaushik, K., Vichare, V., & Pothare, D. (2011). Information seeking behavior of users of cyber library: A case study of Tata Institute of Social Sciences. *Journal of Indian Library Association*, 47(1), 17-25.
59. KevalKumar, M.P. (2014). Changing role of the librarian in the ICT world. *eLibrary Science Research Journal*, 2 (11), 1-5.
60. Khan, Z. A., & Tyagi, S. (2016). Use of eResources by the users of Uttarakhand college of education, Dehradun: A case study. *Professional Journal of Library & Information Technology*, 6 (1), 129-141.
61. Kumar, B. (2010). Employability of Library and Information Science Graduates: Competencies Expected versus Taught--A Case Study. *DESIDOC Journal of Library & Information Technology*, 30(5), 74. Retrieved from <http://publications.drdo.gov.in/ojs/index.php/djlit/article/view/621/283>.
62. Lee, H., & Luyt, B. (2020). The Challenges of Maintaining Clean and Orderly Libraries: Perspectives from Library Staff. *Library Management*, 41(8/9), 606-618.
63. Leeladharan, M. (2015). SAARC Countries contribution to open access publishing: A study. *Gyankosh-The Journal of Library and Information Management*, 6(2), 40-48.
64. Leon, A., & Mathews, L. (1999). *Fundamentals of information technology*. Leon Press.
65. LibBest. (2018) Library RFID Management System. Retrieved from [http://www.rfidlibrary.com/en/default\\_e.html](http://www.rfidlibrary.com/en/default_e.html)
66. Maharana, B., & Mohanty, R. (2019). Automation in Libraries: A Review of Literature. *Library Philosophy and Practice*, 2019.
67. Malhotra, Y. (1998). Knowledge management for the new world of business. Retrieved from <http://brint.com/km/>
68. MISHRA, R., & ANGADI, M. (2011). Building an Academic Library Website: Experiences and challenges at IISER Mohali. *JOURNAL OF INDIAN LIBRARY ASSOCIATION*, 47(1), 5-10.
69. Mittal, A. (2017). Emerging Technologies and their Impact on the Libraries. *Indian Journal of Science and technology*, 10(31), 1-4.
70. Mittal, C. (2006). Information technology. Meerut: Pragati Prakashan.
71. Mommoh, R. L., & Emmanuel, V. (2019). Library staff utilization of Information and Communication Technology (ICT) for service delivery in special libraries in north central Nigeria. *Information Impact: Journal of Information and Knowledge Management*, 10(1), 33-47.

72. Moore, G. (2010). Atmosphere: Core, content and the cloud. Retrieved from <https://www.youtube.com/watch?v=0swJCYLH2Ck>
73. Moore, G. B., Rey, D A., & Rollins, J. D. (1997). Paradox for the future: Information technology shatter and shapes success. Mumbai: ETIT.
74. Moudgal, S. (2018). Cloud computing to transform education system in Karnatka. The Times of India, p.5.
75. Mu, J., Luo, L., & Wang, Y. (2021). Application of Artificial Intelligence in Library Management: A Review of Literature. *Journal of Academic Librarianship*, 47(1), 102308.
76. Muniraja A, G. M. (2021). Library Automation–An Introduction. *International Journal of Research in Library Science (IJRLS)*.
77. Nair, S., & Mani, M. (2020). Library Automation and Its Impact on Services: A Review. *DESIDOC Journal of Library & Information Technology*, 40(4), 193-200.
78. Nalsar Library. (2019). Retrieved from <http://www.nalsar.ac.in/eLibrary/aboutlibrary.html>
79. National digital library of India. (2019). Retrieved from <https://ndl.iitkgp.ac.in/>
80. Natrajan, M. & Dahiya, S. (2012). Library automation in college libraries of university of Delhi (South Campus): Problems and prospectus. *International Journal of Library and Information Management*, 3 (2), 9-16.
81. Nayana, J. (2019). A study on library automation status among the aided college libraries in Bengaluru. *Library Philosophy and Practice (e-journal)*, 3048.
82. Nilakant, V., & Ramnarayan, S. (1998). Managing organizational change. New Delhi: Response Books.
83. NITs. Retrieved from <http://mhrd.gov.in/nits>
84. Noronha, F. (2019). The ten best open source tools for librarians. Open Source for You, 7(5), 53-54
85. Nwalo, K. I. N. (2000). Collaboration in the provision and utilization of IT facilities for library and information science education in Nigeria. *Information Technology in library and information science education in Nigeria*, 35.
86. Ogunkoya, O. O., & Omotosho, R. (2021). Management of Housekeeping Operations in Academic Libraries: A Review of Literature. *Library Philosophy and Practice*.
87. Oni, F.A. (2004) Enhancing the Performance of Operations Using Appropriate Information Technology. In: Madu, E.C., Ed., Technology for Information Management and Services, Evi-Cloeman Publications, Ibadan, 95.

88. Pandey, D. K. (2016). OnLine public access catalogue usage at Rajiv Gandhi University library Itanagar: A case study. *Professional Journal of Library & Information Technology*, 6 (1), 25-31.
89. Parvez, M. M., & Chowdhury, M. A. (2020). An Assessment of the Housekeeping Practices in Libraries: The Case of Dhaka University Library, Bangladesh. *Library Philosophy and Practice*, 2024.
90. Priya. (2011). Library administration and computers. New Delhi: Information Resource Centre.
91. Rahaman, W., Patra, S., & Mondal, S. K. Open Source Tools for Effective Resource Management and Services: A Descriptive Analysis.
92. Ramesh, M. R. (2012). Reading habits of public library users in Erode Corporation, Tamilnadu: A survey. *Journal of Indian Library Association*, 48(2), 13-17.
93. Rana, M. (2019). *Study on Library and Information Process Outsourcing (LIPO): Issues and Approaches with Special Reference to Technical Institutions of West Bengal* (Doctoral dissertation, University of Calcutta (India)).
94. Rana, M., & Mondal, P. (2021). Library and information process outsourcing (LIPO): An Important tool for managing engineering and technical institutes in higher education, government of West Bengal. *Journal of Indian Library Association Now Available at <https://journal.ilaindia.net/>*, 56(3), 29-39.
95. Rath, P. (2015). Application of mobile technology in libraries: a survey of periodical literature published by emerald. *Gyankosh-The Journal of Library and Information Management*, 6(2), 25-39.
96. Refread. (2019). Meet library users online. Retrieved from [www.refread.com](http://www.refread.com)
97. Ridley, D. (2012). The literature review: A step-by-step guide for students.
98. Roy, R., & Ghosh, S. (2014). Use of eResources in North Bengal University library: A case study. *Professional Journal of Library and Information Technology*. 4 (2), 12-22.
99. Saraf, S. (2016). Information communication technologies in academic libraries: An overview. *Professional Journal of Library & Information Technology*, 6 (1), 32-38.
100. Sen, P., & Das, S. K. (2022). ICT Infrastructure and Use of E-resources in the College Libraries under West Bengal State University. *College Libraries*, 37(II), 70-77.
101. Sengupta, J., & Sengupta, J. (2005). Growth of the IT Industry: India and the World. *India's Economic Growth: A Strategy for the New Economy*, 97-129.
102. Sharma, B.K. (2001). Library and information science. Agra: Y K Publishers.



103. Sharma, P. L. (2002). HRD in Libraries. National Hydroelectric Power Corporation Limited, Faridabad. Retrieved from <http://hdl.handle.net/1849/411>.
104. Shibu, S., & Baby, M. D. (2011). Information seeking behaviour of the academics of University of Kerala in the changed library environment. *IASLIC Bulletin*, 56(2), 111-123.
105. Singh, A. S., Devi, T. M., & Phuritsabam, B. (2015). North East University Libraries of India: A comparative study. *Library Progress (International)*, 35(2), 121-132.
106. Singh, J. (2010). Information seeking behaviour of academics in government colleges in changing scenario. *INDIAN LIBRARY ASSOCIATION*, 56, 27.
107. Singh, N. (2020). Housekeeping Operations in Libraries: Challenges and Solutions. In K. P. Rathod & S. Ray (Eds.), *Information and Communication Technologies for Competitive Strategies* (pp. 217-225). Springer.
108. Singh, O. S. S. (2010). Career Opportunities in Library & Information Science. *Employment News*. p.1.
109. Singh, O.S.S., & Khan, M.T.M. (2017). Smart library apps: Productive and innovative steps in digital literacy. *Employment News*, 33. Retrieved from <http://employmentnews.gov.in/NewEmp/MoreContentNew.aspx?n=Editorial&k=147>
110. Singh, R., & Tyagi, S. (2018). Library documents classification by using the web tools. In *National Conference on Changing Digital Landscape in SMART Environment* (pp. 503-510).
111. Sinha, P., & Kumar, M. (2012). Internet literacy skills and internet usage patterns to access e-resources by Assam university library users: An evaluative study. *Sinha, Manoj Kumar*, 010-026.
112. Sivathaasan, N., Murugathas, K., & Chandrasekar, K. (2014). Attitude towards the usage of electronic information resources in Medical Library, University of Jaffna, Sri Lanka. In *Information and Knowledge Management* (Vol. 4, No. 1, pp. 48-57).
113. State Universities. (2018). Retrieved from <http://www.ugc.ac.in/stateuniversity.aspx>
114. Strothmann, K., & Bennett, B. (2020). Investigating Users' Perceptions of Space and Service Quality in Academic Libraries. *College & Research Libraries*, 81(2), 211-227.

115. Sujata, S. (2014). Frequently using eResources by the faculty members in APJNTU: A study. *Professional Journal of Library & Information Technology*, 4 (2), 59-76.
116. Surwade, Y. P., & Patil, D. T. (2021). SOUL 2.0 (Software for University Libraries) for Library Automation. *International Journal for Science and Advance Research in Technology*, 7(3), 72-76.
117. Takappa, R., & Ramakrishna, R. K. (2017). Present status of library automation in polytechnic colleges in Karnataka State: A survey. *International Journal of Digital Library Services*, 7(2), 87-98.
118. Thomas, L.C. (2013). Mobile libraries 2012. *Library Journals*, 137 (2).
119. Tian, Y., & Williams, P. T. (2019). Automation in Libraries: A Literature Review. *Journal of Librarianship and Information Science*, 51(3), 811-825.
120. Total number of universities in the country. (2018). Retrieved from <https://www.ugc.ac.in/oldpdf/consolidated%20list%20of%20All%20universities.pdf>
121. Tripathi, M., & Kumar, S. (2014). Use of online resources at Jawaharlal Nehru University: a quantitative study. *Program*, 48(3), 272-292.
122. Tyagi, S. (2015). Electronic resources in management libraries: An analytical study of national capital region (NCR) of Delhi. *Journal of Indian Library Association*, 51(3), 14-23.
123. Upadhyay, C. N. (2013). An evaluation of the impact and students' behavior towards the use of e-resources at the collage of Ramanhjan, University of Delhi. *Professional Journal of library and information technology*, 3(1), 52-61.
124. Vajpayee, A.K. (2011). Librarian as cyberarian. *Amar Ujala*, p.7.
125. Wangchuk, P.P. (2011). A boon for bookworms. *Hindustan Times*, p.9.
126. Wilson, K. B., Tete-Mensah, I., & Boateng, K. A. (2014). Information and communication technology use in higher education: Perspectives from students. *European Scientific Journal*, 10(19).
127. Yang, Y., & Lei, S. A. (2020). Smart Library: Current Development and Future Perspective. *Library Hi Tech*, 38(1), 101-119.
128. Zahid, S. S., & Chaudhry, A. S. (2019). The Impact of Service Quality on User Satisfaction in Academic Libraries: A Review of Literature. *Library Philosophy and Practice*, 2019.
129. Zhang, J., Liu, Y., & Liu, Y. (2020). Applications of Artificial Intelligence Technologies in Library Service: A Literature Review. *Library Hi Tech*, 38(1), 30-43.

130. Zia, T., & Singh, K. P. (2016). Use of E-journals by Faculty Members and Research Scholars in Area Studies: A Case Study of Select Area Studies Centres of Jawaharlal Nehru University. *Library Herald*, 54(4), 406-420.

## **Appendix I**

### **LIBRARIAN PROFILE**

**TITLE: “USE OF ICT APPLICATION IN HOUSE KEEPING OPERATION  
IN UNIVERSITY LIBRARY IN WEST BENGAL: REVIEW & ANALYSIS”**

#### **Section - A**

##### **GENERAL:-**

1. Name of Librarian.....
2. Qualification (please tick)
  - a) Diploma, b) BLIB, c) M.LIB d) Others.....
3. Experience in working [ please tick ]
  - a) Less than 5 yrs. b) 6-10 yrs., c) 11-15yrs., d) More than 15 yrs.
4. Status of Librarian [ please tick ]
  - a) Permanent, b) Contractual, c) Casual, d) Daily Basis

#### **Section B**

##### **Scenario of library services of the University library :-**

5. Name of University.....
6. Current location your  
library/Address.....
7. Year of establishment.....
8. Library Hours:
  - At on working days.....
  - On Holidays.....

9. Website Address.....

**Infrastructural facilities of the University**

**Section: (C)**

**LIBRARY BUILDING:**

10. What type of the Library building is (Pl. ✓)

a) Rented [ ] b. Own [ ]

11. Area of the library building (in Sq.ft.)

a) Carpet area.....

b) Floor area.....

12. Total seating capacity in the reading room.....

13. Various sections of the library ( Please tick )

I. Circulation Section ( ) ii. Periodical Section ( )

iii. Reference Section ( ) IV. Cataloguing Section ( )

v. Photocopying Section ( ) VI. Binding Section ( )

Vii Internet Section ( ) viii. Physical handi-capped Section ( )

ix. Any other Sections (pl. Specify).....

14. How many numbers of fire Extinguishers you have in your library?  
.....

15. How many numbers of heating and cooling equipment in your library? .....

**Section (D)**

**LIBRARY COLLECTION'S**

16. Is there any book selection Committee for purchase and distribution of books' in your library? Yes (      )      No. (      )

17. Who is the Chairman of the Book selection Committee? .....

18. What is the Book selection policy? (Pl. Specify)

.....  
.....

19. What is the acquisition policy of your library? (Pl specify)

.....  
.....

20. Total collection of your Library.....

Library Collection	Quantity
Book's	.....
Manuscripts	.....
Govt. Reports	.....
Journals	.....
Newspaper	.....
Map	.....
Magazine	.....
Monographs	.....
Atlas	.....
CD/DVDs	.....

Electronics Journal .....

Any others (Pl. Specify).....

21. What type of rare collection does your library have? Please specify with numbers: .....

22. What type of special collection (for physical/Visual challenged of persons) does your library have? Pl. specify with numbers :

.....  
.....  
.....

23. Does your library provide resource sharing facilities?

Yes [     ]     No [     ]

24. Which classification scheme is used for classification your library collection?

i) DDC [     ], ii) UDC [     ], iii) CC [     ], IV. Any otherScheme [     ].

25. What type of access system is used in your library?

i) Open access [     ], ii) Closed access [     ], iii) partially open Access..... [     ]

26. Is the catalogue facility available in your library to local the reading materials?

i) Yes [     ], ii) No [     ]

27. If yes, do you find the library card catalogue helpful in locating the documents?

i) Yes [     ], ii) No [     ]

28. If yes, what type of approach do you follow in your library catalogue?

i) Subject [     ], ii) Author [     ], iii) Title [     ], IV. Classified [     ],  
v. Dictionary [     ], VI. Others [     ]

**SECTION E:**  
**USERS AND CIRCULATION**

29. Total number of Registered Members/users.....

30. Categories of Members	Strength of Members
Students (UG/PG)	.....
Research Scholar	.....
Faculties/Teaching staff	.....
Non-teaching staff	.....
Ex-student	.....
Ex-Staff	.....
Others (pl. specify)	.....

31. Are there any physically/visually challenged users in your library? If yes, Pl. specify the number.....



32. Is there any membership fees? If yes, how much?.....

33. Please mention the circulation system

(I) Manual [ ] (ii) automated [ ]

34. If automated/Computerized which software is used?

.....  
.....

35. Number of books issued by the users at a time and for how many day's uses can keep the issued books?

Categories of Members	No. of issued	Duration
Students (UG/PG)	.....	.....
Research Scholar	.....	.....
Faculty	.....	.....
Non-Teaching Staff	.....	.....
Others (pl. Specify)	.....	.....

36. Do you have considered for borrowing the reference Book/  
Dissertations to uses from your library? Yes [ ], No. [ ]

37. Is there any fine if books are not returned in the due date? If yes,  
how much per day? .....

38. What procedure is followed by loss of issued books by a user?

.....  
.....

39. Total number of staff in your library.....

40. Details the working staff in your library?

Categories	Strength	Skilled	Unskilled
I. Librarian	.....	.....	.....
ii Deputy librarian	.....	.....	.....
iii Assistant librarian	.....	.....	.....
IV Professional Assistant.....	.....	.....	.....
v. Library Assistant	.....	.....	.....
Vi. Library Attendant.....	.....	.....	.....
vii. Others	.....	.....	.....

OR

Please give details about your library staff

Designation	No of Staff	Permanent/Vacancy Contractual Ad hock/Incharge	Education professional qualification
a) Librarian	.....	.....	.....
b) Asst. Librarian	.....	.....	.....
c) Library Assistant	.....	.....	.....
d) Library Attendant	.....	.....	.....
e) Technical Assistant.....	.....	.....	.....
f) Computer Assistant	.....	.....	.....
g) Library Clerk	.....	.....	.....
h) Book binders	.....	.....	.....

i) Any other (pl. specify) ..... ..

41. Have you got opportunity for professional development?

(If yes, Pl. tick ( √ )

a) Attending workshop [   ]

b) Participating conferences/seminars [   ]

c) Short term training [   ]

d) Any refresher course [   ]

e) Any other [ pl. Specify].....

### **Section (F)**

#### **LIBRARY SERVICES**

42. Does your library bring out any bibliographic services?

a) Yes [   ], b) No. [   ]

43. If yes, how often do you make use of them?

Once in a week [   ] Once in a fortnight [   ]

Once in a month [   ] Twice in a Week [   ]

44. In which process the current awareness service using e-media service in your library users?

	<u>Services</u>	(put √ mark)
I.	SMS Alerts	[   ]
ii.	E-Notice Board	[   ]
iii.	E-mail service	[   ]
iv.	Web-sites	[   ]

v. Social networking sites [       ]

vi. Whatsapp group       [       ]

vii. Others [Pl. Specify].....

45. Are the reprographic service available in your library?

a) Yes [       ], b) No [       ]

46. Do you make the service for your users?

a) Yes [       ], b) No [       ]

47. For what purpose do you avail for uses of the reprographic facilities?

a) for getting the articles reproduces [       ]

b) for getting the graphs [       ]

c) for any others [       ]

48. Are you aware of the microfilm facilities available for users from your library? a) Yes [       ], b) No [       ]

49. Does your library provide translation services for uses?

a) Yes [       ], b) No [       ]

50. If yes how many languages translation service is being provided?  
(pl. specify)

.....  
.....

51. Does your library provide inter library loan service?

a) Yes [       ], b) No [       ]

52. Does your library provide audio-visual facilities?

a) Yes [ ], b) No [ ]

53. If yes, how often do you make for users?

a) Frequently [ ] b) Sometimes [ ]

**Section (G) Use of ICT Application in Housekeeping operation:-**

54. Use of Tools of ICT application in Housekeeping operation under your library

Tools	No. of usage (Quantity)
i. Desktop	.....
ii. Printer	.....
iii. Scanner	.....
iv. Bar Code reader	.....
v. Projectors	.....
vi. Photocopies	.....
vii. Web cam/CCTV	.....
viii. UPS	.....
ix. Others (pl. Specify)	.....

55. Which is the important ICT skill for a library professional?

1. Strongly Disagree (SD), 2. Disagree (D) 3. Neutral (N), 4. Agree (A),

5. Strongly agree (SA) Statement :-

1            2            3            4            5

Effectively using library

Management Software

Digital Library

Information retrieval

Capabilities

Management digital

## Resources

Using emerging  
technologies

56. Which software you are using for digital preservation work for your library under ICT application?

a) Open sources software [       ]

b) Commercial software [       ]

c) Software design by own [       ]

d) Others (pl. Specify [       ]

57. Name the software used for preservation work.....

58. Which of the following standards' does your library use in digital preservation work under ICT application?

a) Dublin Core [    ]

b) E- GMS [    ]

c) ISO - 19115 [    ]

d) EAD (Encoded  
Archival description] [    ]

e) ONIX [    ]

f) MODS [    ]

59. Do you consider the following an important to improve your understanding of the ICT application in your library?

1. Strongly disagree (SA), 2. Disagree (D), 3. Neutral (N), 4. Agree (A),  
5. Strongly Agree (SA)

<u>STATEMENT</u>	1	2	3	4	5
1. Training at the place of work					
2. Self-learning					
3. External training with sponsor					
4. Seminars					
5. Workshop					
6. Refresher courses					
7. Training by professionals					
8. Training from senior suppliers					
9. Formal education					
10. Informal education					
11. Online courses					
12. learning from friends					

60. Please give marks against each of the following statement according to your own choice

Codes: strongly agree (5) agree (4) Neutral (3), disagree (2), strongly Disagree (1)

60.1 Your perspectives information technology parameters

	(SD)	(D)	(N)	(A)	(SA)
Computer would be helpful for my library work .....	.....	.....	.....	.....	.....
The use of IT goes against the interest of the employees and show note encouraged .....	.....	.....	.....	.....	.....
ICT application improves quality of library services .....	.....	.....	.....	.....	.....
I would like to use computer.....	.....	.....	.....	.....	.....
Use of IT in my library for huge motivating for my daily job .....	.....	.....	.....	.....	.....
ICT make my work more complicated .....	.....	.....	.....	.....	.....

## 60.2 Constraints in acquiring

of ICT skills	(SD)	(D)	(N)	(A)	(SA)
Inadequate training in ICT application.....	.....	.....	.....	.....	.....
Lacks infrastructure and network facility.....	.....	.....	.....	.....	.....
Lack of co-ordinate of library staff .....	.....	.....	.....	.....	.....
Lack of internet library professional in learning ICT application .....	.....	.....	.....	.....	.....
Non co-operation of consultation services .....	.....	.....	.....	.....	.....
Overload of working hours .....	.....	.....	.....	.....	.....

## 60.3 Over all views on your library

<u>STATEMENTS</u>	(SD)	(D)	(N)	(A)	(SA)
-------------------	------	-----	-----	-----	------



Total no of staff sufficient .....  
All staff are hardworking .....  
staff salary are satisfied .....  
No need to fill the vacant post .....  
Professional staff are essential  
for betterment of library service .....  
Most of librarian are not  
Co-operate .....  
Most of librarian not equipped for  
IT based services .....

61. For better development of university library systems. Please provide your valuable suggestions that will make more advantage for my study.

.....  
.....  
.....

62. Please mention in any future plan for betterment of library service to the users

Date

NAME AND DESIGNATION

Signature with Seal

Thank you so much for your kind co-operation and also give me your precious time for research work.

N.B. 1. Above information will be use only for research work.

2. All information provided by you will keep confidential

## Appendix II

### PROFILE FOR STUDENTS

**TITLE: “USE OF ICT APPLICATION IN HOUSE KEEPING OPERATION IN UNIVERSITY LIBRARY IN WEST BENGAL: REVIEW & ANALYSIS”**

1. Name and Address of the Student.....
2. Faculty                      Arts ☐      Science ☐
3. Gender                      Male ☐      Female ☐
4. Location of the residence:-  
Urban ☐              Semi Urban ☐              Rural ☐
5. Are you visiting your University Library?              Yes ☐      No. ☐
6. Are you registered member of your library?              Yes ☐      No ☐
7. How frequently do you visit your Library?  
  
Daily ☐              Weekly ☐              Monthly ☐
8. If no please indicate how many hours should then be extended.....
9. On each occasion, how much time do you usually spend in the Library?  
  
Less than 1/2 hour ☐              1/2 to 1 hour ☐              1-2 hours ☐  
2-4 hours ☐              More than 4 hours ☐
10. Please give marks against each of the following statement according to your choice  
  
Code fully satisfied - 5              Satisfied -4              Neutral - 3  
Dissatisfied -3              Strongly dissatisfied - 1

*Contd.....*

10.1. Your level of satisfaction about the services provided by the Library

Library Services	Level of Satisfaction
Circulation	.....
Reference Service	.....
CAS	.....
Online Public Access	.....
Catalogue	.....
Internet	.....
Referral Service	.....
Translation Service	.....

10.2 Your Level of Satisfaction about the library amenities

<u>Library Amenities</u>	<u>Level of Satisfaction</u>				
	FS	S	N	D	SD
Library Atmosphere					
Library Cleanliness					
Electricity					
Lavatory					
Drinking Water					
Seat comfort					

10.3 Give your opinion about the attitude and skill of library staff towards users.

<u>Opinion</u>	<u>Level of satisfaction</u>				
	FS	S	N	D	SD
Helpful Attitude					
Pleasant behavior					
Skillfulness of the staff					
Communication with right answer					

*Contd.....*

11. For what purpose do you visit your library?

For writing assignment ☐

Update your subject knowledge ☐

For General Knowledge ☐

Reading Magazines and News Paper ☐

To Borrow Books ☐

12. What is your opinion with regard your satisfaction with the following library collection in your Library Please Tick

<u>Items</u>	<u>Very Satisfied</u>	<u>Satisfied</u>	<u>Dissatisfied</u>	<u>No Comments</u>
Text Book .....	.....	.....	.....	.....
Reference book.....	.....	.....	.....	.....
Periodicals. ....	.....	.....	.....	.....
.....				
Newspapers/Magazines.....	.....	.....	.....	.....
Thesis & Dissertation.....	.....	.....	.....	.....
Electronic Resources.....	.....	.....	.....	.....
CD ROM .....	.....	.....	.....	.....

13. Does your Library staff help to locate documents in your library?

Yes ☐ No ☐

14. Does your Library provide Internet facility?

Yes ☐ No. ☐

15. Level of satisfaction of Internet facilities?

Satisfied ☐ Fully Satisfied ☐ Not Satisfied ☐

16. Do you need orientation programmes for access of Internet?

Yes ☐ No ☐

*Contd.....*

17. Do you avail the Catalogue facility from your Library for locate the reading materials :

Yes ☐

No ☐

18. If yes do you find the library card catalogue helpful in locating the documents

Yes ☐

No ☐

19. Do you find it easy to locate books on shelves through library catalogue?

Yes ☐

No ☐

20. What is your opinion about library physical facilities Please Tick

<b><u>Items</u></b>	<b><u>Poor</u></b>	<b><u>Good</u></b>	<b><u>Very good</u></b>
Seating Arrangement	.....	.....	.....
Lighting facilities	.....	.....	.....
Furniture facilities	.....	.....	.....
Drinking/Water facilities	.....	.....	.....
Cleanliness facilities	.....	.....	.....
Ventilation	.....	.....	.....
Wash room facility	.....	.....	.....

21. Do you get reprographic facilities from Library?

Yes ☐

No ☐

22. If Yes for what purpose do you avail the facilities?

- a) for getting the articles reproduced ( )
- b) for getting the graphs ( )
- c) for any others ( )

23. Do you get the lending (Text Books) facilities from your Library

Yes ☐ No ☐

If yes, How many Books are lending from your Library?

UG/PG	No. of Books	Duration
	.....	.....

24. Do you get the bibliographic service from your Library?

Yes ☐ No ☐

25. If yes. How often do you make use this services?

Once in a week <input type="checkbox"/>	Once in a fortnight <input type="checkbox"/>
Once in a month <input type="checkbox"/>	Twice in a week <input type="checkbox"/>

26. Do you get the audio, visual facilities from your Library?

Yes ☐ No ☐

27. If yes, how often do you make use of the facilities?

Frequently ☐ Sometime ☐

28. What is your opinion about the ICT related services rendered by your library?

<u>Services</u>	<u>Excellent</u>	<u>Very good</u>	<u>Good</u>	<u>Poor</u>	<u>No comments</u>
OPAC	.....	.....	.....	.....	.....
Wi-Fi Services	.....	.....	.....	.....	.....
Current Awareness Services	.....	.....	.....	.....	.....
Document delivery Services	.....	.....	.....	.....	.....
Inter Library Loan .....	.....	.....	.....	.....	.....
E-mail Services .....	.....	.....	.....	.....	.....
Mobile Based Alert Services	.....	.....	.....	.....	.....

Please specify any other recommendation/suggestions for improvement  
of Library facilities

---

Signature of the Student  
Mob. No.....

*Contd.....*

## Appendix III

The screenshot shows the top section of the University of Calcutta Online Catalogue. At the top center is the University of Calcutta logo, a circular emblem with a book and a lamp. To its right is the text "University of Calcutta". Below this is a banner image of a building with the text "Welcome to the University Library Online Catalogue" overlaid. On the left is a vertical menu with a blue header "Books" and a right-pointing arrow. The menu items are: Medical Dissertations, Peace Studies Collection, A.P.Mitra Collection, CAS - History Collection, Anglo Indian Collection, China Studies Collection, and Gandhian Studies Collection. The main content area is titled "Online Catalogue". It features a "Search in" dropdown menu set to "Books". Below this are two search sections: "Basic search" with a "Title" dropdown and a "Search here" button, and "Free-text search (Title or Author or Subject heading Contains)" with a "Search here" button.

Web view of University Library Online Public Access Catalogue (OPAC)

This screenshot shows the same "Online Catalogue" page but with more search options visible. The left menu now includes: Theses (Ph.D.), BNCC Collection, Pak & W. Asia Studies Collection, IFPS Collection, R.N. Tagore Collection, Nehru Studies Collection, and Bela Datta Gupta Collection. The main content area has expanded to include "Boolean search" sections. Each Boolean search section has a "Title" dropdown, a "Search here" input field, and an "And" dropdown menu. There are three such Boolean search sections. The "Free-text search" section remains at the top of the Boolean search area.

Book searching in OPAC

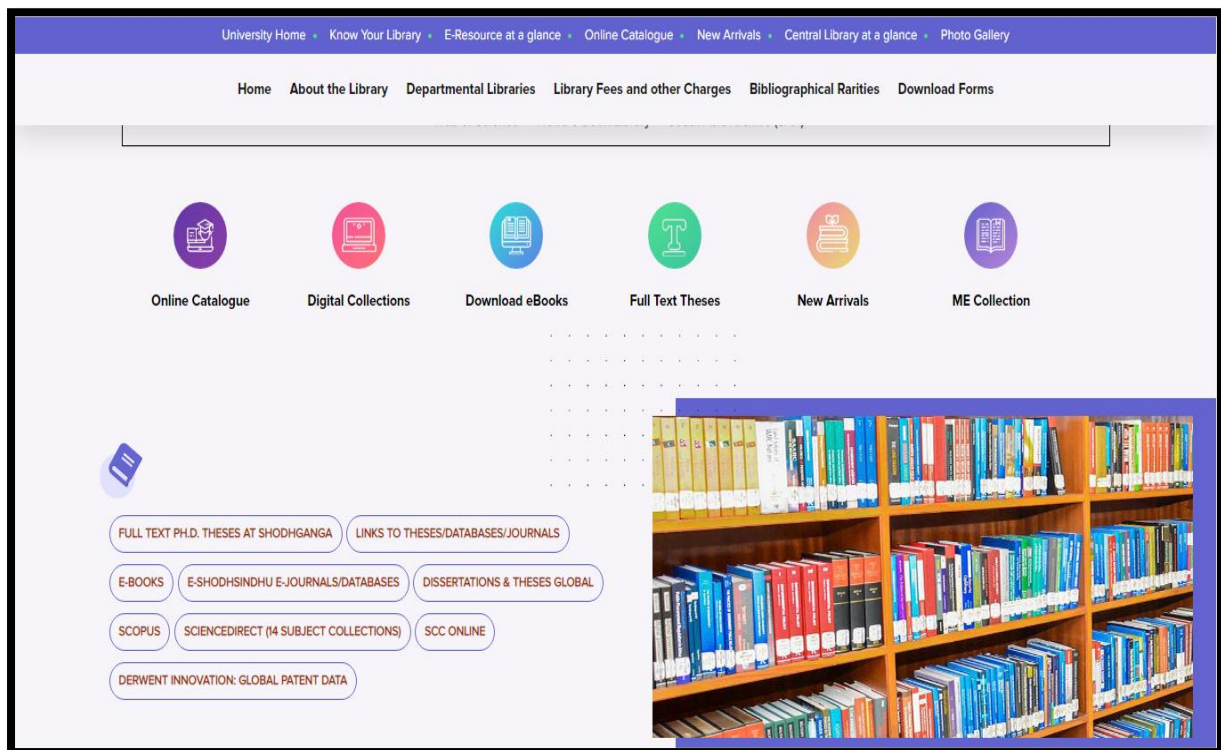


## Use of ICT application in the housekeeping operations of the University Libraries in West Bengal: review and analysis

The screenshot displays the library's online public access catalog (OPAC) interface. On the left, a vertical menu lists various collections: IFPS Collection, R.N. Tagore Collection, Nehru Studies Collection, Bela Datta Gupta Collection, Thai Collection, and ME Collection. Below this menu are two blue buttons labeled 'JOURNALS (OLD ISSUES)' and 'EBOOK CATALOGUE'. The main search area features a 'Title' dropdown menu, a 'Search here' input field, and a 'search' button. A 'Boolean search' section is also visible. Below the search area, the 'Library Locations' section is presented in a table format.

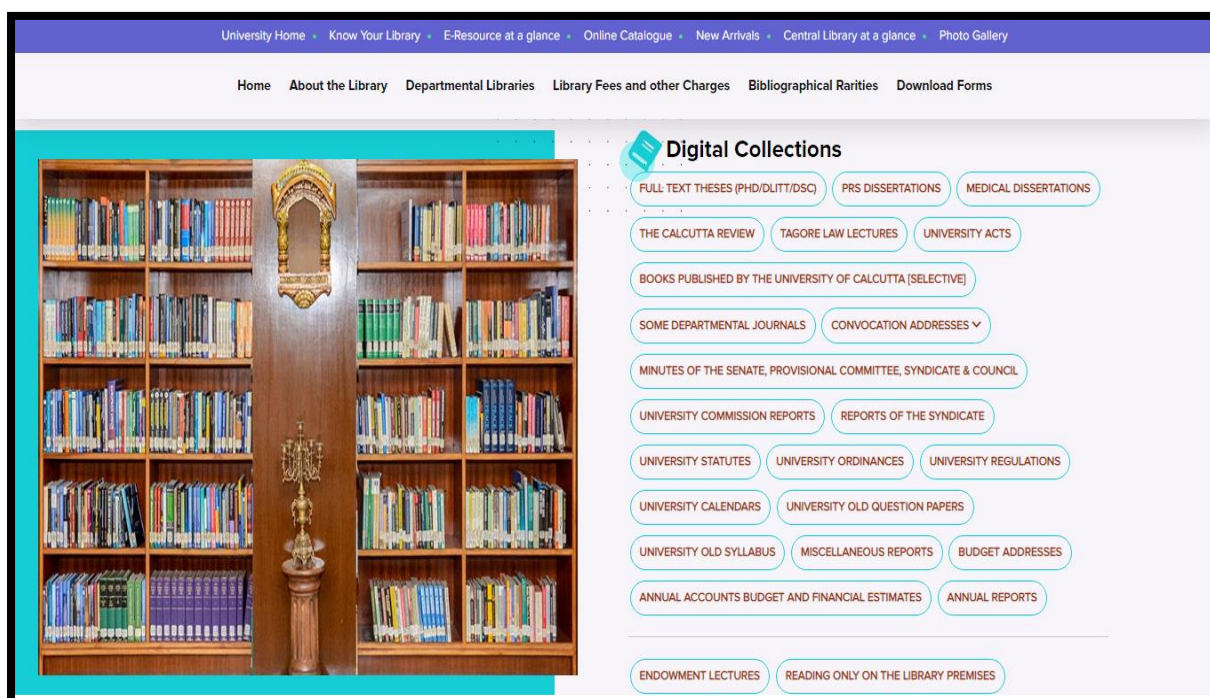
Library Location	Address
ALP = Alipore Campus Library, University of Calcutta	1, Reformatory Street, Kolkata - 700027
CL = Central Library, University of Calcutta	87/1, College Street, Kolkata - 700073,
TSP = Ballygunge Science College (Taraknath Siksha Prangan)	35, Ballygunge Circular Road, Kolkata - 700019
RBSP= Rashbehari Siksha Prangan – Rajabazar Science College	92, Acharyya Prafulla Chandra Road, Kolkata - 700009

## Web view of OPAC and different Library locations of University of Calcutta



## Different services available in the Library of University of Calcutta

## Use of ICT application in the housekeeping operations of the University Libraries in West Bengal: review and analysis



### Digital Library collections available in University of Calcutta

[University Home](#) • 
 [Know Your Library](#) • 
 [E-Resource at a glance](#) • 
 [Online Catalogue](#) • 
 [New Arrivals](#) • 
 [Central Library at a glance](#) • 
 [Photo Gallery](#)

[Home](#) • 
 [About the Library](#) • 
 [Departmental Libraries](#) • 
 [Library Fees and other Charges](#) • 
 [Bibliographical Rarities](#) • 
 [Download Forms](#)

Physical subjects (including Botany and Zoology)

3,000

**Oriental works**

Sanskrit

1,500

Persian

500

Arabic

1,000

3,000

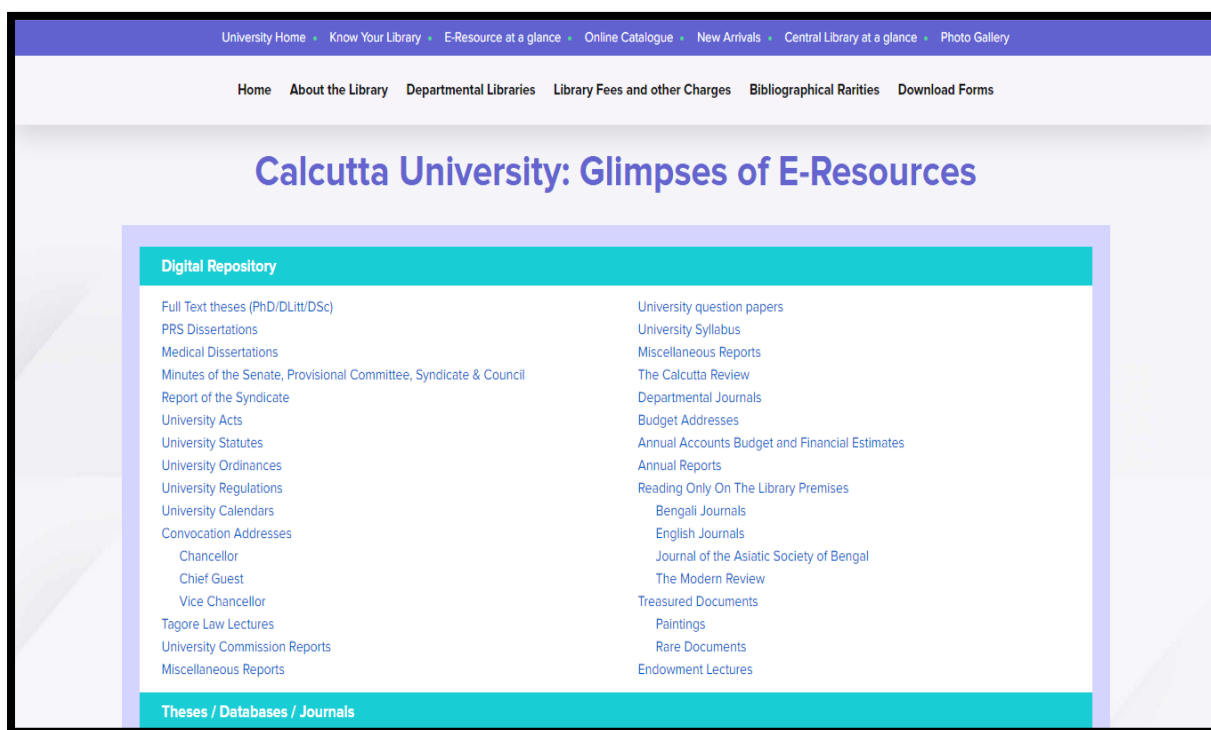
European Classics

3,000

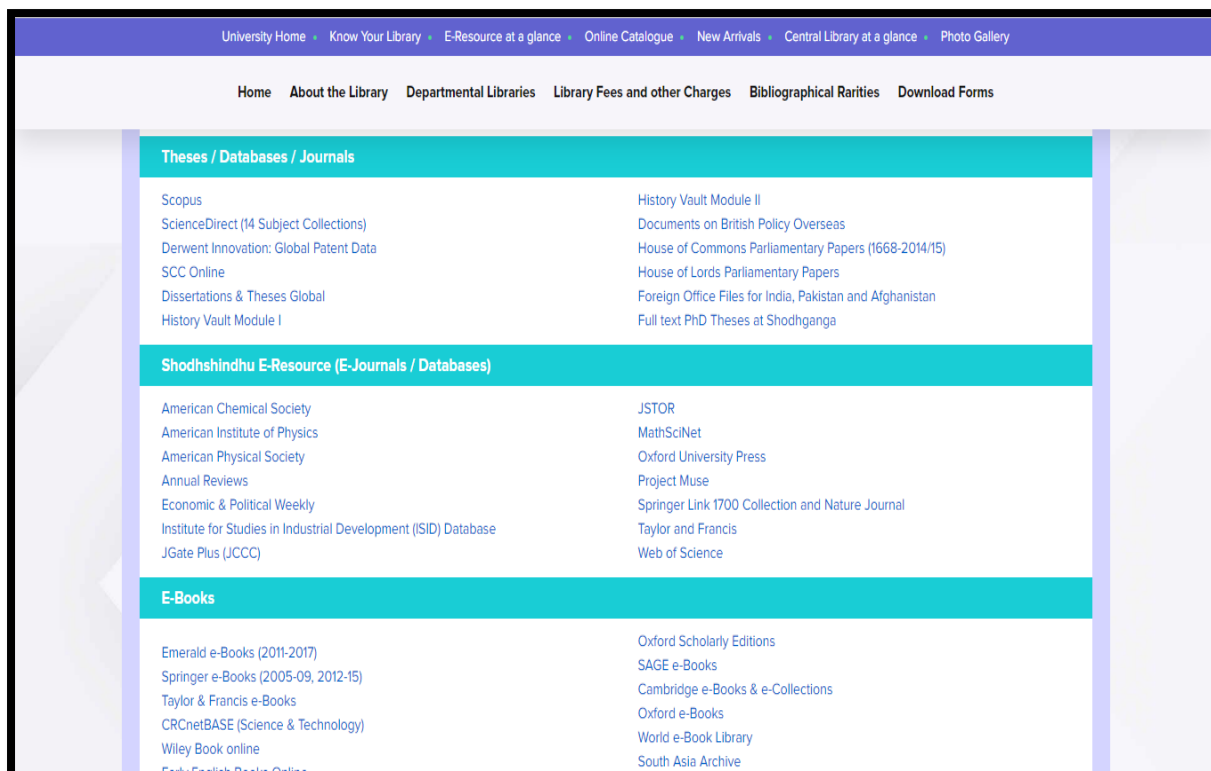
**Total**

**9,000**

### Total no. of oriental works in the Library of University of Calcutta



## University of Calcutta: Glimpses of E-Resources



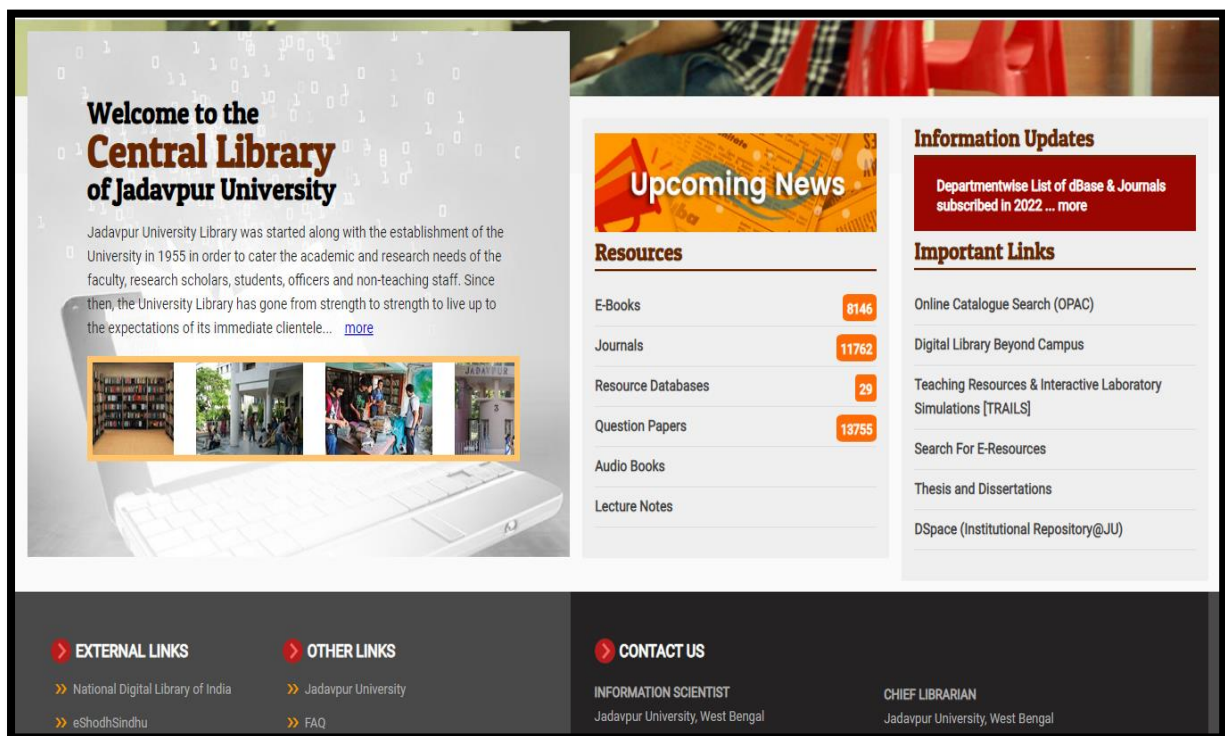
## University of Calcutta: Glimpses of E-Resources II



## Use of ICT application in the housekeeping operations of the University Libraries in West Bengal: review and analysis




Home page of Jadavpur University Library Portal



Webpage of Central Library, Jadavpur University

## Use of ICT application in the housekeeping operations of the University Libraries in West Bengal: review and analysis

Jadavpur University Library was started along with the establishment of the University in 1955 in order to cater the academic and research needs of the faculty, research scholars, students, officers and non-teaching staff. Since then, the University Library has gone from strength to strength to live up to the expectations of its immediate clientele... [more](#)



### Resources

E-Books	8146
Journals	11762
Resource Databases	29
Question Papers	13755
Audio Books	
Lecture Notes	

### Important Links

- Online Catalogue Search (OPAC)
- Digital Library Beyond Campus
- Teaching Resources & Interactive Laboratory Simulations [TRAILS]
- Search For E-Resources
- Thesis and Dissertations
- DSpace (Institutional Repository@JU)

### EXTERNAL LINKS

- National Digital Library of India
- eShodhSindhu
- Shodhganga
- IndCat
- JCCC@UGC-INFONET
- Bichitra: Online Tagore Variorum
- Directory of Open Access Journals

### OTHER LINKS


- Jadavpur University
- FAQ
- Disclaimer

### CONTACT US


<b>INFORMATION SCIENTIST</b> Jadavpur University, West Bengal Phone: 033 24146460/6866 Email: <a href="mailto:informationscientist@jadavpuruniversity.in">informationscientist@jadavpuruniversity.in</a>	<b>CHIEF LIBRARIAN</b> Jadavpur University, West Bengal Phone: 033 24146460/6866 Email: <a href="mailto:chief librarian@jadavpuruniversity.in">chief librarian@jadavpuruniversity.in</a>
---	---

2017 © All Rights Reserved by Jadavpur University.

E-resources and important links available in the Central Library, Jadavpur university


Cart Lists

Log in to your account Search history Clear


**যাদবপুর বিশ্ববিদ্যালয়**  
**JADAVPUR UNIVERSITY**

Search Library catalog All Item type All libraries ARABIC Go

[Advanced search](#) | [Authority search](#) | [Tag cloud](#) | [Libraries](#)

Home


**Services:**

- Discovery Services: Single Search Box for Library Resources

**E-Resources:**

- E-Books
- Ejournals
- Resource Databases

IR @ JU



**Welcome to Central Library, Jadavpur University**

**Library Hours:**

*Central Library:*

Monday – Friday

10.00am to 8.30pm

Saturday

10.00am to 5.30pm

Web view of Online Public Access Catalogue (OPAC), Central Library, Jadavpur University

## Use of ICT application in the housekeeping operations of the University Libraries in West Bengal: review and analysis

**IR @ JU**


Digital Library beyond Campus

Registration for New Library Cards


Important Links:

- e-ShodhSindhu
- Shodhganga
- IndCat
- Bichitra: Online Tagore Variorum
- National Digital Library of India (NDLI)
- Directory of Open Access Journals;

**to Central Library, Jadavpur University**



**New Arrivals**



**All for love**

Saturday

10.00am to 5.30pm

Sunday

11.00am to 6.00pm

*Salt Lake Campus Library:*

Monday – Friday

10.00am to 7.00pm

Saturday

10.00am to 5.30pm


Sunday

11.00am to 6.00pm

❖ The Library remains closed on all public holidays

Different links available in the OPAC page of JU Central Library

Login







শাদ্রপূর বিশ্ববিদ্যালয়  
**JADAVPUR UNIVERSITY**

[Home](#)
[E-Resources](#)
[Tutorials](#)
[Feedback](#)
[Login](#)

Single Window Search for "All Electronic Resources subscribed by Jadavpur University"

DISCOVERY SERVICE







American Concrete Institute

American Geophysical Union

American Institute of Aeronautics and Astronautics

American Institute of Physics



News Feeds

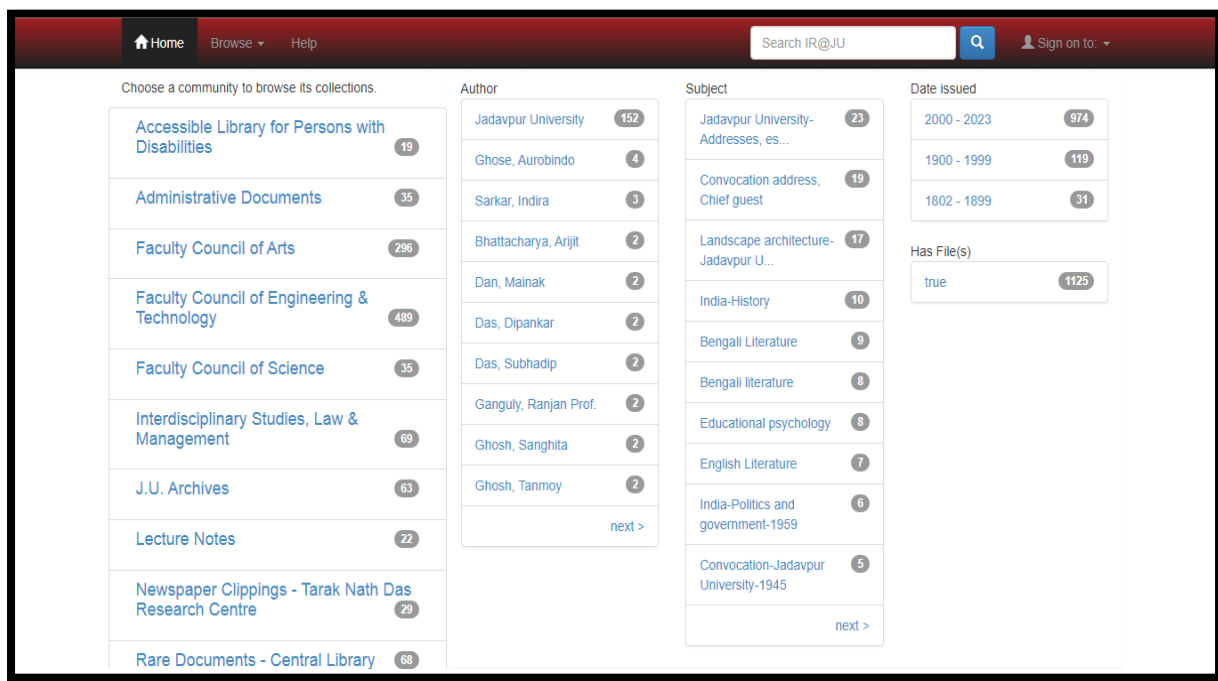
NDTV Latest News

Webpage of “Digital Library Beyond Campus” service through RemoteXs, Central Library, JU

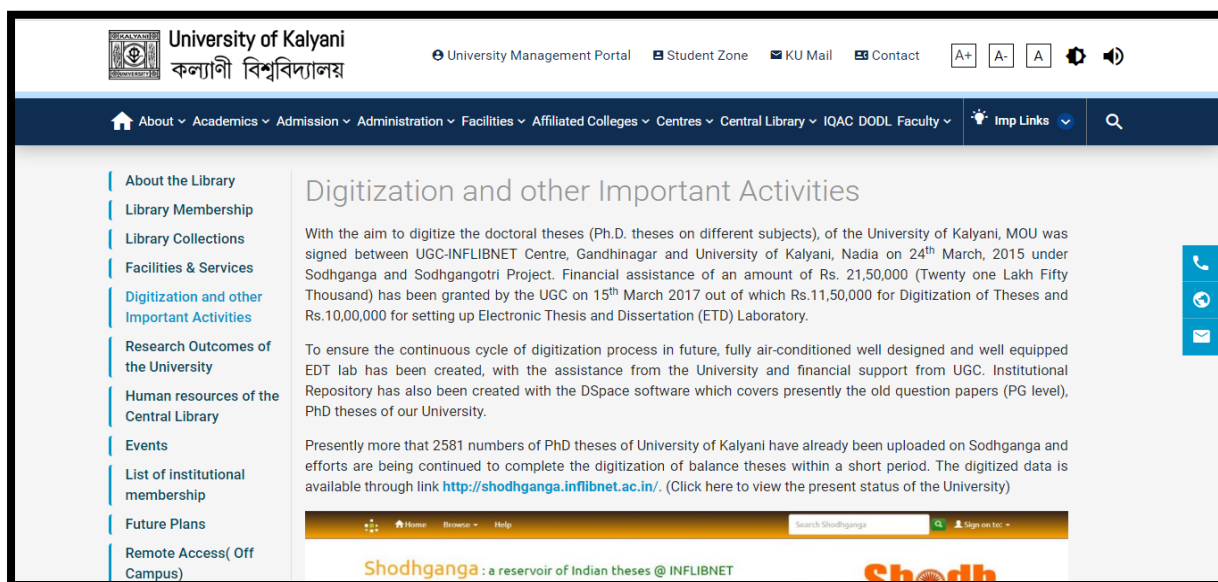




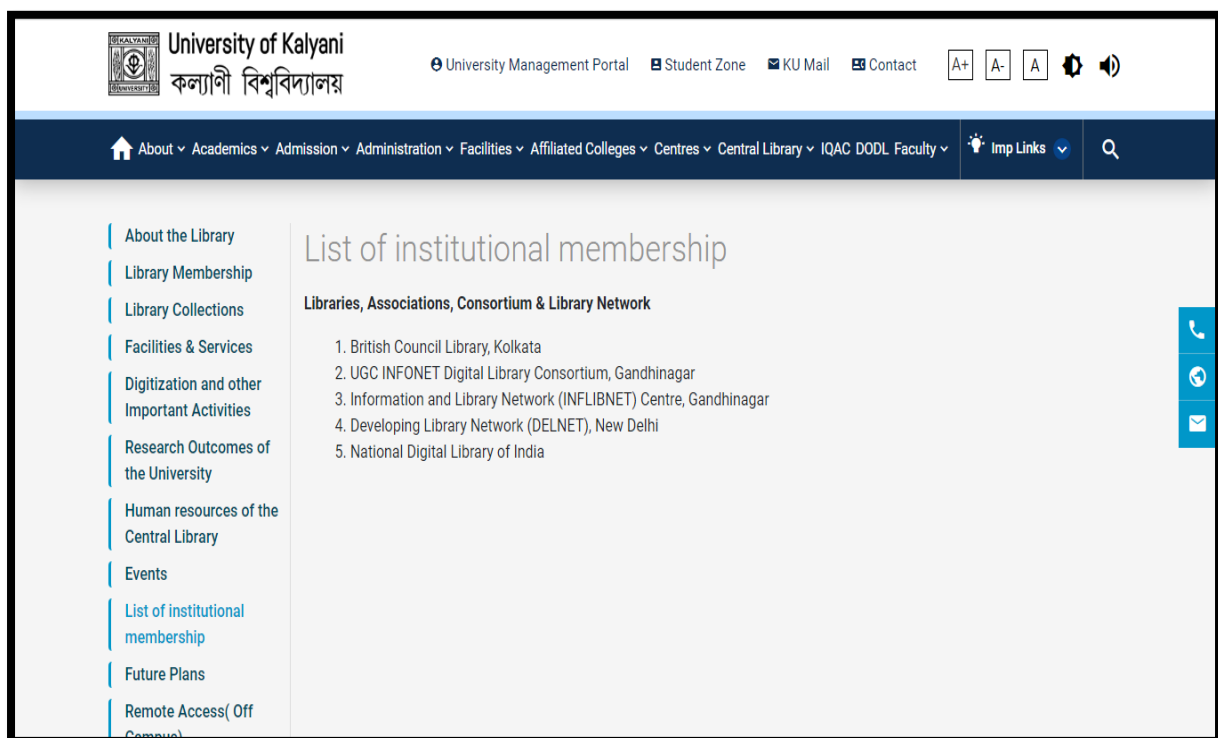
Webpage of Institutional Repository of Jadavpur University (IR@JU)



E-resources available in the Institutional Repository of JU (IR@JU)



University of Kalyani Central Library Webpage



University of Kalyani Central Library Webpage II



**University of Kalyani**  
কল্যাণী বিশ্ববিদ্যালয়

University Management Portal Student Zone KU Mail Contact

About Academics Admission Administration Facilities Affiliated Colleges Centres Central Library IQAC DODL Faculty Imp Links

**Library Collections**

Central Library is having its healthy collection of physical as well as electronic/online resources to satisfy the need of its user community. Collection of the Central Library mainly covers

**Physical Resources [Click Here](#)**

- Books
- Journals
- Bound Periodicals (Old issues) : List [Click Here](#)
- University Thesis
- Special Collections
- Other printed resources

**Electronic/Online Resources**

[e-Books & Research Monographs](#) [e-Journals & Databases](#) [e-SS e-Resources](#)

## Library Collections of Central Library, University of Kalyani

**University of Kalyani**  
কল্যাণী বিশ্ববিদ্যালয়

University Management Portal Student Zone KU Mail Contact

About Academics Admission Administration Facilities Affiliated Colleges Centres Central Library IQAC DODL Faculty Imp Links

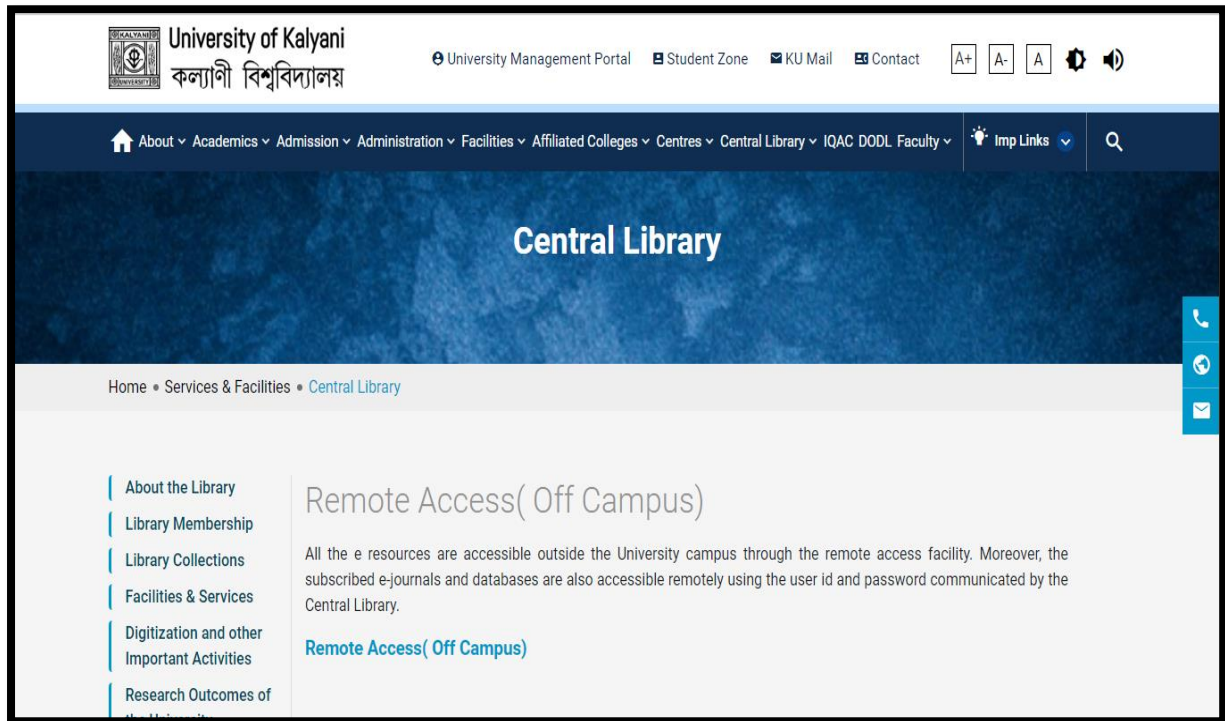
**List of e-Books & Research Monographs**

[Economics](#) [English](#) [History](#) [Mathematics](#) [Physics](#) [Political Science](#) [Sociology](#)

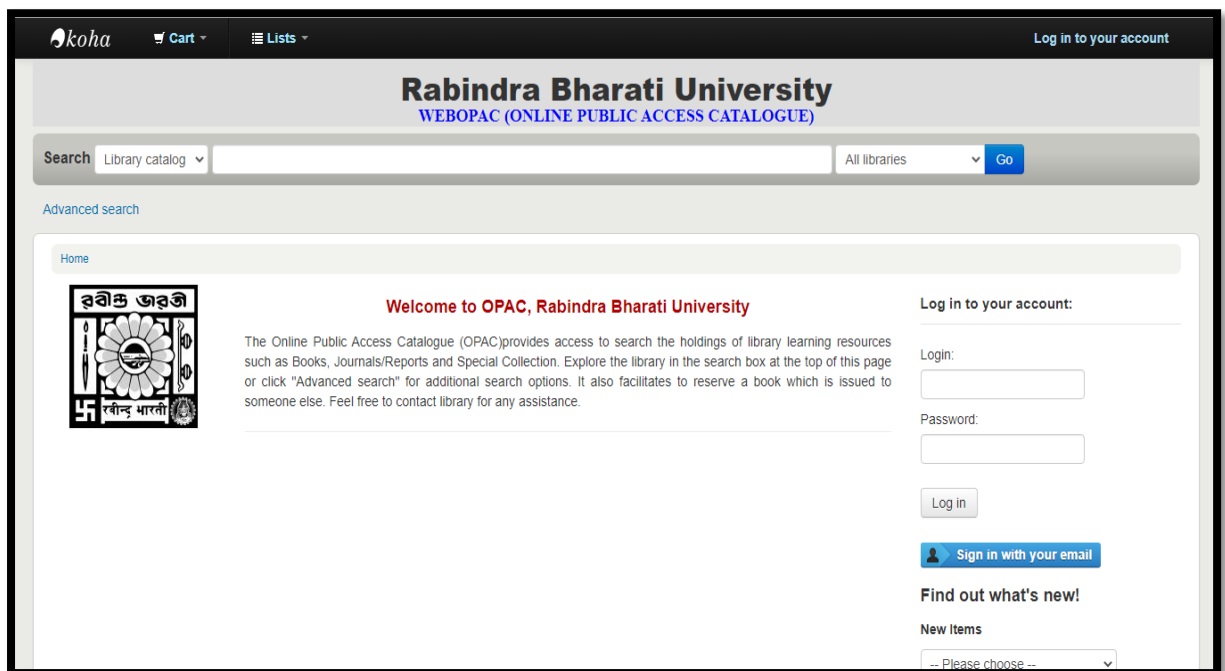
**Department - Economics**

Sl. No.	Title	Author	URL	Publisher	Year of publication	ISBN
1	Advancing Human Development	F. Stewart et al	<a href="http://dx.doi.org/10.1093/oso/9780198794455.001.0001">http://dx.doi.org/10.1093/oso/9780198794455.001.0001</a>	Oxford	3/22/2018	9780191835902
2	Beyond Experiments in Development Economics	J. Taylor et al	<a href="http://dx.doi.org/10.1093/acprof:oso/9780198707875.001.0001">http://dx.doi.org/10.1093/acprof:oso/9780198707875.001.0001</a>	Oxford	9/18/2014	9780191783074

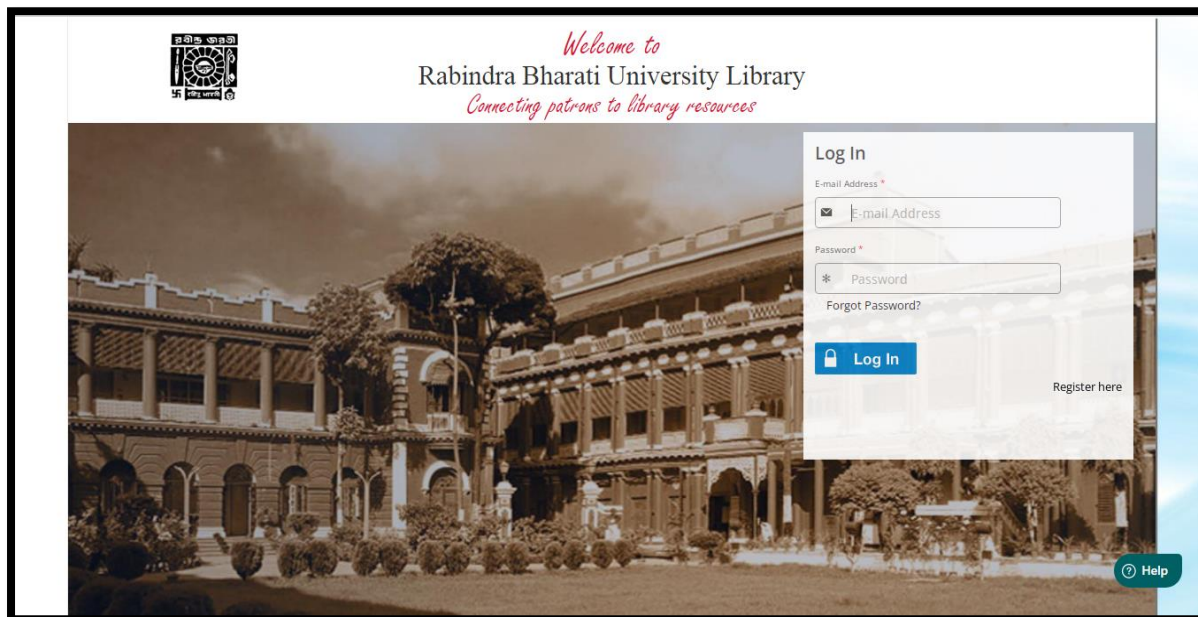
## Departmentwise list of e-Books, Central Library, University of Kalyani



Remote Access Service of Central Library, University of Kalyani



Online Public Access Catalogue (OPAC), Rabindra Bharati University



Homepage of Rabindra Bharati University Library

Department of Publication	
Names of the journals published by RBU	ISSN
Rabindra Bharati Patrika	0975-0037
Modern Historical studies	0972-6756
Journal of the Department of Sanskrit	2277-4165
RBU journal of Library and Information Science	0972-2750
Rabindra Bharati Journal of Philosophy	0973-0087
রবীন্দ্রভারতী বিশ্ববিদ্যালয় বাংলা বিভাগ পত্রিকা	2320-3633
Rabindra Bharati University Journal of Economics	0975-802X
Rabindra Bharati Journal of Political Science	2393-8218
Journal of Education	0972-7175
Journal of the Department of Instrumental Music	NIL
নৃত্যরসমঞ্জসী	NIL
Journal of the Department of English	NIL
নাট্যকলা-নাট্যবিভাগ	NIL
রবীন্দ্র সংগীত	NIL
Departmental Journal, Department of Rabindra Sangeet	
Journal of the Department of Musicology	NIL
Vichitra- Journal of Visual Arts	NIL

Names of Journals published by Rabindra Bharati University

## Use of ICT application in the housekeeping operations of the University Libraries in West Bengal: review and analysis

**Current Journals:** Rabindra Bharati University Library regularly subscribes 250 print journals which are displayed at the periodical section in the 2nd floor. Central Library also provides access to a good number of e-journals and some e-resources.

Special Collection Section of the central library has a special attraction to readers. This section has developed since 1962 when Government of West Bengal purchased the books of Sajani Kanta Das and donated them to the university. Later the collection of Kalidas Nag was added which was purchased by the then Vice-Chancellor Professor Hiranmoy Bandyopadhyay. Also "Kshitindra Nath Tagore Collection" donated by Menoka Devi, "Sukumar Bhattacharya Collection" and books, journals donated by Prafulla Sengupta were preserved in this section for reference and use. Renowned actor and Dada Saheb Phalke Awardee Soumitra Chattopadhyay also donated a part of his personal collection to this University. After accessioning and cataloguing those books were preserved in this section. Lastly students of eminent singer Maya Sen donated books to central library.

**Campus Map**  
Right to Information  
**Contact Us**  
Emerald Bower Campus  
56A, B.T. Road, Kolkata – 700 050  
Email: registrar@rbu.ac.in  
Jorasanko Campus  
6/4, Dwarkanath Tagore Lane, Kolkata – 700 007  
**External Link**  
UGC  
Shodhganga  
NIRF  
INFLIBNET  
National Digital Library  
NAAC

**Arts**  
**Fine Arts**  
**Visual Arts**

**Quick Links**  
Affiliated Colleges  
Research & Study Centres  
Rabindra Bharati Museum  
West Bengal State Academy of Dance Drama and Visual Arts  
Holiday Home  
INFLIBNET  
NCTE  
Fellowships / Scholarships  
University Library  
National Academic Depository (NAD)  
Registration and Migration  
Directorate of Distance Education

© 2023 All Rights Reserved Rabindra Bharati University, (RBU), Kolkata-700050, W.B., India.

### Homepage of Rabindra Bharati University Library II

**University Library** Home Search Member Status Member Registration Journals Plagiarism Campus Apps Our Team

**UNIVERSITY LIBRARY**  
**UNIVERSITY OF NORTH BENGAL**  
Accredited by NAAC

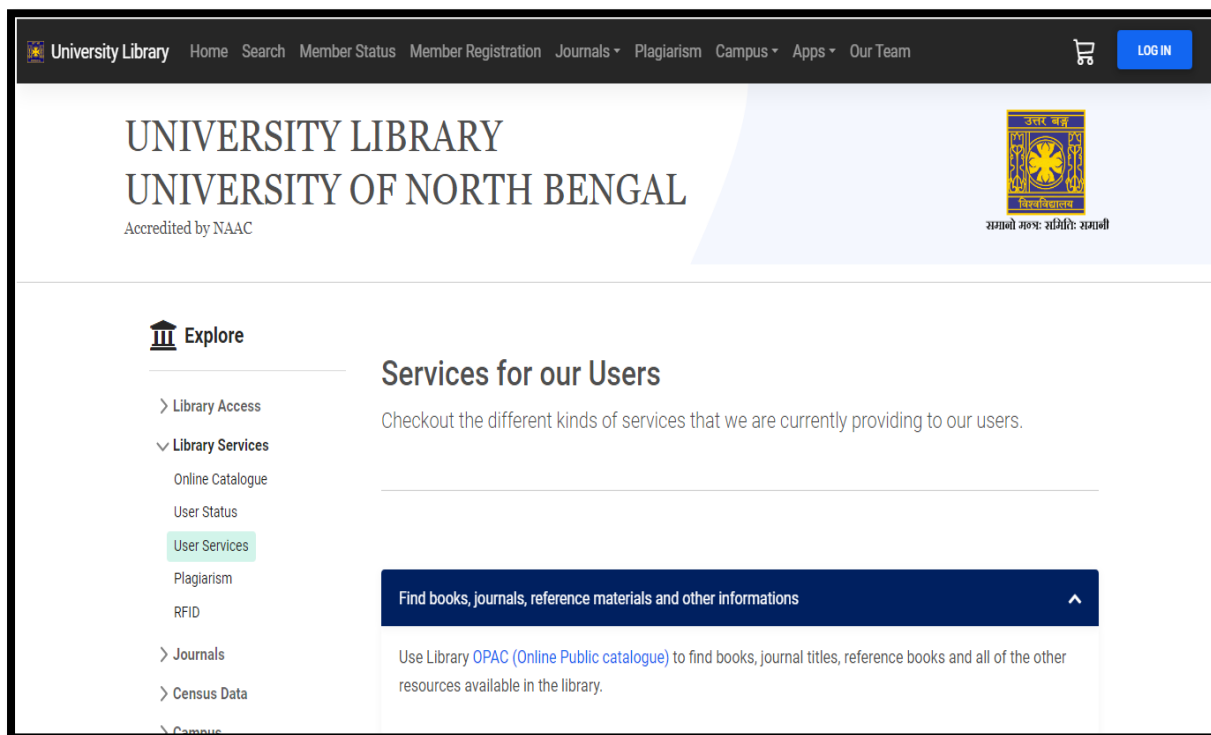
**Basic search**

Select Title Enter Book Title **SEARCH**

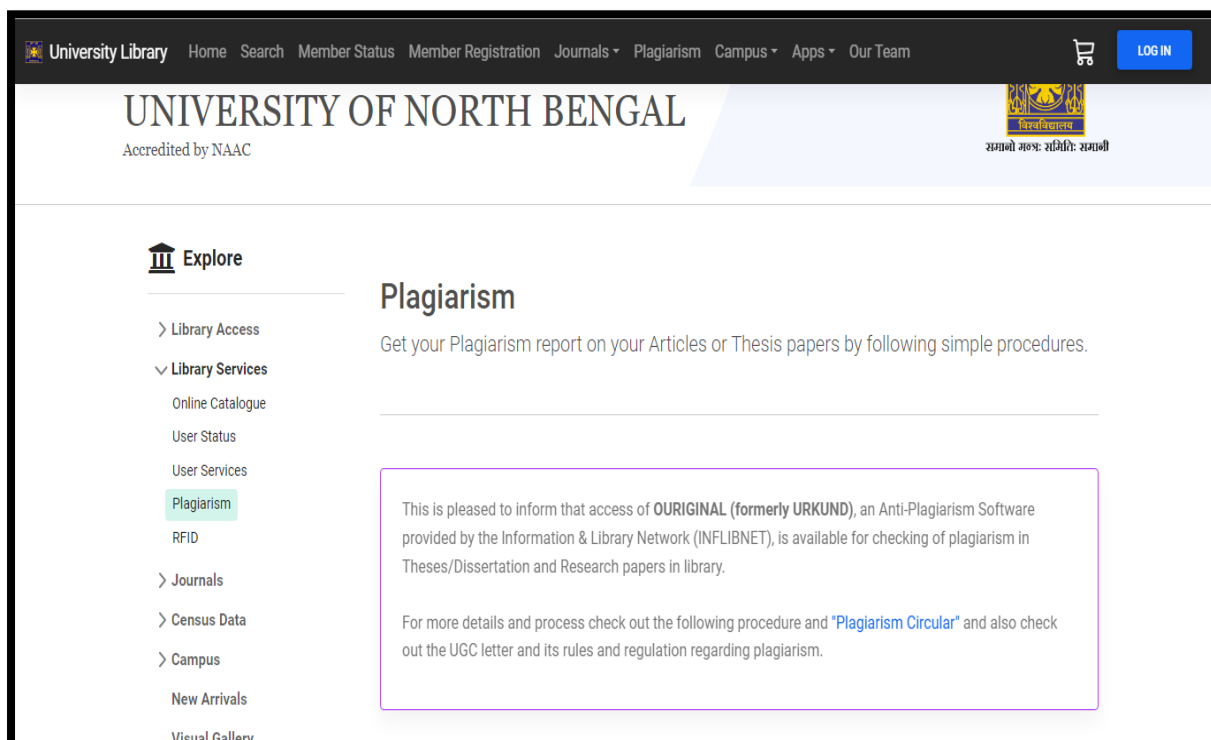
☒ Contains ☐ Exact ☐ Begins with ☐ Ends with

Material Type All

### Homepage of University of North Bengal Library




## List of Services available in the Library of University of North Bengal





## List of Services available in the Library of University of North Bengal II




**University Library**

[Home](#)
[Search](#)
[Member Status](#)
[Member Registration](#)
[Journals](#)
[Plagiarism](#)
[Campus](#)
[Apps](#)
[Our Team](#)


[LOG IN](#)




সমগ্র মনঃ সমীচি: সমগ্রী

# UNIVERSITY LIBRARY

## UNIVERSITY OF NORTH BENGAL


Accredited by NAAC


**Explore**

- > Library Access
- > Library Services
  - Online Catalogue
  - User Status
  - User Services
  - Plagiarism
  - RFID**
- > Journals
- > Census Data
- > Campus


### RFID System

NBU Library RFID System.




**N**orth Bengal University (NBU) Library is a state-of-the-art facility equipped with the latest modern technologies and resources. The library serves as a vital source of information for the academic community, and its efficient functioning is critical to ensuring the smooth flow of information and data. One of the latest additions to NBU Library's technological arsenal is **RFID** (Radio Frequency Identification) technology. One of the major advantages is the automated check-in/check-out process, which allows users to easily issue or return

## About the RFID system available in the Library of University of North Bengal








**University Library**

[Home](#)
[Search](#)
[Member Status](#)
[Member Registration](#)
[Journals](#)
[Plagiarism](#)
[Campus](#)
[Apps](#)
[Our Team](#)


[LOG IN](#)

- User Services
- Plagiarism
- RFID**
- > Journals
- > Census Data
- > Campus
- New Arrivals
- Visual Gallery
- Recent Activities
- Best Library User

### GALLERY

### e-Resources

- > NBU IR
- > Open Access e-Resources
- > e-References
- e-Books

< 1 >

## RFID equipments in the Library of University of North Bengal

## Use of ICT application in the housekeeping operations of the University Libraries in West Bengal: review and analysis

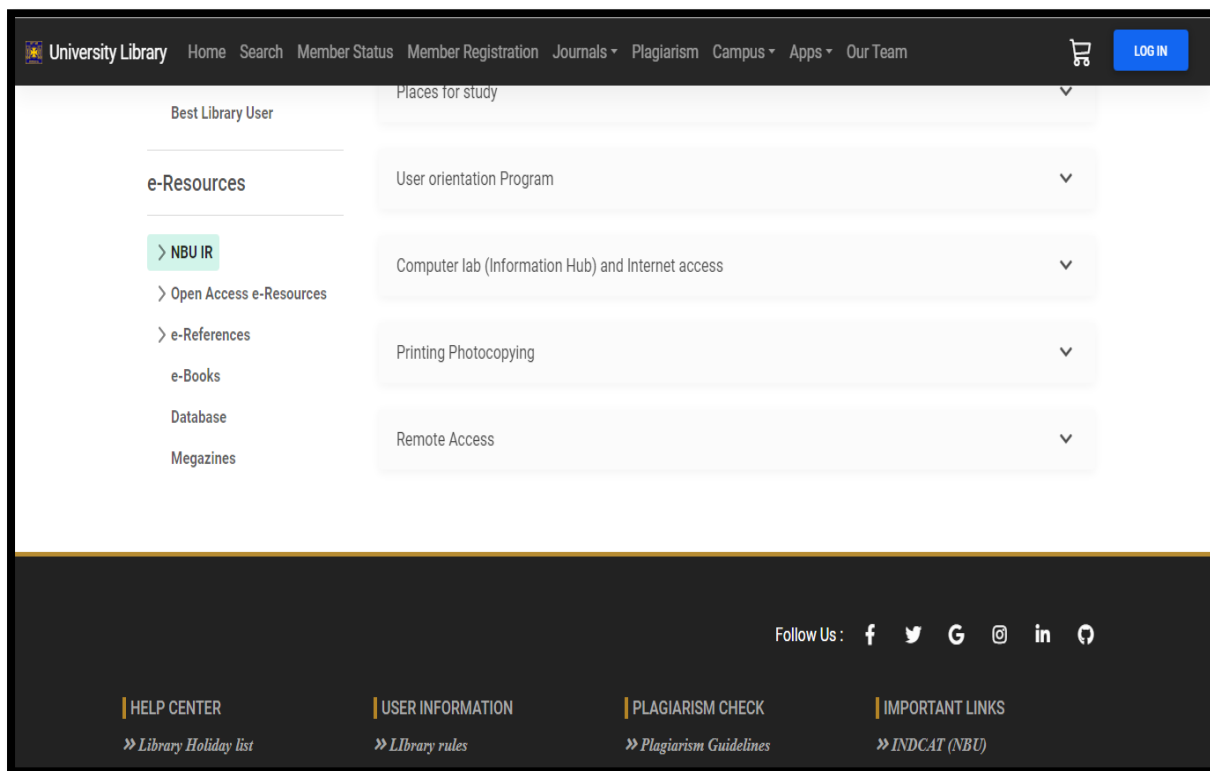
The screenshot displays the University Library website interface. The top navigation bar includes links for Home, Search, Member Status, Member Registration, Journals, Plagiarism, Campus, Apps, and Our Team, along with a shopping cart icon and a LOG IN button. The left sidebar lists services such as User Services, Plagiarism, RFID, Journals (with sub-links for e-Journal Lists, Printed Journal Lists, Serials A-Z, and Bound Periodicals), Census Data, Campus (highlighted), New Arrivals, Visual Gallery, Recent Activities, and Best Library User. The main content area features an 'Upcoming Events' calendar for July 2023, a 'Some Important Links' section with links to INDCAT (NBU), ShodhGanga, e-ShodhSindhu, JGate Plus (JCCC), Economic Political Weekly, Web of Science, and WorldCat, and an 'e-Resources' section with logos for EPW, AR, MATHSCINET, OXFORD Academic Journals, and PROJECT MUSE.

Some important links available in the Library of University of North Bengal

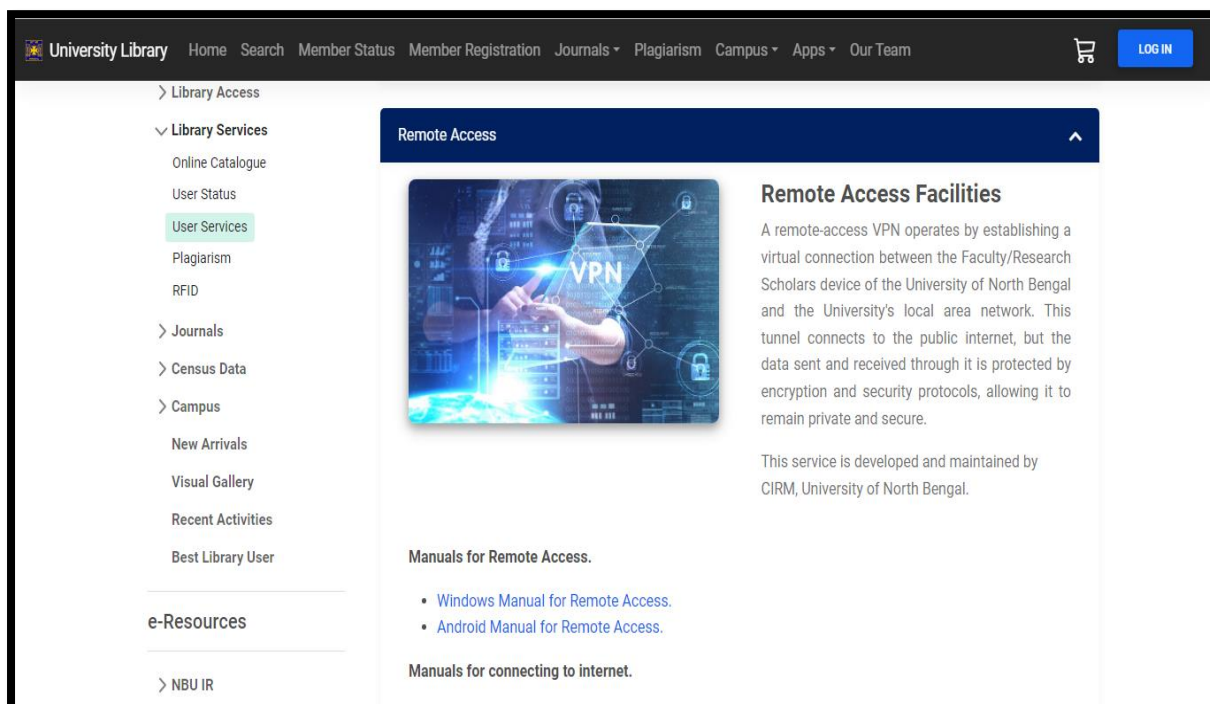
This screenshot shows a different section of the University Library website. The top navigation bar is identical to the previous screenshot. The left sidebar lists 'Best Library User', 'e-Resources', and 'NBU IR' (highlighted) with sub-links for Academic Resources, Administrative and Academic Documents, Journal Contents, Rare Documents, and University Publications. The main content area displays a 'Places for study' dropdown menu with options for User orientation Program, Computer lab (Information Hub) and Internet access, Printing Photocopying, and Remote Access. The bottom section features social media links (Facebook, Twitter, Google+, Instagram, LinkedIn, YouTube) and a footer with links to HELP CENTER (Library Holiday list), USER INFORMATION (Library rules), PLAGIARISM CHECK (Plagiarism Guidelines), and IMPORTANT LINKS (INDCAT (NBU)).

Several services available in the Library of University of North Bengal

## Use of ICT application in the housekeeping operations of the University Libraries in West Bengal: review and analysis



### e-Resources available in the Library of University of North Bengal




### Remote Access facilities available in the Library of University of North Bengal




[News Papers](#)
[E-Books](#)
[E-Journals](#)
[News Channels](#)
[e-News Papers](#)

Customize and control Google Chrome



**CENTRAL LIBRARY :: VIDYASAGAR UNIVERSITY**  
কেন্দ্রীয় গ্রন্থাগার :: বিদ্যাসাগর বিশ্ববিদ্যালয়



[Screen Reader Access](#)  
[Skip to Main Content](#)  
[Skip to Navigation Link](#)


**LATEST LIBRARY NEWS**
The central library has successfully completed User Awareness Programmes for the newly admitted P.G students in 2019-20 academic se...

HOME
RULES

About Library
Services
E-References
Institutional Repository
Publication

FAQ
DOWNLOAD

CONTACT
FEEDBACK

Wide Wi-Fi Hotspot  
**24 x 7 Free**  
  
Get Connected. Stay Connected.

Remote Access

**Ebooks**

**Purchased Ebooks Catalogue**

- [Access From Outside the Library](#)
- [Access From Inside the Library](#)

**Open Access Ebooks Catalogue**

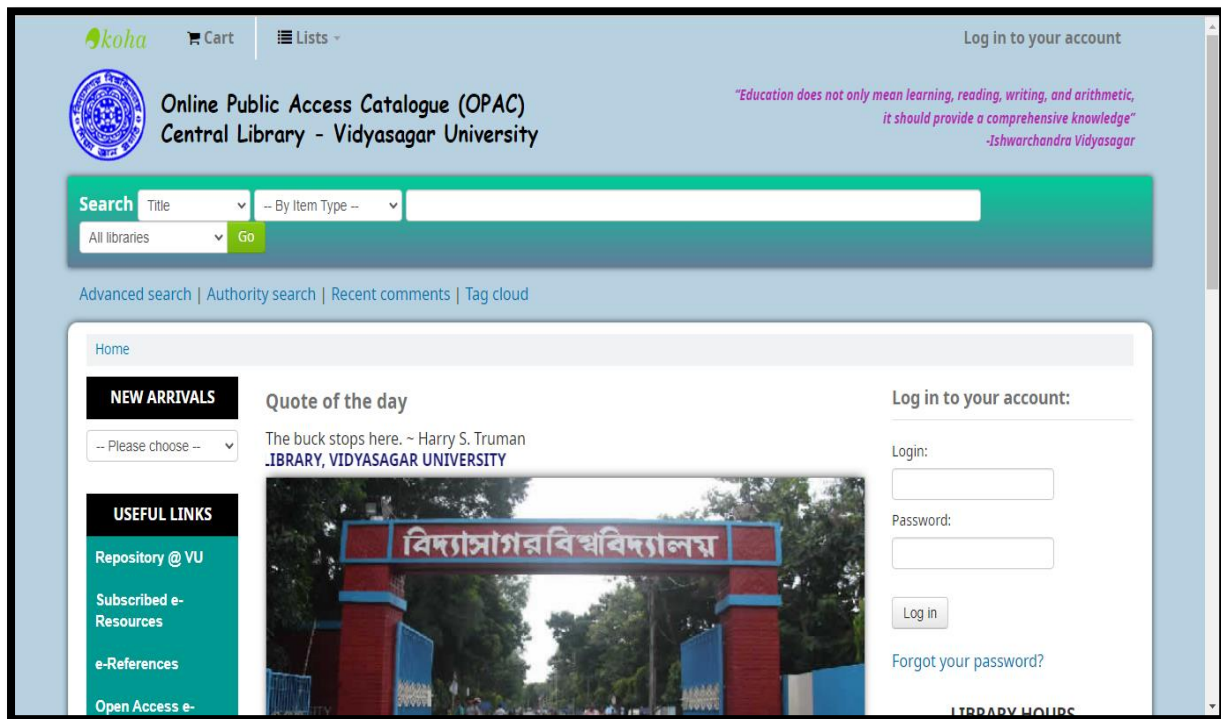
- [Click Here](#)

Access Problem ?

Important Links on the homepage of Central Library, Vidyasagar University



Online Public Access Catalogue (OPAC) of Central Library, Vidyasagar University



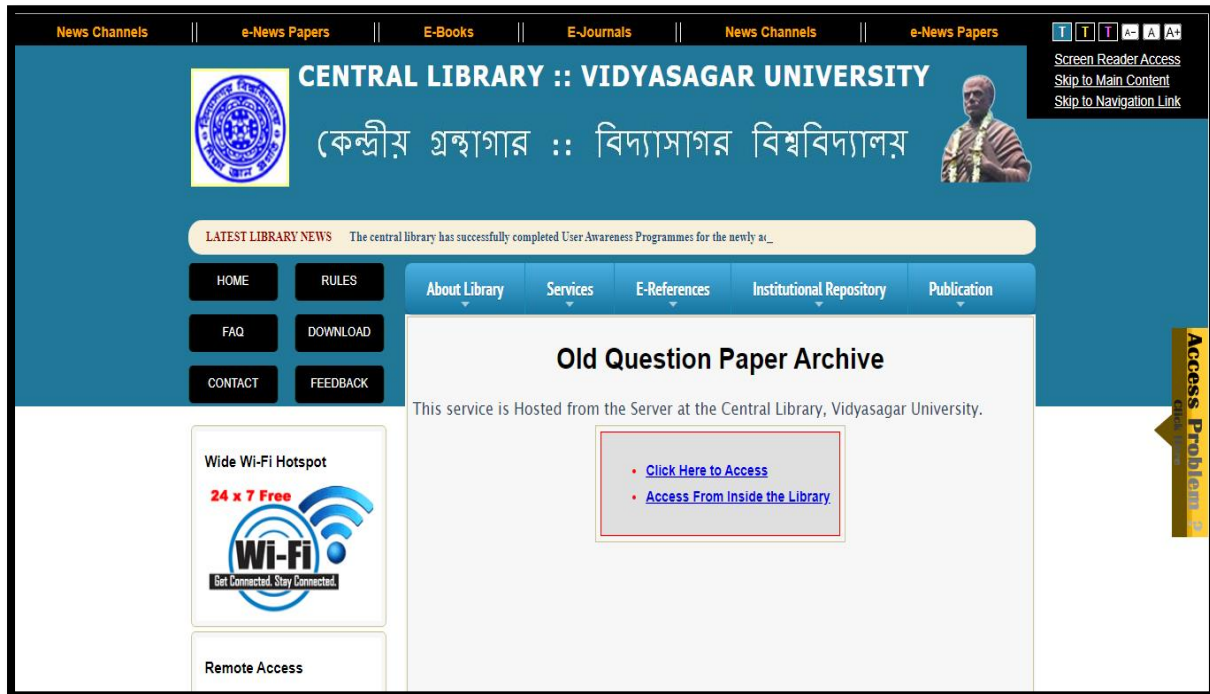
Online Public Access Catalogue (OPAC) of Central Library, Vidyasagar University II



Multimedia Repository of Central Library, Vidyasagar University



Link for CD/ DVD Mirror Server of Central Library, Vidyasagar University



Old Question Paper Archive of Central Library, Vidyasagar University

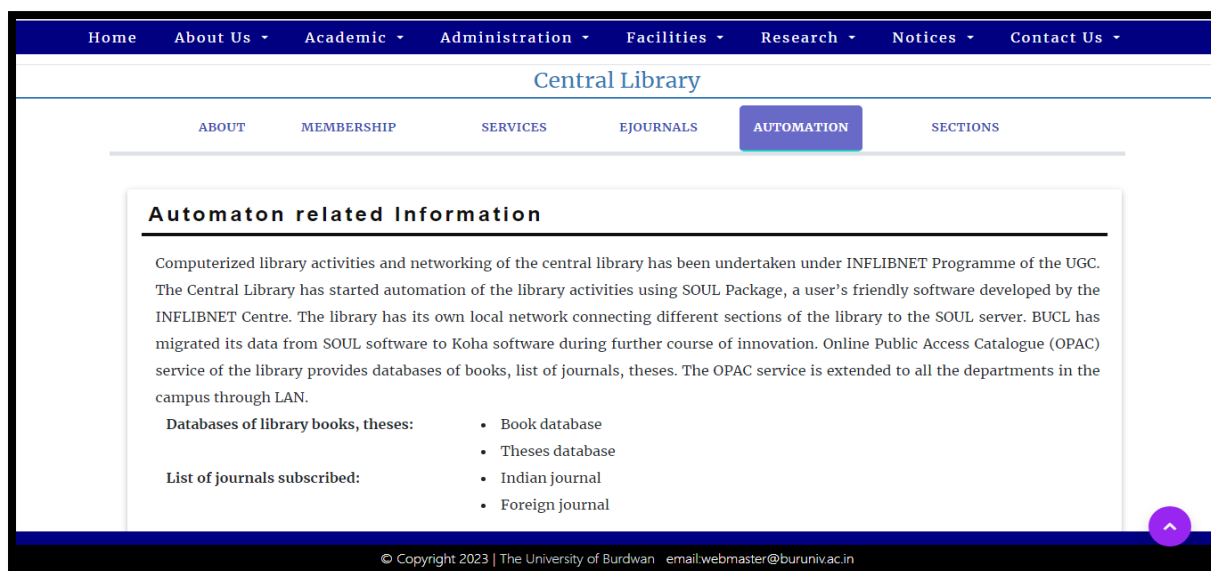


Institutional Repository of Central Library, Vidyasagar University





Homepage of the Central Library of The University of Burdwan



Automation related information of the Central Library of The University of Burdwan

The screenshot shows the 'Central Library' website. The top navigation bar includes links: Home, About Us, Academic, Administration, Facilities, Research, Notices, and Contact Us. Below this, a breadcrumb trail shows 'Facilities' leading to 'Central Library'. The main header 'Central Library' is centered. A secondary navigation bar contains links: ABOUT, MEMBERSHIP, SERVICES, EJOURNALS (highlighted), AUTOMATION, and SECTIONS. The main content area features a section titled 'EJournals subscribed by UGC-Infonet' with a table listing five publishers and their journal counts. A purple 'back to top' button is visible on the right side of the content area. The footer contains copyright information for 2023 and contact details for The University of Burdwan.

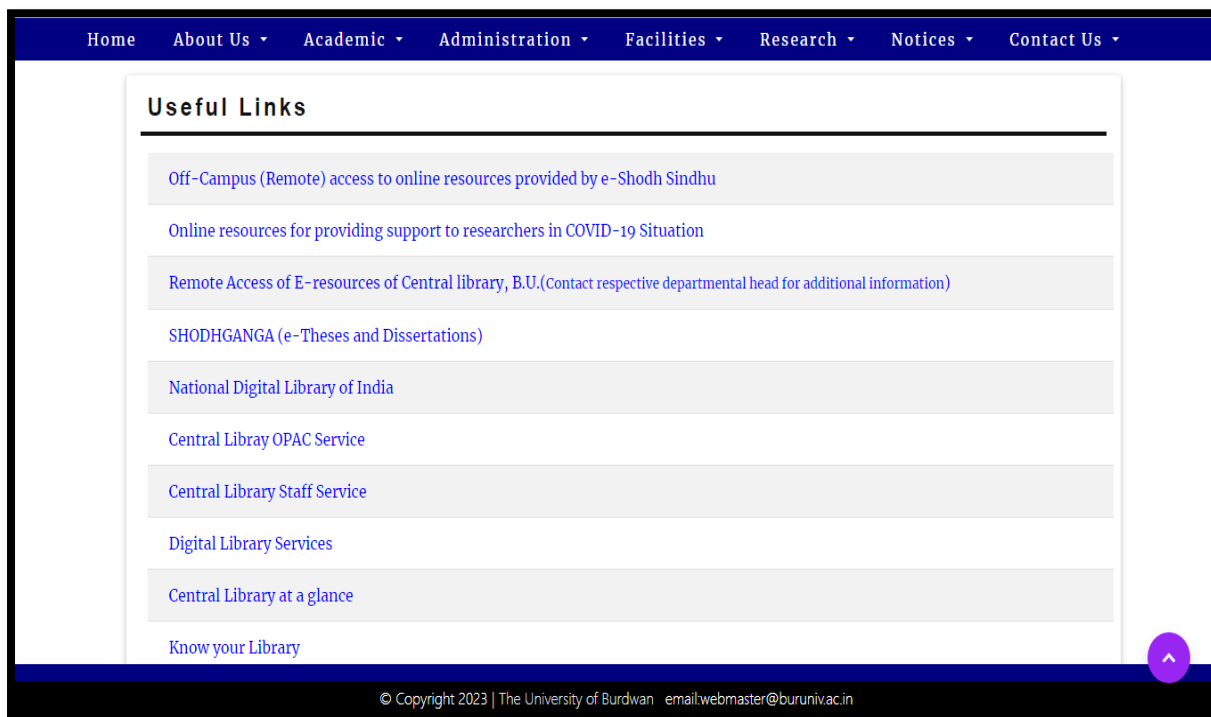
No.	Name of the Publisher	Journals count	Website
1.	American Chemical Society(1876)	29 Journals	<a href="https://www.pubs.acs.org">https://www.pubs.acs.org</a>
2.	American Institute of Physics	18 Journals	<a href="https://www.aip.org">https://www.aip.org</a>
3.	American Physical Society	10 Journals	<a href="https://www.aps.org">https://www.aps.org</a>
4.	Annual Reviews	33 Journals	<a href="https://ajournals.annualreviews.org">https://ajournals.annualreviews.org</a>
5.	Blackwell publishing	489 Journals	<a href="https://www.interscience.wiley.com">https://www.interscience.wiley.com</a>

### List of e-Journals subscribed by The University of Burdwan

The screenshot shows the 'Useful Links' section of the Central Library website. The top navigation bar is identical to the previous screenshot. The main content area lists ten links in a vertical stack, each within a light gray box. A purple 'back to top' button is located on the right side. The footer is the same as the previous screenshot.

- [Off-Campus \(Remote\) access to online resources provided by e-Shodh Sindhu](#)
- [Online resources for providing support to researchers in COVID-19 Situation](#)
- [Remote Access of E-resources of Central library, B.U.\(Contact respective departmental head for additional information\)](#)
- [SHODHGANGA \(e-Theses and Dissertations\)](#)
- [National Digital Library of India](#)
- [Central Library OPAC Service](#)
- [Central Library Staff Service](#)
- [Digital Library Services](#)
- [Central Library at a glance](#)
- [Know your Library](#)

### Useful Links in the Central Library of The University of Burdwan



### Useful Links in the Central Library of The University of Burdwan II



### Useful Links in the Central Library of The University of Burdwan III

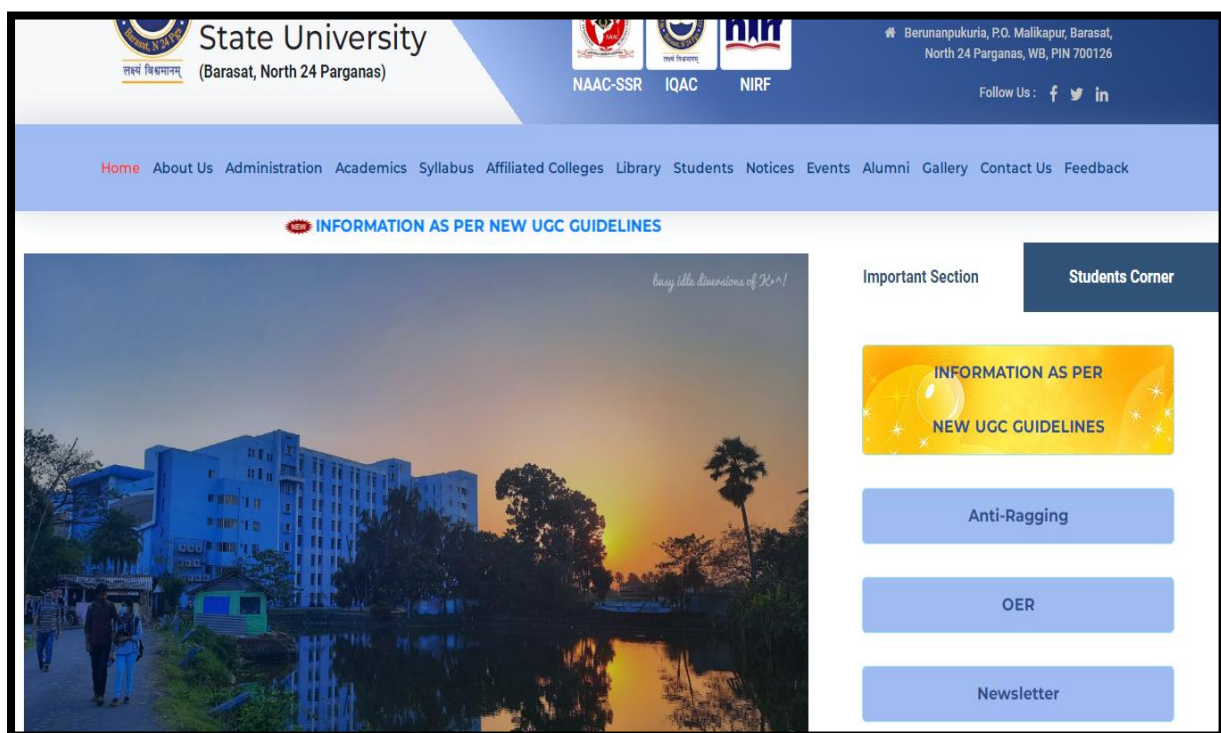


Central Library of The University of Burdwan

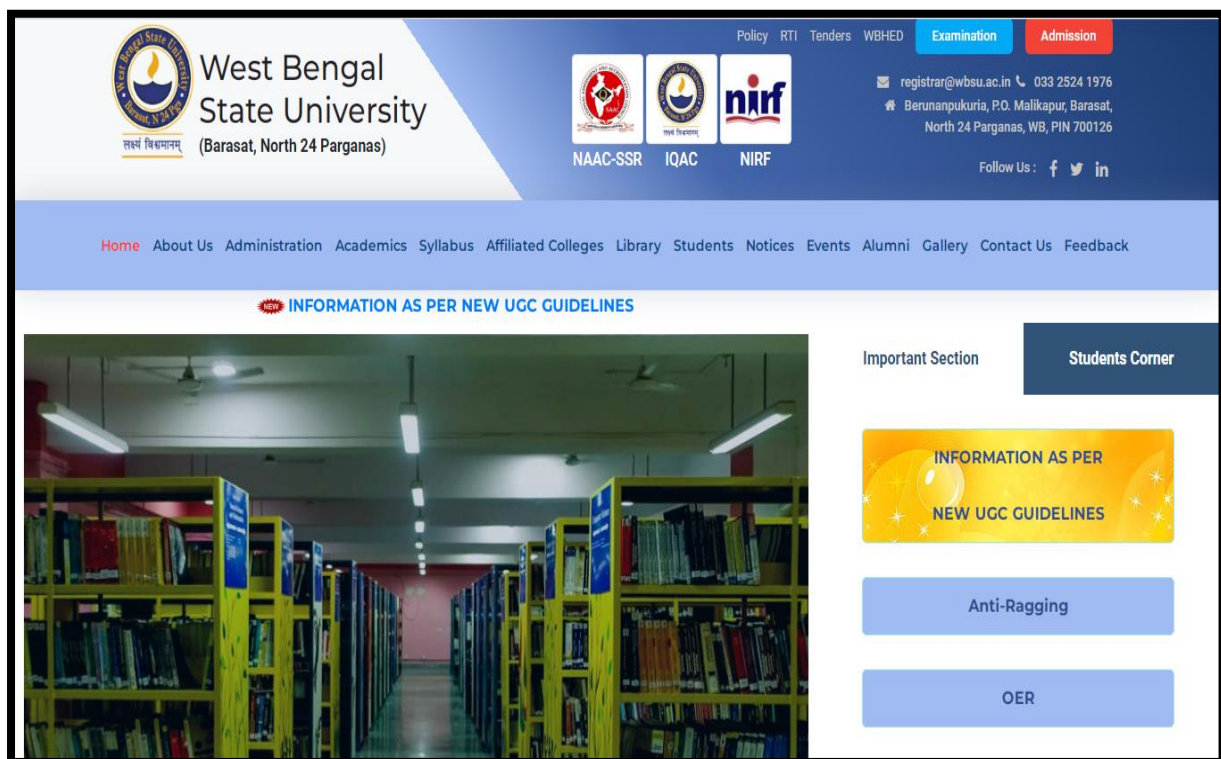


Central Library of The University of Burdwan II

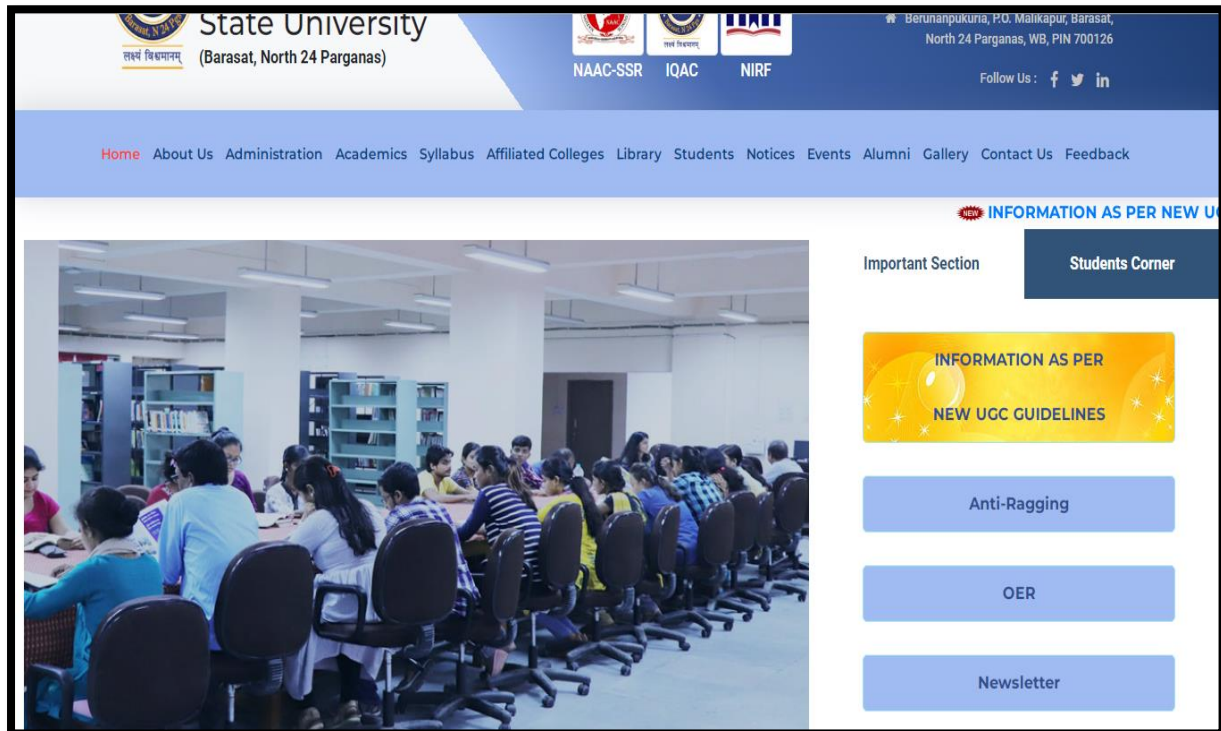




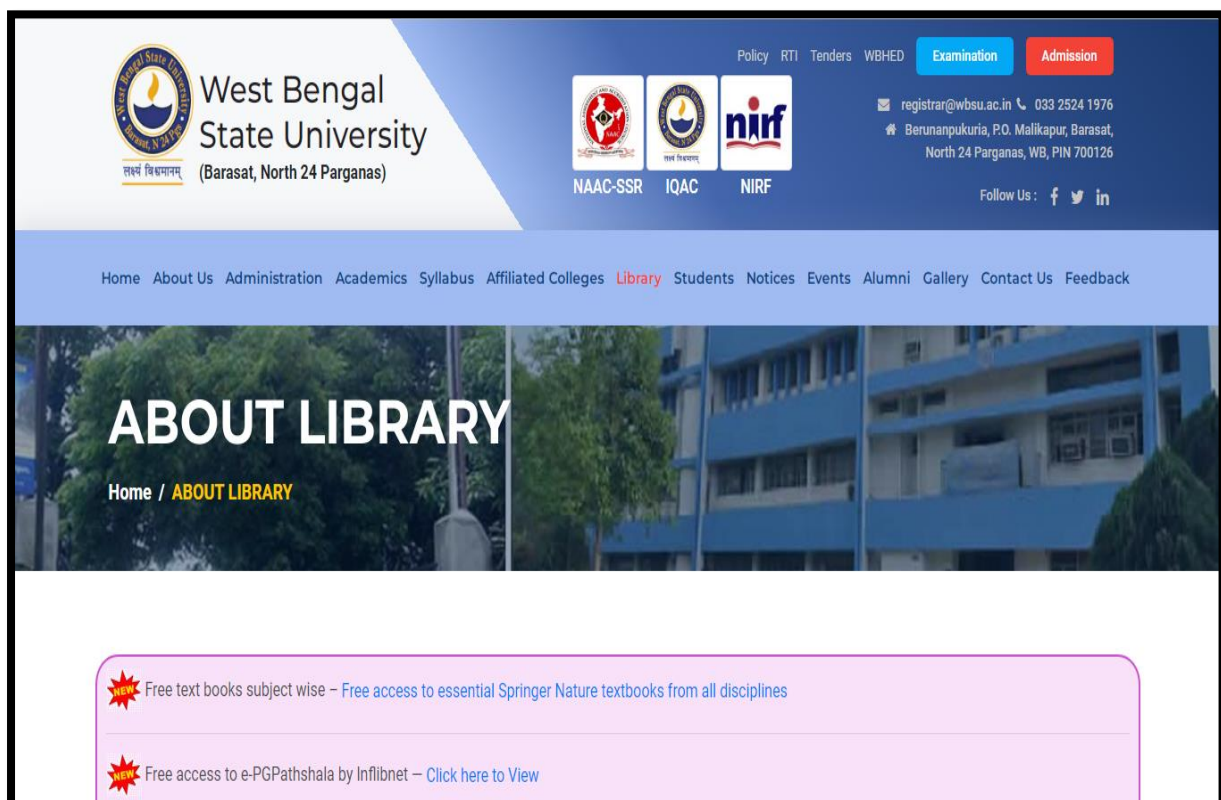
West Bengal State University Home Page



West Bengal State University Library




West Bengal State University Library Reading Room



West Bengal State University Library Webpage

## Use of ICT application in the housekeeping operations of the University Libraries in West Bengal: review and analysis


[Home](#) [About Us](#) [Administration](#) [Academics](#) [Syllabus](#) [Affiliated Colleges](#) [Library](#) [Students](#) [Notices](#) [Events](#) [Alumni](#) [Gallery](#) [Contact Us](#) [Feedback](#)


 Study Materials of Dept. of Education –  
[Sem – 2, Socialization, Nelay Sarkar](#)  
[Sem – 2, Social Process, Nelay Sarkar](#)  
[Sem – 2, Contemporary Issues, Unit 2\(IV\), AM](#)  
[Sem – 2, AICTE, AKP](#)  
[Sem – 2, Contemporary, Unit-1 \(ALL\), AM](#)  
[Sem – 2, Contemporary Issue, Unit-2\(i\), AM](#)  
[Sem – 2, Contemporary Issues, Unit-2\(ii\), AM](#)  
[Sem – 2, Medical Council of India, AKP](#)  
[Sem – 3, ET, Unit 1 „iv., AM](#)  
[Sem – 4, Psychology of Using Teaching Aids, AKP](#)  
[Sem – 4, TE, Learning Style & Cognitive Style, AM](#)  
[Sem – 4, TE, Sem – Current Issues, AM](#)  
[Sem – 4, TE, Simulated Teaching, AM](#)  
[Sem – 4, Teaching ,Learning and Pedagogy, AKP](#)  
[Sem – 4, TE-School Effectiveness, AM](#)  
[Sem – 4, Unit-1, Psychosis, MKM](#)  
[Sem – 4, Unit-1, Schizophrenia, MKM](#)  
[Sem – 4, CS, U-2, SCA](#)

### West Bengal State University Library (Study Materials available)


[Home](#) [About Us](#) [Administration](#) [Academics](#) [Syllabus](#) [Affiliated Colleges](#) [Library](#) [Students](#) [Notices](#) [Events](#) [Alumni](#) [Gallery](#) [Contact Us](#) [Feedback](#)

The University Library of West Bengal State University started its journey 10 years back with a collection of 1800 books. It was housed at the university's Guest House. About 8 years back the collection was shifted to its present location at the academic building of the university. Over the years collection of the library has grown and at present the library has more than 28000 books on almost all the subjects. It has a great collection of rare books in the form of hardcopy as well as electronic copy. The library is equipped with more than 50 computers with high speed internet facility. Wi-Fi facility is also available now. With the help of the university librarian who has joined recently, the pace of the modernization of library has been on an accelerated path.






Of Various new initiatives that have now been taken, the organization of books through application of modern library management software needs mention. The process of giving a huge facelift of the library's look and feel is also



### West Bengal State University (about the Library)







[Home](#) [About Us](#) [Administration](#) [Academics](#) [Syllabus](#) [Affiliated Colleges](#) [Library](#) [Students](#) [Notices](#) [Events](#) [Alumni](#) [Gallery](#) [Contact Us](#) [Feedback](#)



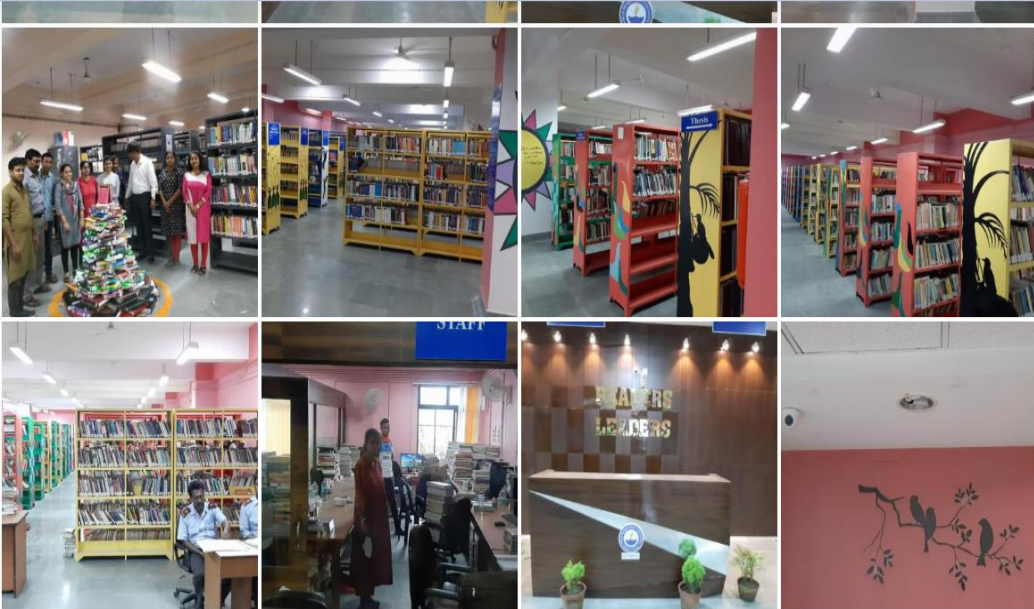
Of Various new initiatives that have now been taken, the organization of books through application of modern library management software needs mention. The process of giving a huge facelift of the library's look and feel is also started. The plan over the next one year is to make the library a Center of Excellence where both the students and teachers will get information through modern technologies as well as through reading of books. The library also has plans to organize many events on subjects like Women Empowerment, Career enhancement, debate, JAM, quiz etc.

Presently the library has a footfall of more than 200 people per day. Most of the library visitors are young university students. They get book lending service, photocopying service, Internet and printing facility is also provided.

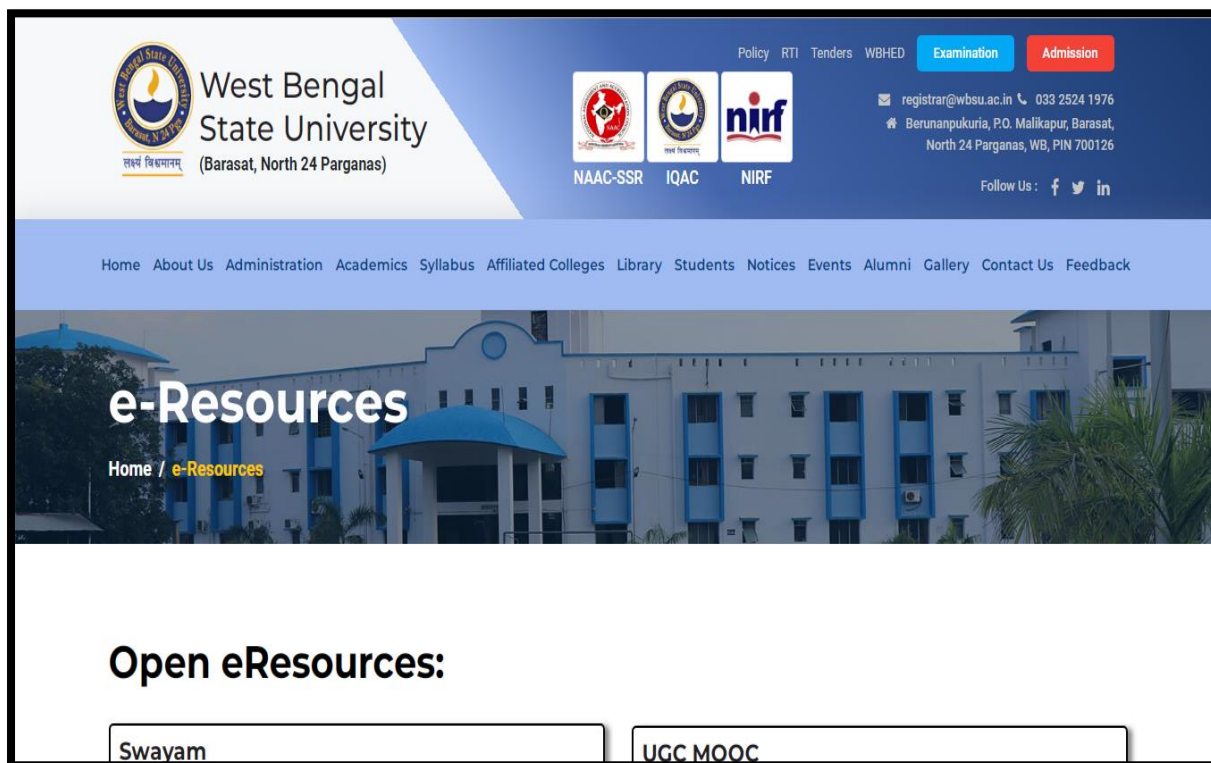


West Bengal State University Library Reading Room

[Home](#) [About Us](#) [Administration](#) [Academics](#) [Syllabus](#) [Affiliated Colleges](#) [Library](#) [Students](#) [Notices](#) [Events](#) [Alumni](#) [Gallery](#) [Contact Us](#) [Feedback](#)



West Bengal State University Library



West Bengal State University  
(Barasat, North 24 Parganas)

Policy RTI Tenders WBHED Examination Admission

registran@wbsu.ac.in 033 2524 1976  
Berunanpukuria, P.O. Malikapur, Barasat,  
North 24 Parganas, WB, PIN 700126

Follow Us: f t in

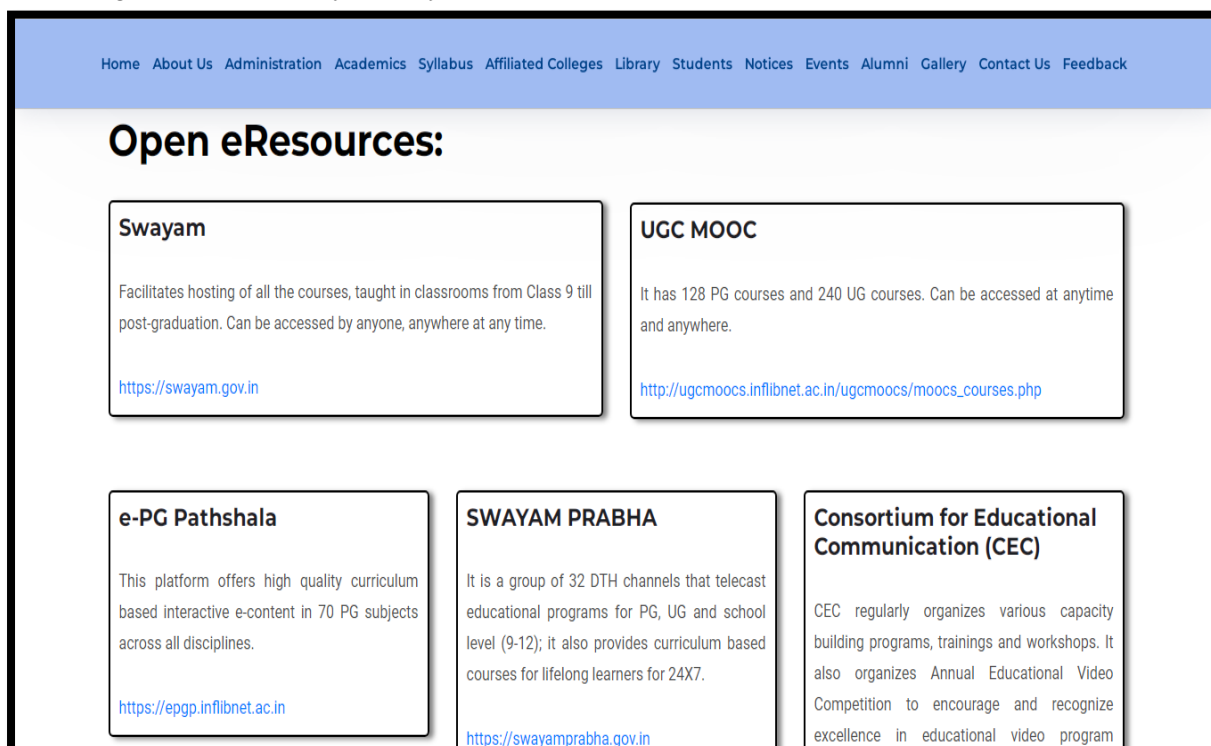
Home About Us Administration Academics Syllabus Affiliated Colleges Library Students Notices Events Alumni Gallery Contact Us Feedback

e-Resources  
Home / e-Resources

Open eResources:

Swayam UGC MOOC

## West Bengal State University Library e-Resources



Home About Us Administration Academics Syllabus Affiliated Colleges Library Students Notices Events Alumni Gallery Contact Us Feedback

Open eResources:

**Swayam**  
Facilitates hosting of all the courses, taught in classrooms from Class 9 till post-graduation. Can be accessed by anyone, anywhere at any time.  
<https://swayam.gov.in>

**UGC MOOC**  
It has 128 PG courses and 240 UG courses. Can be accessed at anytime and anywhere.  
[http://ugcmoots.inflibnet.ac.in/ugcmoots/moots\\_courses.php](http://ugcmoots.inflibnet.ac.in/ugcmoots/moots_courses.php)

**e-PG Pathshala**  
This platform offers high quality curriculum based interactive e-content in 70 PG subjects across all disciplines.  
<https://epgp.inflibnet.ac.in>

**SWAYAM PRABHA**  
It is a group of 32 DTH channels that telecast educational programs for PG, UG and school level (9-12); it also provides curriculum based courses for lifelong learners for 24X7.  
<https://swayamprabha.gov.in>

**Consortium for Educational Communication (CEC)**  
CEC regularly organizes various capacity building programs, trainings and workshops. It also organizes Annual Educational Video Competition to encourage and recognize excellence in educational video program

## West Bengal State University Library e-Resources II

[Home](#) [About Us](#) [Administration](#) [Academics](#) [Syllabus](#) [Affiliated Colleges](#) [Library](#) [Students](#) [Notices](#) [Events](#) [Alumni](#) [Gallery](#) [Contact Us](#) [Feedback](#)

### National Digital Library (NDL)

Facilitates hosting of all the courses, taught in classrooms from Class 9 till post-graduation. Can be accessed by anyone, anywhere at any time.

<https://swayam.gov.in>

### Shodhganga

Shodhganga provides a platform for research scholars to deposit their Ph.D. theses electronically and make it available to the entire scholarly community in open access.

<https://shodhganga.inflibnet.ac.in/>

### VIDWAN


VIDWAN is the premier database of profiles of scientists / researchers and other faculty members working at leading academic institutions and other R & D organization involved in teaching and research in India.


<https://vidwan.inflibnet.ac.in>

## PUBLISHING HOUSES:

### Taylor & Francis

One of the world's largest publishers of open access sources. They publish over 180 high-quality full open access journals, ranging across disciplines and subject areas.

**Taylor & Francis**  
Taylor & Francis Group



### West Bengal State University Library e-Resources III

[Home](#) [About Us](#) [Administration](#) [Academics](#) [Syllabus](#) [Affiliated Colleges](#) [Library](#) [Students](#) [Notices](#) [Events](#) [Alumni](#) [Gallery](#) [Contact Us](#) [Feedback](#)

## PUBLISHING HOUSES:

### Taylor & Francis

One of the world's largest publishers of open access sources. They publish over 180 high-quality full open access journals, ranging across disciplines and subject areas.

<https://www.tandfonline.com/openaccess>

**Taylor & Francis**  
Taylor & Francis Group





### Elsevier

Specializes in science, technical, and medical content. It publishes more than 500,000 articles annually in 2,500 journals. Its archives contain over 17 million documents and 40,000 e-books. Total yearly downloads amount to more than 1 billion.

<https://www.elsevier.com/about/open-science/open-access/open-access-journals>




### West Bengal State University Library Publishing Houses

[Home](#) [About Us](#) [Administration](#) [Academics](#) [Syllabus](#) [Affiliated Colleges](#) [Library](#) [Students](#) [Notices](#) [Events](#) [Alumni](#) [Gallery](#) [Contact Us](#) [Feedback](#)


## OTHER IMPORTANT OPEN RESOURCES:

- **Directory of Open Access Journals (DOAJ)**  
An online directory that indexes and provides access to high quality, open access, peer-reviewed journals.  
<https://doaj.org>
- **Directory of Open Access Books**  
An online directory that indexes and provides access to high quality, open access books.  
<https://www.doabooks.org/>
- **National Programme on Technology Enhanced Learning (NPTEL)**  
An initiative by seven IITs (IIT Bombay, Delhi, Guwahati, Kanpur, Kharagpur, Madras and Roorkee) and (IISc) for creating course contents in engineering and science.  
<https://nptel.ac.in/>
- **Open Access Thesis & Dissertations**  
A repository of open access theses and dissertations published around the world. OATD currently indexes 5,153,410 theses and dissertations.  
<https://oatd.org/>
- **Open Knowledge Repository-World Bank (OKR)**


### West Bengal State University Library e-Resources (important resources)



**CENTRAL LIBRARY**  
West Bengal State University




**WEBOPAC (ONLINE PUBLIC ACCESS CATALOGUE)**

Title 

[Advanced search](#) | [Authority search](#) | [Tag cloud](#) | [Libraries](#)

Home

[Our Website](#)  
[Library Services](#)  
[Library Rules](#)  
[Our Library Team](#)  
[E-Resources](#)

**Welcome to the CENTRAL LIBRARY, WEST BENGAL STATE UNIVERSITY**  


**LIBRARY HOURS**

Days	Timings
Monday to Friday	11:00 AM-5:00 PM
Saturday, Sunday & Holiday	Closed

**CIRCULATION HOURS**

Days	Timings
Monday-Friday	11:00 AM-04:30 PM

[For Mobile OPAC](#)


### West Bengal State University Central Library Homepage



## Use of ICT application in the housekeeping operations of the University Libraries in West Bengal: review and analysis

[Home](#)

Welcome to the CENTRAL LIBRARY, WEST BENGAL STATE UNIVERSITY



Central Library

The University Library of West Bengal State University started its journey 10 years back with a collection of 1800 books. It was housed at the university & rsquo;s Guest House. About 8 years back the collection was shifted to its present location at the academic building of the university. Over the years collection of the library has grown and at present the library has more than 28000 books on almost all the subjects. It has a great collection of rare books...

LIBRARY HOURS


Days	Timings
Monday to Friday	11:00 AM-5:00 PM
Saturday, Sunday & Holiday	Closed

CIRCULATION HOURS

Days	Timings
Monday-Friday	11:00 AM-04:30 PM


[Our Website](#)
[Library Services](#)
[Library Rules](#)
[Our Library Team](#)
[E-Resources](#)

For Mobile OPAC



DOWNLOAD




### West Bengal State University Central Library Homepage II



**West Bengal State University**  
(Barasat, North 24 Parganas)

[Research](#)
[Policy](#)
[RTI](#)
[Tenders](#)
[WBHED](#)


[Examination](#)
[Admission](#)


registr@wbsu.ac.in 033 2524 1976

Baranankuria, P.O. Malikapur, Barasat, North 24 Parganas, WB, PIN 700126

Follow Us: [f](#) [t](#) [in](#)



Search WBSU OER Repository



**About WBSU**

The West Bengal State University (WBSU), Barasat was established in the year 2008. After the initial teething problems that persisted for a rather long time of about six to seven years, the University is now at a position to stand before the world in respect of assessment and it is contributing well in the field of teaching , learning process and research. The University

[Show more](#)

**About CEMCA**


Commonwealth Educational Media Centre for Asia

In response to needs expressed by the Commonwealth countries of the Asian region for a more effective utilization of educational media resources for Distance Education, the Commonwealth of Learning (COL) established Commonwealth Educational Media Centre for Asia

[Show more](#)

About WBSU-OER

Mission And Vission Of WBSU-OER



### West Bengal State University Central Library Repository