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# AI-Assisted Library Reconstruction

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*Sri Krishna Arts and Science College, Coimbatore, India*

A volume in the Advances in Library and  
Information Science (ALIS) Book Series



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to changing user needs by utilizing mathematical optimization. With its foundation in user insights, data analytics enables libraries to customize services to meet the requirements of a wide range of users, make well-informed choices, and create personalized experiences. The cooperative strategy combines data analytics and optimization algorithms to produce customized book suggestions, effective resource distribution via queuing systems, and trend detection in library collections. Ethical factors emphasize the need for appropriate data handling, particularly the preservation of privacy through methods like differential privacy.

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Academic libraries are essential for providing information services to the user community. Historical initiatives have been implemented to establish these libraries based on recommendations from commissions on education. The chapter discusses the digital transformation of academic libraries, focusing on automation, digital library services, digital reference services, INFLIBNET services, digital initiatives in India for higher education, artificial intelligence in libraries, and resource digitization.

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## Preface

### Chapter 17: Digital Transformation of Academic Libraries: Developments and Encounters

Authored by Thangiah Librarian and team, this chapter discusses the digital transformation of academic libraries in India. Recognizing India's economic resilience and effective management of external challenges, the authors emphasize the key drivers of economic growth, including private consumption and capital formation. The chapter provides insights into India's economic growth in FY 2022-23 and its resilience during the pandemic. It highlights the need for private capital expenditure to enhance employment opportunities and stimulate further growth, positioning academic libraries within the broader economic landscape. This overview merely scratches the surface of the comprehensive journey that *Revolutionizing Libraries: The AI-Assisted Reconstruction Odyssey* undertakes. As we navigate through subsequent chapters, we will address ethical considerations, delve into practical implementation strategies, and envision the future landscape where libraries, augmented by AI, stand as beacons of knowledge in a rapidly evolving information ecosystem.

#### Description of Where the Topic Fits in the World Today

In the contemporary landscape, the intersection of artificial intelligence (AI) and libraries stands at the forefront of technological innovation, cultural preservation, and information accessibility. As societies grapple with the challenges and opportunities presented by the digital age, the infusion of AI into libraries represents a pivotal moment in shaping the role of these institutions in the world today.

#### Technological Renaissance

The integration of AI in libraries places them at the epicenter of a technological renaissance. As AI technologies advance, libraries become dynamic hubs for the application of cutting-edge tools, transforming their traditional functions into adaptive and responsive knowledge ecosystems.

#### Cultural Heritage Preservation

In an era where cultural heritage preservation faces both digital and physical threats, the digitization and reconstruction efforts powered by AI play a crucial role. Libraries, as custodians of our collective history, utilize AI to safeguard and make accessible rare manuscripts, fragile texts, and historical artifacts.

#### Information Accessibility and Inclusivity


The world today demands information to be not only abundant but also easily accessible to diverse communities. AI-assisted library reconstruction aims to break down barriers by enhancing search capabilities, providing personalized recommendations, and making knowledge resources available to a wider audience, thereby fostering inclusivity.



## Chapter 17


# Digital Transformation of Academic Libraries: Developments and Encounters

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### ABSTRACT

*Academic libraries are essential for providing information services to the user community. Historical initiatives have been implemented to establish these libraries based on recommendations from commissions on education. The chapter discusses the digital transformation of academic libraries, focusing on automation, digital library services, digital reference services, INFLIBNET services, digital initiatives in India for higher education, artificial intelligence in libraries, and resource digitization.*

### INTRODUCTION TO ACADEMIC LIBRARIES

One of the mainstays of the nation's higher education system is the academic library. The former president of India, Dr. Radhakrishnan, says that the library is the heart of the university. Earlier academic libraries housed collections of books, journals, dissertations, journal back volumes, theses, reports, and other

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## ***Digital Transformation of Academic Libraries***

materials related to the curriculum and research resources for university libraries. Academic libraries offer specialized collections in specific fields of study to meet the demands of graduate students and professors in terms of research.

They play a crucial role in supporting every aspect of the academic journey, from providing essential resources for teaching and learning to facilitating cutting-edge research and scholarly exploration. They facilitate access to materials not available locally by borrowing from other libraries and also through an inter-library loan from DELNET, providing researchers with powerful databases, research tools, and software. Libraries provide valuable research assistance to scholars, and postgraduates help LIS professionals. Librarians should teach information literacy skills to users effectively. Libraries provide a quiet and separate corner for book reading, group study, discussion, and collaboration among students. All the academic libraries provide information and communication technology gadgets, namely computers, kindle readers, printers, scanners, access to all the online supported materials and related software, and a separate server for web OPAC access.

Libraries also conducted workshops, seminars, conferences, and orientation programmes on different academic topics related to the current literature and organised programmes for LIS professionals with opportunities to expand their knowledge and develop new skills. These libraries empower researchers to analyse data, visualise findings, and collaborate globally. Academic libraries are dynamic hubs of knowledge, learning, and research, playing a critical role in educational institutions' success and intellectual development. As technology and information landscapes evolve, they adapt and innovate, ensuring their relevance as pillars of teaching, learning, and research.

## **Recommendations on Academic Libraries by Various Commissions**

The recommendations of various education commissions throughout history have had a significant impact on the development of academic libraries. The Raleigh Commission (1902) reported that this Indian panel mandated appropriate space, furnishings, and loan availability for all students, laying the foundation for modern university libraries.

Dr. Sarvepalli Radhakrishnan University Education Commission (1948–1949) proposed annual awards for students at Rs. 40, 6.25% of the total budget, emphasising libraries' importance as the university's heart, extended operation hours, and unique non-recurring awards. Dr. S. R. Ranganathan served as the chair of the UGC Library Committee (1957), which pushed for qualified staff, equal pay, and sufficient funding in the library industry. In India, the Education Commission (1964–1966) emphasised the various functions of academic libraries, emphasising research, faculty development, and personal growth. The UGC Pay Revision Committee (2006) revised pay structures for library staff, aligning them with teaching faculty. The Curriculum Development Committees (1990 and 2001) revamped library science education, recommending diploma courses as degrees and offering graduate and doctoral programmes.

International commissions and organisations like UNESCO have influenced academic library development, encouraging collaboration and best practices. However, regional and national variations in recommendations and implementation reflect local contexts and educational needs.

## **Reviews of Related Studies**

**Mariana Ferreira, Paulina Preto, and Inês Braga (2021)** found that this study on the Faculty of Economics of the University of Porto (FEP) has implemented a training programme for information literacy

## ***Digital Transformation of Academic Libraries***

(IL) and digital literacy (DL) to support teaching and learning in the face of digital transformation. The project aimed to provide distance learning, reduce onsite training, provide relevant information to FEP community members, and provide coaching to the all educational community, including Erasmus students.

**Singh, B. P. (2018)** wrote in this study that India, the third-largest country for education, is transforming its library services to be available 24x7 through mobile technologies and QR codes. The rapid growth of mobile technologies, particularly smartphones, has led to a shift from digital to mobile library services. Indian academic libraries are using tools in order to offer services such Library Kiosk, mobile accessible websites, Web-scale discovery, e-resources platform, and mobile technologies, QR codes, mobile apps, MOPAC, mobile library websites, and mobile databases Ask a Librarian, audio-visual lessons, user manuals for libraries, blog posts, e-mail/SMS alerts, library exhibits and orientations for libraries.

**Singh, K. K., and Mohamed Asif (2019)** wrote that this study explores the implementation of Open-source digital library software has the power to revolutionise established library systems. It emphasises the importance of digital transformation, focusing on change management, activities, processes, competencies, and models. Open source software offers quality, reliability, flexibility, and cost-effectiveness, enabling the creation of online digital libraries.

## **The Need for Digital Transformation in Academic Libraries**

Academic libraries are facing a critical need for digital transformation due to the rapid evolution of research and learning. To remain relevant and valuable, libraries must strategically adopt digital technologies. Key areas for digital transformation include expanding digital collections, enhancing service delivery, embracing new technologies, cultivating a digital culture, and ensuring accessibility and inclusivity.

Enhancing service delivery through user-friendly interfaces, personalised research assistance, and AI-powered tools can also help. Embracing new technologies, such as learning management systems, virtual reality, and augmented reality, can enhance research visualisation and immersive learning experiences. Collaborating with faculty and researchers to understand evolving needs and develop tailored digital solutions can also help. Ensuring accessibility and inclusivity is crucial, as digital resources and services should be accessible for users with disabilities, encourage digital literacy and close the digital divide. A successful digital transformation strategy requires careful planning, resource allocation, and ongoing evaluation.

## **Digital Transformation in Library Automation**

In the history of library automation, there are four eras. Library automation began in the 1930s with Punch card technology was created by US Census Bureau employee Herman Hollerith. A circulatory control system was developed in 1935 by Dr. Ralph H. Parker at the University of Texas in Austin. The first is before the 1960s, when libraries used manual systems for cataloguing, circulation, and other operations, which were labour-intensive and time-consuming. Card catalogues were used to track collections. The 1960s saw the development of the first wave of library automation, which involved the use of computers to create bibliographic databases and catalogues.

The first trend of library automation was developed in the 1960s, using computers for creating bibliographic databases and catalogues. The second one is the early automation era (1960s–1980s). These mainframe-based systems used batch processing. Libraries created machine-readable catalogue records (MARC) and developed Online Public Access Catalogues (OPACs) for electronic catalogue search. The

### ***Digital Transformation of Academic Libraries***

1960s saw the introduction of computers, leading to the development of the first computerised library systems. The first computer-based library network was the Online Computer Library Centre in 1967. The advent of integrated computer chips and storage devices in the 1970s caused a library automation boom. The 1980s saw the rise of CD-ROMs, computer networking, and the Internet, leading to the introduction of hardware-specific automation packages. Computerised catalogues, or OPACs, took the place of traditional library catalogues, and resources were made available online and in electronic form. The field of libraries has gone through a period of transformation as integrated library systems, automation, and management have evolved. Integrated Library Systems (ILS) were developed in the 1980s and 1990s, combining library functions like cataloguing, circulation, and acquisitions into a single system. They improved efficiency and streamlined library operations, with client-server technology making them more affordable.

The modernization era from 2000 to present saw the rise of the internet and web-based technologies, leading to the rise of online services in libraries. Social media and cloud-based systems are used to engage patrons, while AI is being used to develop new services like chatbots and virtual assistants. Library automation has evolved significantly in recent years, with key trends including the rise of open-source software, cloud-based technologies, social media integration, and the use of artificial intelligence (AI). Open-source systems are more affordable and customisable than traditional ILSs, while cloud-based systems offer scalability, reliability, and affordability. Social media and online, In order to engage with customers and advertise services, tools are used to connect with patrons and promote services, while AI is being used to develop new library services like chatbots and virtual assistants.

Library automation is the use of technology to improve library operations, including cataloguing and circulation, acquisitions, patron management, searching and discovery, and resource sharing. It involves software for cataloguing materials, tracking borrowing and returns, and generating overdue notices. It also manages budgets, invoices, and patron accounts, and provides online catalogues and search tools for patrons. Software for library automation has many advantages, such as more productivity, better accuracy, easier accessibility, and lower expenses. Staff time and effort are saved by automating routine tasks, and computers are less likely to make mistakes than humans. Online catalogues and search tools make it easier for patrons to find materials, regardless of location or physical abilities.

Library automation software offers numerous benefits, including increased efficiency, improved accuracy, enhanced accessibility, and reduced costs. It saves staff time and effort by automating routine tasks. However, there are also challenges, such as cost, training, and data security. Some technologies used to automate libraries include integrated library systems (ILS), self-service kiosks, RFID tags, e-books, and audio books. These systems combine all library functions into a single system, allowing patrons to check out, return materials, pay fines, and update account information without interaction with staff. Libraries should anticipate even more creative methods to enhance operations and services as technology develops further. Despite these challenges, the benefits of library automation far outweigh the drawbacks, making it essential for libraries to remain competitive in the digital age. The digital transformation in library automation has revolutionized traditional library services, enhancing accessibility and efficiency. Embracing technology has empowered libraries to adapt to the evolving information landscape, fostering a dynamic and user-centric environment. As we navigate this digital era, libraries play a pivotal role in bridging the gap between knowledge seekers and vast digital resources, ensuring a future of seamless access and innovation.

## ***Digital Transformation of Academic Libraries***

### **Digital Transformation in Digital Library Services**

A heterogeneous and extensible set of distributed services backed by digital technology can be used to organise, access, evaluate, and employ a regulated collection of information-bearing objects in digital form, according to R. Smith. Digital library services are a variety of digital technology-based offerings that enhance access to information and resources. Common services include online catalogues, e-books and e-journals, databases, multimedia collections, digital archives, interlibrary loans, reference assistance, digitization projects, mobile apps, and responsive websites. Online catalogues allow users to search for books, journals, articles, and other materials by title, author, keyword, or other criteria, providing links to the full text of the materials.

E-books and e-journals can be downloaded and read on various devices, saving money on subscriptions. Databases, such as academic journals, news, and government document databases, can be used to search for specific topics. Multimedia collections, such as audio recordings, video recordings, and images, are valuable resources for students, researchers, and anyone interested in learning more about a particular topic. Digital archives preserve historical materials by digitising rare books, manuscripts, and other materials. Interlibrary loans allow users to borrow materials from another library if they are not available in a particular digital library.

Reference assistance is also available through online chat or email, helping users find information or use the library's resources. Digitization projects convert physical materials into digital format, making them more accessible to a wider audience. Mobile apps allow users to access library resources on smartphones or tablets, while responsive websites make it easier for users to access library resources from any device. Digital library services provide users with increased access to information, convenience, preservation of historical materials, and cost savings. They are open 24/7, accessible from anywhere with an internet connection, and can be accessed from homes or offices. They also help preserve materials, making them accessible to future generations. The cost savings can be significant, as they eliminate the need for physical library buildings. Check out your local digital library for a wealth of resources. The digital transformation of library services signifies a paradigm shift in how information is accessed, managed, and shared. By leveraging advanced technologies, digital libraries not only broaden global access to knowledge but also empower users with personalized and interactive learning experiences. As we witness this transformative journey, it becomes evident that digital libraries are key facilitators in shaping a more interconnected and knowledge-driven future.

### **DIGITAL INITIATIVES OF THE GOVERNMENT OF INDIA**

Under the auspices of the Ministry of Education, the Indian government is endeavoring to digitise the country's higher education system. Two such initiatives are the Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMNT) and the National Mission on Education through Information and Communication Technology (NME-ICT). The ministries of information technology and education oversaw the following digital projects.

## **Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNTT)**

A government programme called the Pandit Madan Mohan Malviya National Mission on Teachers and Teaching (PMMMNT) aims to improve teacher learning and teaching in order to raise the standard of education across the board. Schools of Education in Central, State, and Deemed Universities; Centres of Excellence for Curriculum and Pedagogy; Centres of Excellence in Science and Mathematics Education; Teaching Learning Centres; Faculty Development Centres; Inter-University Centre for Teachers Education; Academic Leadership and Education Management Centres; Innovations; Awards; Teaching Resource Grants; Subject Networks for Curricular Renewal and Reforms; Leadership Development for Senior Functionaries in Higher Education Institutions; Induction training of Newly Recruited Faculty; National Resource Centre; and Leadership for Academic Programme are some of the components that make up the mission. The teaching community and educators today possess substantially more knowledge thanks to these initiatives.

## **National Mission on Education through Information and Communication Technology (NMEICT)**

The National Mission on Education through Information and Communication Technology (NMEICT) aims to use ICT in teaching and learning to benefit all higher education students, anytime, anywhere. This was intended to boost higher education's Gross Enrolment Ratio (GER) by 5% during the XI Five-Year Plan. The Ministry of Human Resource Development (MHRD), Government of India, announced its mission in 2009 to seamlessly provide quality educational content to all eligible and willing learners in India. We emphasise ICT since it multiplies capacity building in educational institutions without compromising quality. Satisfying the educational and learning needs of students, educators, and lifelong learners is the aim. Technology can enhance the scope and quality of education. By fostering the development of new multidisciplinary fields of knowledge and enhancing people's abilities and knowledge, the purpose is also necessary to maintain rapid economic growth. All higher education institutions should be connected, professors and students should have inexpensive access to computers, and all students should have free access to high-quality e-content. These actions will contribute to the realization of the three guiding principles of education policy: quality, equity, and accessibility.

### **NMEICT Includes All Three:**

#### **Creation of Content**

NMEICT connects 419 universities and colleges, including polytechnics, to provide low-cost access devices and bridge the digital divide among urban and rural higher education teachers. Campus Connect aims to make campuses Wi-Fi-enabled. The mission focuses on e-learning pedagogy, virtual laboratories, online testing, online teachers, teacher training, and education on satellite and direct-to-home platforms. The National Digital Library (NDL) indexes and hosts all digitised and digital information from educational institutions, while SAKSHAT is expected to be the principal distribution platform for all mission information. The NDL aims to empower those left out of the digital revolution and knowledge economy.

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### **National Academic Depository (NAD) and Digi Locker Services**

All academic awards, including certificates, diplomas, degrees, and mark sheets, that have been digitized and submitted by academic institutions, boards, and eligibility assessment authorities are kept in one place: the National Academic Depository (NAD), an online portal. The NAD certifies and confirms the authenticity of these awards, facilitates their retrieval, and stores them in a secure manner. It is associated with the Digi Locker, a flagship project within the Digital India programme of the Ministry of Electronics and IT (MoE&IT). According to Rule 9A of the Information Technology Act, Digi Locker seeks to give citizens access to genuine digital records that are equivalent to original physical papers. The NAD operates in full online mode, allowing digital award lodging, maintaining integrity of access, allowing students to retrieve their awards at any time, and allowing employers and other individuals with prior approval to verify the authenticity of any academic award. Stakeholders include students, award holders, academic institutions, verification entities, government entities, academic institutions, universities, and the Ministry of Education/University Grants Commission.

### **Free/Libre and Open-Source Software for Education (FOSSEE)**

To raise the standard of education in our nation, the Free/Libre and Open-Source Software for Education (FOSSEE) project encourages the use of FLOSS tools. Our goal is to lessen the reliance of educational institutions on proprietary software. Through a variety of initiatives, we promote the use of FLOSS tools to make sure that comparable FLOSS products replace proprietary software. In addition, we create brand-new FLOSS tools and enhance current ones to satisfy scholarly and research needs. The FOSSEE project is a component of the Ministry of Education (MoE), Government of India's National Mission on Education through Information and Communication Technology (ICT).

### **Global Initiative of Academic Networks (GIAN)**

In an effort to draw foreign scientists and businesspeople to India's higher education institutions, the Indian government has established the Global Initiative of Academic Networks (GIAN) in Higher Education. The initiative intends to improve India's scientific and technology capabilities to the level of global leadership, expedite quality reform, and increase the nation's academic resources. A system of worldwide summer and winter terms is required to promote international cooperation. It was decided to create a system of guest lectures by nationally and internationally renowned experts and a comprehensive faculty development programme for new IITs, IIMs, IISERs, and other institutions in India during the IITs' "Retreat" with Minister of Human Resource Development Smt. Smriti Zubin Irani.

### **Sakshat: A One-Stop Education Portal**

Launched in 2006 by the Indian President at the time, the SAKSHAT pilot initiative intends to provide free lifetime learning opportunities for students, educators, and anyone seeking job or further education. The National Council for Educational Research and Training, Delhi University, IGNOU, Navodaya Vidyalaya Sangathan, Kendriya Vidyalaya Sangathan, the National Institute of Open Schooling, and representatives from other educational institutions made up the Content Advisory Committee (CAC), which was in charge of content development. Additionally, a few NGOs contributed free content to the platform.

### ***Digital Transformation of Academic Libraries***

The goal is to use a proposed programme named “National Mission in Education through Information and Communication Technology (ICT)” to scale up the initiative to meet the learning needs of over 50 crore people. The programme seeks to connect students to postsecondary educational institutions, take advantage of ICT potential, and provide high-quality knowledge modules with e-content that is customised to meet each student’s unique needs.

### **DIKSHA: One Nation, One Digital Platform**

Under the direction of the Ministry of Education (MoE), Government of India, the nationwide Council for Educational Research and Training (NCERT) launched the nationwide platform for school education known as DIKSHA (Digital Infrastructure for Knowledge Sharing). Since its launch in 2017, nearly all states, union territories, and central autonomous organizations and boards—including CBSE—have embraced DIKSHA. At Diksha, the mission is established to create a revolutionary learning ecosystem that empowers students to thrive in the 21<sup>st</sup> century, in which education should be accessible, engaging, and tailored to the individual needs of each learner. The vision is to transform the way education is delivered by leveraging technology and innovation. It aims to provide students with a holistic learning experience that goes beyond traditional classrooms. The goal of this platform is to give students the tools they need to succeed academically as well as for personal development. DIKSHA can be accessed by learners and teachers across the country and currently supports 36 Indian languages. Access is enabled through this portal to various stakeholders, like students, teachers, parents, and others, on the open digital content.

### **MOOCs**

Massive Open Online Courses, or MOOCs, are open to all users and offer free online education. MOOCs offer a flexible and reasonably priced means of delivering high-quality educational experiences at scale, advancing careers, and learning new skills. MOOCs are used by millions of learners worldwide for a wide range of learning objectives, such as job advancement, career transitions, college readiness, life-long learning, supplemental education, corporate eLearning and training, and more. Two of the largest MOOC providers experienced a “exit” incident in 2021. While EdX lost its non-profit status and was purchased by the public corporation 2U for \$800 million, Coursera became public.

### **SWAYAM 2.0**

The Government of India launched the SWAYAM initiative, which aims to accomplish the three main goals of education policy: equity, quality, and access. This is accomplished through a platform that makes it possible for all classes taught in classrooms starting in Class 9 and continuing through post-graduation to be hosted and accessed at any time, by anybody, anywhere. All of the interactive courses are offered without charge to all students and are created by the top educators in the nation. Over a thousand carefully selected educators from all throughout the nation have contributed to the creation of these courses. SWAYAM courses are offered at no cost to the students; but, in order to receive a SWAYAM certificate, students must register for the final, paid proctored tests and show up in person at the designated locations on the scheduled days.

The courses offered by SWAYAM are divided into four sections: (1) video lectures; (2) reading material that has been particularly produced and may be printed or downloaded; (3) quizzes and tests for



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self-assessment; and (4) an online discussion forum for questions. Modern pedagogy and technology, audio-video, and multi-media have all been used to enhance the educational process. Nine National Co-ordinators have been appointed in order to guarantee the production and delivery of the highest calibre content, notably AICTE (All India Council for Technical Education) for self-paced and international courses, NPTEL (National Programme on Technology Enhanced Learning) for Engineering, UGC (University Grants Commission) for non-technical post-graduation education, CEC (Consortium for Educational Communication) for under-graduate education, NCERT (National Council of Educational Research and Training) for school education, NIOS (National Institute of Open Schooling) for school education, IGNOU (Indira Gandhi National Open University) for out-of-school students, IIMB (Indian Institute of Management, Bangalore) for management studies and NITTTR (National Institute of Technical Teachers Training and Research) for Teacher Training programme. One of the largest learning hubs, this portal offers a wealth of e-learning materials for educators and students in both secondary and postsecondary education.

## **National Repository of Open Educational Resources**

Open Educational Resources National Repository (NROER). CIET and NCERT work together to build NROER. In partnership with the Department of School Education and Literacy, Ministry of Human Resource Development, Government of India, NROER was introduced on August 13, 2013, in New Delhi. The repository is housed on the Metastudio platform, which is an effort of Knowledge Labs at the Homi Bhabha Centre for Science Education in Mumbai. Several educational resources for basic, secondary, and senior secondary levels are available on NROER in a variety of disciplines and Indian languages. A variety of formats, including audio, video, image, document, and interactive, are available for resources.

## **National Digital Library of India (NDLI)**

A virtual collection of educational materials, the National Digital Library of India (NDLI) provides access to a variety of materials such as textbooks, articles, films, audiobooks, lectures, simulations, and fiction. Created by the Indian Institute of Technology Kharagpur, it offers free access to literature in ten commonly used Indian languages as well as support for multiple language interfaces. Launched in May 2016, the National Digital Library of India (NDLI) was dedicated on June 19, 2018 for the benefit of the country. It currently hosts more than 4.5 crore items, including more than 1,50,000 volumes in English as of April 2019. The library welcomes visitors from all around the world and offers free access to literature in English and Indian languages. However, only registered users get access to some popular source content. The Indian Institute of Technology, Kharagpur is in charge of running the library. The digital initiatives undertaken by the Government of India represent a visionary leap toward a technologically empowered and inclusive nation.

## **Information and Library Network (INFLIBNET) Services**

### **INFLIBNET Centre Union Catalogues**

Bibliographic records of books, serials, and theses from participating universities across all subjects are available through the Online Union Catalogue of Indian Universities (IndCat). Between 1994 and 1995,

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subsidies were given to university libraries to create infrastructure and convert their card catalogues to machine-readable format. The IndCat is searched using the internal search interface available at <http://indcat.inflibnet.ac.in>. Apart from these databases, IndCat's book collection, and serials, the Centre offers a number of additional non-bibliographic resources.

### **Books Database**

The Union Catalogue of Books gives bibliographic information about member universities' books. The database includes monographs, reference volumes, conference papers, textbooks, and more, which universities classify as books. Member universities' millions of bibliographic records are available. MARC21, CCF, and ASCII bibliographic records can be downloaded from the Union book database. Any MARC21-compliant library management software, including SOUL 2.0, can import downloaded bibliographic records. IndCat is a virtual catalogue for every library as well as a union catalogue of titles from university libraries. The union catalogue of theses gives bibliographic information about Indian university doctoral dissertations. The initiative began in 1995 with 52,000 documents from 82 universities. Over 2.64 million records from 350 universities are in the database.

### **Serials Database**

Three categories—holdings, current, and e-periodicals—in the union catalogue of serials provide bibliographic details about university-subscribed journals. Bibliographic data on more than 33,000 titles and member university holdings can be found in the serial database. Title, publisher, frequency, year of publication, homepage URL, subject headings, holdings, and university names are all included in serial bibliographic entries.

### **CEC's Video Database**

The INFLIBNET Centre and Consortium for Educational Communication (CEC) collaborate to share CEC's video programmes with academics and the public. The collection contains around 15,000 CEC and 17 EMMRC instructional video programme bibliographies. The "Online Copy-Catalogue System" (OCS) was developed by the Centre to promote collaborative cataloguing and lessen duplication. Libraries can search and browse IndCat bibliographic entries via the "Online Copy Catalogue System (OCS)" interface. They can also download specific records straight into SOUL 2.0 or another MARC21-compliant programme.

### **VIDWAN (Subject Expert Database)**

VIDWAN is India's major database of scientists, researchers, and other academics at top academic institutions and R&D organizations. The University Expert Database, released in 1999, comprised subject expert profiles from Indian universities and other academic organizations. With funding from the National Information System for Science and Technology (NISSAT) and DSIR, the Centre created the Expert Database in Science and Technology in 2001 to profile R&D experts in science and technology. These two databases were merged in 2012 and renamed Expert Database to connect users directly with experts who possess the necessary expertise, find peer reviewers for articles and research proposals,

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facilitate information sharing and networking opportunities, and provide information about experts to peers, potential collaborators, funding agencies, policymakers, and research scholars nationwide. The Vidwan database contains accomplishments, skills, contact details, and expert background. More than 11,000 expert profiles from prestigious academic institutions and R&D companies, including as DRDO, CSIR, and IITs, are available in the database.

### **Research Projects Database**

The Research Projects Database lists academic projects from colleges and institutions nationwide. UGC-funded MRP project investigators regularly submit over 15,000 project reports to the database. The INFLIBNET Centre has softcopy and print project reports for walk-in users.

### **SOUL University Library Software**

The INFLIBNET Centre developed SOUL (Software for University Libraries), cutting-edge integrated library management software for colleges, universities, and other academic libraries. It is easy-to-use client-server software. SOUL 2.0 debuted in January 2009. SOUL 2.0 follows international bibliographic and circulation standards. The programme meets worldwide standards, including MARC 21 for data transfer and exchange, Unicode for multilingual content, SIP and N-SIP for RFID compliance, FRBR for bibliographic record functionality, etc. Indian libraries liked the new version. Refer to the paper's "Case Study: SOUL" module for SOUL details. Other software R&D activities include library-paid customisation of SOUL 2.0 software, development of SOUL Query Management System (SQMS) to handle and manage user queries about SOUL software, web version development, institutional repository customisation, etc.

### **UGC-Infonet Digital Library Consortium and Associate Membership Program**

A.P. J. Abdul Kalam, the president of India at the time, unveiled the UGC-Infonet Digital Library Consortium in December 2003. Access to 8,500+ core, peer-reviewed journals and 11 bibliographic databases from 28 publishers—including university presses, commercial publishers, scholarly societies, and aggregators in a variety of fields—is available both currently and historically through the UGC-Infonet Digital Library Consortium. Programme execution was included. E-resources were made available to 50 institutions with Internet access in 2004 through the UGC-Infonet Internet Connectivity Programme.

After UGC-Infonet connected the universities to the Internet, 50 more universities joined the second phase in 2005. There is currently uneven access to subscribed e-resources for 208 member institutions, including 14 national law schools, universities, and UGC IUCs. Nearly all subject areas are covered by this e-resource, including computer sciences, biology, physical sciences, chemical sciences, social sciences, arts, and statistics. ILL has been initiated by the Centre via J-Gate@UGC-INFONET. Article-level access to all journal subscriptions held by the UGC-Infonet Digital Library Consortium and the 26 university libraries recognised as INFLIBNET Centre ILL Centres is made possible by J-Gate. Through the "Associate Membership Programme" of the Consortium, research organisations and private institutions can subscribe to certain e-resources. See the "Library Consortium: UGC INFONET Digital Library Consortium" module in the paper for additional information.

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### **N-LIST**

The Ministry of Human Resource Development's National Mission on Education through ICT funded the "National Library and Information Services Infrastructure for Scholarly Content (N-LIST)" before it became a UGC-INFONET Digital Library Consortium college component scheme. The N-LIST gives all government employees access to 6,150 e-journals and 1,64,309 e-books using an innovative access mechanism. Government-aided and non-aided colleges. N-LIST electronic resources cover all college disciplines, including arts and humanities, social sciences, physical and chemical sciences, life sciences, computer sciences, political sciences, library and information science, law, business, mathematics, statistics, etc. INFLIBNET Centre uses OCLC EZ-Proxy remote access server to authenticate registered users.

### **Shodhganga**

Shodhganga is a digital archive for Indian university students' theses and dissertations that are open to the global scholarly community. Universities are signing MoUs with the INFLIBNET Centre for non-exclusive Shodhganga ETD hosting. The repository also receives voluntary electronic theses from students from various universities. Over 21,000 theses are available from Shodhganga. The Shodhganga employs Dspace, which follows international protocols and interoperability standards. The repository lets university research students store, reuse, and distribute theses and dissertations. The portal lets administrators, representatives, and researchers submit theses. The interface allows researchers to self-register and receive email alerts and notifications at various workflow phases. The key topic domains are natural sciences, engineering and technology, medical and health sciences, agricultural sciences, social sciences, and humanities.

### **ShodhGangotri**

New initiative Shodhgangotri complements "ShodhGanga." "ShodhGanga" has full-text theses submitted to Indian institutions, whereas Shodhgangotri contains synopses of approved research ideas submitted by Ph.D. applicants to Indian universities.

### **OJAS @ INFLIBNET**

Open Journal Access System @ INFLIBNET Centre hosts electronic journals in open access mode and handles submission, peer-reviewing, editing, layout creation, and publishing. It invites universities and institutes that produce print journals to use OJAS @INFLIBNET to host their electronic journals on the INFLIBNET Centre server for free.

**IR @ INFLIBNETIS** is an institutional repository hosted at <https://ir.inflibnet.ac.in>, uses DSpace, open-source software. CALIBRE and PLANNER proceedings papers are uploaded to the repository. The repository comprises course materials, newspaper articles, etc.

### **InfoPort (Indian Scholarly Internet Resources Subject Gateway)**

It is a subject gateway for Indian Electronic Resources that helps users access Internet resources. Indian intellectual information on the Internet is accessible through an integrated interface that supports search, browsing, and multiple listing. INFOPORT allows DDC-based Internet browsing.

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### **HR Consulting and Development**

A key goal of the Centre is to teach university and college library and information science personnel about ICT. The centre holds annual conventions, training programmes, workshops, and seminars on library automation, networking, e-resource awareness, theses repositories, institutional repositories, etc. INFLIBNET Regional Training Programmes for Library Automation (IRTPLA) and User Awareness Training Programmes are held nationwide with universities and colleges.

### **Scientometric and Bibliometric Studies**

The Bibliometric Group was formed to explore how e-resources affect research output in Indian universities. Every member university is creating research profiles. Research output, including the growth of research publications annually and cumulatively over a four-decade period, the impact of research in terms of citations, the H Index, specific research areas, strengths and weaknesses, national and international collaborations across disciplines, and the relationship between e-resource downloads and published research are all included in these profiles. We use the Web of Science for source and citation data. Research profiles for 50 universities are done.

### **Centre Web 2.0 Implementation**

The INFLIBNET Centre has implemented interactive and collaborative Web 2.0 and Library 2.0 tools. All Web 2.0 tools are open-source. INFLIBNET Centre uses Web 2.0 and Library 2.0 technologies like Chat, Blogs, Wiki, Streaming Media and Social Network, RSS Feed Aggregation Service, Library Toolbar, and more.

e-PG Pathshala: Postgraduate Content Creation.

### **Integrated E-Content Portal**

The National Mission of Education through ICT is sponsoring e-content projects, and the INFLIBNET Centre is creating an online “Integrated e-Content Portal” for them all. Indian institutes, universities, and colleges are developing about fifty-five NME-ICT e-content initiatives in the fields of science, arts, engineering, social science, and other areas.

Through a single interface, the portal enables students to search and see all stored content, including text, multimedia-rich content, audio/video lessons, and more. Additionally, this site would feature usage data, faceted search, syllabus-based search, individualised learning with “my account” and “my space,” and more. As an integral part of the academic ecosystem, its continued evolution is paramount for fostering innovation and cultivating a vibrant scholarly community.

### **Integrated Library Systems (ILS) With Cutting-Edge Technologies**

Integrated Library Systems (ILS) have made significant strides in automating library operations, but incorporating advanced technologies namely Web 2.0, AJAX, and linked open data can elevate them to new heights. AJAX enhances the search and browsing experience by providing real-time results without the need to refresh the page. Web 2.0 allows patrons to rate and review books, create reading lists,

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and share recommendations with friends, fostering a more engaged library community. Personalised dashboards display borrowing history, due dates, suggested reads, and relevant library events. Integrated wikis, forums, or chat features enable group study sessions, book clubs, or online discussions around shared reading interests. Linked open data connects library resources to the wider web, increasing their visibility and accessibility. It also enriches search results by linking library data with external knowledge bases. Interlibrary collaboration is facilitated through standardized protocols. Implementing these technologies can improve the user experience, increase resource discoverability, streamline operations, and foster collaboration. However, challenges include cost and implementation, data privacy and security, and the digital divide. Despite these challenges, integrating these technologies into ILS can transform libraries into vibrant hubs of information, learning, and community engagement. Integrated Library Systems (ILS) infused with cutting-edge technologies signify a transformative shift in library management, enhancing efficiency and user experiences. The seamless integration of AI, RFID, and data analytics not only streamlines operations but also positions libraries at the forefront of information accessibility and innovation. Embracing these advancements ensures that libraries remain dynamic hubs of knowledge, catering to diverse needs in our rapidly evolving digital landscape.

### **Interlibrary Loan and DELNET Services**

Interlibrary loan (ILL) is a cooperative arrangement between libraries, enabling books and materials to be loaned out to patrons, while document delivery involves providing published or unpublished documents electronically or for a fee. Normally, this service is available at higher education institutions and research institutions. DELNET—Developing Library Network working head office from New Delhi and it is best resource sharing network in India connecting 8388 member libraries in 33 states of India and some other countries. DELNET provided various digital and online services to member libraries, including access to union catalogues and databases, the DELNET consortium of e-journals, and reference services to member libraries. The familiar service of DELNET provides interlibrary loan and documentation services to the member libraries. DELNET provides photocopies of the required documents, like journal articles and other related documents, through e-mail or courier, and if the book is not available in the member library, DELNET provides the book from other member libraries.

### **Digital Transformation in Digital Reference Services**

Linda Berube outlines three key elements of a digital reference service: a user interface, electronic resources, and print resources, all of which are essential for information professionals to access and utilise effectively. In the olden days, the traditional libraries provided reference services to the members through manual documents sent through email, photocopying of the documents, and asking a librarian from the library website. Nowadays, there are a lot of new digital reference services for the user community, namely web forums, chats through WhatsApp Messenger, AI, and chats. A digital reference service has some advantages, like removing psychological barriers, improving oral communication, and requiring no additional software or training. It allows users to ask queries anytime, without restrictions on working time, making it cost-effective and efficient.

**Email reference services** are useful for readers but unstructured and insufficient for librarians. To address this, the UK Public Services' Ask a Librarian website offers a structured web form for users to respond to queries and ask questions. Accessible from library home pages or reference websites, the

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form includes individual and address details and optional fields. This structured format is useful for both librarians and users, but it should be constructed carefully to avoid frustration or stress. **Live Help** is a supplement to email reference services, allowing real-time interaction between users and reference librarians. It follows the same criteria as email services, with web-based or electronic sources being preferred for easier access and sharing. Reference librarians use tools like software to cobrowse, pre-write messages, and sign off texts to save time during interviews. The service is given importance due to its speed, availability, and ability to attend to multiple users simultaneously. It can also use Voice over Internet Protocol (VoIP) to communicate with users and provide assistance with resource usage. Instant messaging tools like AOL Instant Messenger and ICQ are required for real-time communication between librarians and patrons.

**Video conferencing**, or web cam services, address communication issues in text-based services by incorporating visual elements, allowing users and librarians to use text and speech transactions similar to face-to-face interviews. Digital reference robots, such as Ask Jeeves, utilise artificial intelligence to answer questions when a reference librarian is unavailable, using software to search database answers. The **Collaborative Digital Reference Service (CDRS)** is a free project by the Library of Congress and over 100 partner libraries worldwide, providing professional reference services through an international digital network. It includes a database with three components: member profiles, a request manager, and a knowledge base, combining resources and manpower with library diversity. The internet has led to the rise of digital reference services, offering a wide range of resources such as encyclopedias, dictionaries, handbooks, and abstracting services. As users increasingly rely on online sources, there will be a need for expert librarians and collaborative ventures. The future of reference services will be based on digital collections and web communication links, with libraries and information Centres competing to provide real-time reference services, especially in developing countries like India. Digital Reference Services have redefined the accessibility and responsiveness of information retrieval, transcending geographical constraints. Embracing real-time communication and digital resources, these services enrich user experiences, making knowledge readily available.

### **Digital Transformation and Digitalization of Resources**

The digitalization of resources refers to the conversion of analogue resources into digital formats, such as scanning physical documents or digitising audio and video recordings. This process allows for easier storage, access, and sharing of digital resources, offering numerous benefits. These include being accessible from anywhere, easily shared, preserved, and easily searched. Digital resources can also lead to increased efficiency in areas like research, education, and business, as they can be processed and analysed more quickly and easily. However, digital resources can also pose challenges, such as cyber attack vulnerability and the need for special hardware and software. Some people may prefer physical resources, such as books and records, for their convenience.

Despite these challenges, the benefits of digitalization far outweigh the costs. As digital technology continues to evolve, more resources are expected to be digitised in the future. Libraries scanning their book holdings, streaming services like Hulu and Netflix, and music streaming services are a few examples of digitalization. The digitalization of resources is a transformative process that is changing the way we interact with the world around us, and as digital technology continues to evolve, more resources will be digitised in the future.

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### **DSPACE Digital Library Software**

DSpace is a software package for creating open-access repositories of published digital data that is available as an open-source project. It functions as a digital archive system for digital content storage, archiving, and long-term access. With two configurable user interface options—traditional (JSP-based) or Manakin (XML-based)—DSpace is very customizable. Dublin Core is the default format for metadata customization. DSpace conforms with industry standards for ingest, export, and access, and users have the ability to customize search and browse fields. DSpace may be set up to use numerous authentication methods simultaneously and is integrated with plugins for the most of them. It comes in more than twenty languages and may be set up to handle numerous languages.

### **Greenstone Digital Library Software**

With the help of the software package Greenstone, users can create and share digital library collections that can be published online or on CD-ROM. Greenstone is a multilingual, open-source project created by the University of Waikato's New Zealand Digital Library Project, licensed under the GNU General Public License. Its goal is to enable users to create their own digital libraries, especially those in academic institutions, public libraries, and service organizations. With a focus on poor nations, Greenstone aims to transform the acquisition and distribution of information in UNESCO's partner communities. Anyone with a moderate level of computer literacy may install and operate the software with ease thanks to its menu-driven, step-by-step installation process. Two interactive interfaces are available in Greenstone: the Reader interface, which runs in a web browser, and the Librarian interface. A graphical user interface built with Java. Greenstone, which has been translated into 59 languages and distributed over 90 countries since its founding in 1997, is an essential instrument for knowledge societies and social progress. The digital transformation and digitalization of resources have redefined the landscape of information management, fostering unprecedented efficiency and accessibility. Embracing these advancements not only streamlines processes but also democratizes access to diverse knowledge, catalysing innovation across various sectors.

### **Library Service Platform (LSP) in Academic Libraries**

Redefining library operations and combining the management of all library materials—print and digital—Marshall Breeding, a well-known library technologist, coined the term “library services platform” in 2011. For acquisitions, cataloguing, circulation, electronic resource management, serials, and reporting, these systems provide an integrated system environment. Breeding thinks that these systems help libraries handle the increasing availability of print and electronic resources, as well as the acquisition and management of collections in a variety of formats and procurement methods. A library service platform (LSP) is a flexible, scalable, and user-friendly integrated library system (ILS) that is typically cloud-based, making it easier to maintain and update than a traditional ILS. LSPs offer a variety of features, including a discovery layer for searching library resources across various formats, a user-friendly interface, various tools for managing collections, and integration with other library systems and services like learning management systems and institutional repositories. LSPs, a new technology, are gaining popularity in academic libraries due to their improved user experience, increased flexibility, scalability, and integration with other library systems. They offer a more user-friendly interface, allowing for



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easier resource discovery, customisation, and easy scalability. LSPs are cloud-based, allowing for easy integration with other library systems, thereby improving the efficiency of library operations. LSPs in academic libraries can be expensive, time-consuming, and vendor-locked, making it difficult to switch to a different vendor. However, they offer potential benefits, but it's crucial to consider the challenges before implementing an LSP. Library Services Platforms are functional tools that manage print formats, replace products, manage metadata, manage collections, and offer data analytics. They also offer license management, ILL and resource sharing, and feature cloud-based architecture, SaaS/DaaS platforms, web-based interfaces, and interoperability. Popular library service platforms include BLUEcloud/BUEcloud Campus: products of SirsiDynix; Intota: a product of Serials Solutions; ProQuest; Alma: a product of Ex Libris; ProQuest; Sierra: a product of Innovative Interfaces; Bibliovation™: a product of LibLime, PTFS; WorldShare® Management Services (WMS): a product of OCLC; Kuali Open Library Environment (OLE): an open-source product; and FOLIO: an open-source project. It's essential to carefully consider these factors before implementing an LSP. The Library Service Platform (LSP) emerges as a transformative force in academic libraries, unifying diverse functions for streamlined management and enhanced user engagement. Its integration of advanced technologies fosters efficient resource utilization, empowering academic institutions to adapt to evolving research and educational needs.

## **Artificial Intelligence and Academic Libraries**

AI-powered personalized learning is a revolutionary approach that uses artificial intelligence to provide personalized recommendations and adjust learning content to fit students' needs. AI is used in adaptive learning, where it analyzes student data to determine academic performance and offers tailored recommendations and content. It also creates personalized learning materials based on each student's interests and profile, providing an interactive experience. AI-powered learning tools, such as Duolingo, offer individualized language learning by gathering information on learning styles, strengths, and weaknesses, enabling the AI system to modify exercises and curriculum as needed. This approach has the potential to revolutionize language learning by providing personalized feedback and suggestions for language progress.

AI is also used in content curation and organization, which involves collecting, choosing, and organizing information from various sources to present it in a meaningful and organized manner. AI-driven systems can analyze large volumes of data, select the most relevant and high-quality material, and assist in organizing content by labeling, categorizing, and summarizing it.

The benefits of AI-powered content curation and organization include enhanced efficiency, enhanced precision, personalized recommendations, scalability, and continuous improvement. AI-driven solutions can analyze user behavior and interactions with material, providing tailored recommendations and facilitating exploration of new content. They can also easily manage large amounts of data, making them suitable for various sectors and applications.

## **Applications of Artificial Intelligence in Academic Libraries**

Artificial intelligence, including speech recognition, natural language processing, and robotics, is utilised in fields like medicine, the military, business, education, gaming, and libraries, focusing on learning, interpreting information, and analysing vision. AI tools have the potential to enhance digital accessibility in academic libraries by improving discoverability, creating accessible content, and personalising learning experiences. AI-powered search tools can help users with disabilities find relevant information,

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while automatic tagging and metadata generation can make library resources easier to discover. AI can also read aloud digital text, generate alternative text descriptions, and make sign language translations accessible to deaf or hard-of-hearing users. Adaptive learning platforms can personalise learning experiences based on individual needs and preferences, and reading difficulty adjustments can match the user's comprehension level. Chatbots and virtual assistants can provide 24/7 support and answer basic questions, while automatic captioning and transcripts can make videos and audio recordings accessible to a wider audience. However, AI tools can perpetuate biases, require resources and expertise, and create a digital divide. Despite these challenges, AI tools can be powerful allies in creating accessible academic libraries, but they must be used responsibly and ethically, focusing on inclusivity and equity. AI can also help preserve and conserve library materials by analysing images of deterioration, enabling timely intervention and preventive measures. However, ethical considerations such as data privacy, algorithmic bias, and equitable access must be considered.

As AI advances, libraries must adapt and coordinate these tools to fulfill their mission of enabling people to access data and cultivating a love of learning. The journal's current issue explores various aspects of AI implementation, including knowledge-sharing practices, digital libraries, academic publishing in India, online databases, and academic libraries. The journal appreciates the contributions of its editorial, editorial, and reviewer boards to provide high-quality research inputs and resources. Applications of artificial intelligence in library systems include shelf reading, technical support, cataloguing, indexing, reference services, collection creation, and information retrieval. Robotics, expert systems, natural language processing, and pattern recognition are important areas. Modern retrieval tools include electronic databases, OPAC, web search engines, and robotic systems. Artificial intelligence has significantly improved library information services, including automatic cataloguing, translation, indexing, retrieval of audiovisual materials, interactive bibliographic instruction, intelligent document delivery services, user-structured information environments, intelligent gateways to web sources, and portable computer reader services for the disabled. These advancements have revolutionised knowledge storage and management, enabling faster access to music, pictures, and other library materials.

Automated library systems utilise artificial intelligence for various tasks, such as keyword indexing, translation, digitization, textual analysis, information retrieval, and audiovisual resource analysis. These systems also support clerical functions in book processing, circulation control, and serial management. They provide multiple access points to information resources and round-the-clock service delivery. Artificial intelligence in libraries can enhance research productivity by making it more discoverable, providing round-the-clock access to information resources, and reducing space occupied by piles of books and journals. It can maximise efficiency in library operations such as material selection and acquisition, technical services, circulation services, reference services, and serial management. AI is an aspect of computer science that focuses on learning, interpreting information, vision, speech recognition, speech production, understanding natural language, and expert systems. It is also the programming and development of computers to perform human-required intelligence tasks such as speech recognition, decision-making, visual perception, language translation, talking, and emotional feelings. AI-powered recommendation systems are revolutionising libraries by understanding patron preferences, leveraging machine learning algorithms, and adapting in real time. These systems create detailed user profiles based on patrons' reading habits, genres, authors, books borrowed, and explicit preferences, identifying patterns and trends in reading preferences across a diverse user base.

The integration of AI in libraries has revolutionized information accessibility, streamlining resource management and enhancing user experiences. As technology continues to advance, libraries must em-

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brace AI tools judiciously, balancing innovation with the preservation of human-centric values to ensure a harmonious coexistence between technology and the timeless pursuit of knowledge. Ultimately, AI stands as a formidable ally in the evolution of libraries, propelling them into an era of unprecedented efficiency and adaptability.

## **Encounters Faced With Digital Transformation**

The digital transformation of academic libraries involves a range of challenges, both positive and challenging. These include the adoption of new tools and platforms, integration challenges, data security and privacy concerns, evolving user expectations, digitization of collections, open access initiatives, e-resource management, and information literacy instruction. Organisational culture plays a crucial role in fostering collaboration and partnerships, addressing staff resistance to change, and developing new skill sets. Assessment and evaluation are essential for demonstrating value and securing resources. Emerging technologies like artificial intelligence, virtual reality, and blockchain are also crucial for understanding their potential impact on libraries. Funding pressures for digital initiatives require strong advocacy and a demonstrated return on investment. Social and ethical considerations, such as digital equity, online privacy, and misinformation, require proactive engagement. Global collaborations enrich learning and innovation by sharing experiences and best practices with international counterparts. The digital transformation of academic libraries presents a dynamic and ongoing journey filled with diverse encounters. By embracing challenges, fostering collaboration, and strategically leveraging technology, libraries can evolve into vibrant centres of learning and knowledge creation in the digital age.

## **CONCLUSION**

Academic libraries play a crucial role in India's higher education system, providing essential resources for teaching and learning, facilitating research, and promoting intellectual development. They offer specialized collections, information and communication technology gadgets, and access to online materials and related software. Recommendations from various education commissions have significantly impacted the development of academic libraries, guiding resource allocation, staffing, technology integration, and professional development. Digital transformation refers to the conversion of analogue resources into digital formats, offering benefits such as accessibility, preservation, and searchability. Digital transformation is essential for academic libraries to remain relevant and valuable, and they must strategically adopt digital technologies, including expanding digital collections, enhancing service delivery, embracing new technologies, cultivating a digital culture, and ensuring accessibility and inclusivity. Collaboration with faculty and researchers can help develop tailored digital solutions. Library automation has evolved through four eras, with the modernization era from 2000 to present seeing the rise of online services in libraries. Digital library services include online catalogues, e-books, databases, multimedia collections, digital archives, interlibrary loans, reference assistance, digitization projects, mobile apps, and responsive websites. By the Iron hands of AI tools and supportive software and initiative of the Government of India, the library access, sharing of knowledge and reaching the unreached are near in the future.

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