Innovative Technological Trends in 21st Century Libraries

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Abstract*—Academic libraries have changed significantly in the twenty-first century to meet the evolving demands of students, teachers, and researchers. In addition to facilitating research and data management initiatives, they now provide a vast array of digital resources, cloud-based libraries, and collaborative spaces. They also foster social responsibility and teamwork, form strategic partnerships, personalize services, and constantly evaluate and adjust their offerings. Because they serve as social, educational, and informational centres, libraries are essential to society. To bridge the digital gap and advance interactive learning, they have been embracing digital technologies, internet-based applications, and digital services. A library can become a "platform" rather than a "place" by embracing digital technology, promoting co-creation and collaboration, increasing knowledge about digital technologies, organizing and maintaining free educational materials (Open Educational Resources), fostering collaboration and social responsibility, forming strategic partnerships, personalizing services, and regularly evaluating and adapting. By doing this, libraries can develop into dynamic platforms that offer a range of computer-based materials, opportunities for virtual involvement, customized services, and areas for collaboration. Numerous benefits come with the shift to digital platforms, such as increased accessibility, better collaboration and knowledge sharing, faster access to materials, customized support, flexibility and convenience, global collaboration, lifelong learning, enhancement of communities, sustainability, and cost savings. The loss of standard space and ethical behaviour, reliance on technological advances, potential privacy loss, constraints of digital resources, challenges with preservation of digital materials, training and growth for staff requirements, possible loss of practical collections of records, a lack of digital literacy in the librarianship profession, and issues with creativity and licensing procedures are some of the disadvantages to take into account. To sum up, libraries must move to digital platforms successfully by finding a balance between the benefits of digital media and the need to keep traditional locations, making sure that everyone can use them, keeping information safe, and getting the community involved. Academic libraries may create a comprehensive and easily accessible ecosystem that satisfies the needs of their users in the 21st century by combining the benefits of the digital and physical worlds.

***Keywords*—Academic Libraries, Digital Resources, Digital Literacy, Technological Advancement, Twenty-First Century**

I. INTRODUCTION

Academic libraries are changing significantly in the twenty-first century as they reinterpret their functions and adjust to the digital era. Historically, people have thought of libraries as actual places where they go to obtain information and find books and other resources. However, as technology advances swiftly and user needs to evolve, libraries are redefining themselves as dynamic platforms rather than static locations. This study examines the idea of restructuring libraries from "place" to "platform" and the reasons behind this change. It lays the groundwork for talking about the main facets of this shift while highlighting the potential and difficulties academic libraries confront in the digital age. The creation, sharing, and accessibility of knowledge have all been profoundly altered by the digital revolution. The way people interact with information has changed as a result of the widespread availability of e-books, online databases, and digital resources. Libraries are working to match users' expectations of easy access to information at any time and from any location. Academic libraries are realizing that they must embrace a cyber presence in addition to their physical ones. They are reaching a wider audience and interacting with users in fresh and creative ways by utilizing digital technology and internet platforms. Libraries are developing into platforms that support knowledge creation and collaboration, as well as interactive learning experiences, rather than merely serving as information repositories. The study emphasizes how crucial it is to reconsider library services and places to better meet the demands of today's students. It highlights how technology may help libraries become centres of creativity and

innovation. To improve user experiences, offer individualized services, and give immersive learning opportunities, libraries are embracing cutting-edge technology like augmented reality and virtual reality, along with artificial intelligence. The report also highlights how collaborative this process is. To establish multidisciplinary spaces and promote an innovative culture, libraries are collaborating with academics, researchers, students, and outside stakeholders. Through these partnerships, libraries can access a wider range of knowledge, materials, and viewpoints, which improves their capacity to assist with scholarly, teaching, and research endeavors. Ultimately, this study lays the groundwork for investigating the transition from a library as an actual structure to a library as an emerging platform. It lays the groundwork for the discussion that follows the main facets of rebuilding academic library systems in the twenty-first century and emphasizes the reasons, difficulties, and opportunities that are propelling this change.

ICT, or information and communication technology, has the potential to alter libraries, which are vital public spaces. The shift from print to electronic media brought about by the quick development of ICT has altered the character of investigation and the appeal of virtual and digital libraries. The emergence of visual libraries has drastically altered the definition of libraries, diminishing their physical presence. Libraries are reevaluating their offerings and knowledge products to satisfy changing information needs.

Traditional libraries still handle large and expensive materials, but there is an increasing need for digital information. Libraries are acquiring new materials that are "born digital," meaning they have only developed digitally or have no analogue or print counterparts. With the ability to efficiently distribute educational resources to students and other users, digitization has emerged as an operational requirement and reality.

Teaching and research in higher education are greatly aided by technological advances in communication and information (ICT), and in the modern library as well as the knowledge centre environment, web technology is a crucial component. Since a library's success may be gauged by how much ICT it uses, library systems were reorganized to integrate ICT into operations.

The Government of India's Department of Human Resources Development and University Grants Commission have taken steps to advance research and higher education. Research activities help make teaching and learning more effective. This is because information and control knowledge centres have had to adapt to modern trends since computers, the internet, and wireless communication came along.

Information Technology's Development in Past

Without the advancement of natural language programming, it would never have been possible. Early programming languages used a set of codes or numbers. The majority of early computer programs have a mathematical foundation. Early in the 1970s, the idea that IT jobs were different from computing jobs originally surfaced (Vintage College, 2021). The Computer Tech Support Newsletters (2016) assert that IT has been around for a very long time. In essence, IT will continue to exist for as long as there are humans! People have always been ready to adopt new technology to communicate more effectively and quickly. We can divide the history of IT into four primary ages: mechanical, mechanical, electro-mechanical, and electronic. However, only the most recent era—the electronic one—has a significant impact on us today, with some aspects of the electromechanical age still having an impact. It went on to say that the first technological era, known as pre-mechanical, spanned the years 3000 B.C. to 1450 A.D. When people first began speaking, they attempted to use language to create basic images, or petroglyphs, to map their environment, tell stories, or record information like the number of animals they possessed.

The second era, known as the mechanical age, is when we first begin to see the similarities between modern technology and its predecessors. It can be viewed as the period between 1450 and 1840, during which several new technologies, including slide rules, were created as a result of the surge in interest in information and computing. The next era, the electromechanical age, marked the start of modern telecommunications. In general, it can be described as the years 1840–1940.

The development of several groundbreaking technologies, such as the radio, telephone, and Morse code, occurred during this period. Machines from the fourth age, known as the electronic period, employed vacuum tubes as electronic switches rather than the

electromechanical relays of the earlier era. Since there would be no moving parts to wear out, electronic switches should be more dependable in theory. However, technological advancement was still young, and tubes were as reliable as relays. Electronic switches' ability to "open" and "close" hundreds of times more quickly than relays was their main advantage. The first general-purpose electronic computer was called the Electronic Numerical Integrator and Computer (ENIAC).

An Overview of Libraries and Information Technology

Western nations have been using information technology in their libraries and information centres since the 1940s. The 1960s marked the emergence of IT use in poorer nations, albeit in varying phases. The rapid advancement of technology in communication and information has significantly impacted the methods used for gathering, processing, storing, and disseminating information.

The landscape of library and information services has changed significantly since the creation of the Internet. Its influence has led to both possibilities and problems for information professionals worldwide (Lisb Network, 2018). Without question, IT has altered the library's purpose. University libraries utilize information technology to enhance the effectiveness and efficiency of their daily operations and services. Tasks related to library services, such as acquisition, cataloguing, circulation, and binding, include administrative, technical, reader, and special services.

Kumar (2017) asserts that we can manage these types of services using integrated library automation software. Online searching, web-based database servers, the online public access catalogue (OPAC), the Web OPAC, digital reference services, electronic document delivery, computerized clipping services, internet-based services, and selective dissemination and information (SDI) services are just a few of the reader services that show how IT has changed things.

According to Uddin and Hasan (2012), computers are now a necessary piece of technology in libraries for the collection, processing, management, and distribution of information. Without the use of pertinent information resources and materials, one cannot complete research or advanced studies. With differing degrees of efficacy and efficiency, the majority of information institutions and libraries offer this service.

Integrated information infrastructure connects academic, special, and public libraries to computer-based data centres and library systems. It is the handling of information through the use of computer systems and telecommunications equipment. This includes electronic processing on a computer, information transmission via telecommunications equipment, and multimedia information distribution. Since the beginning of time, a huge variety of methods for categorizing information have been developed and used. Substantial obligations are being placed on library databases and retrieval systems due to the enormous amount of new material being produced and the growing level of specialization in all fields of human knowledge.

Traditional methods, aside from the use of IT devices, can hardly meet these expectations. Information processing and sharing methods in academic libraries have been greatly affected by improvements and new developments in computing and telecommunications, as well as the merging of these two fields. This has led to better use of these libraries (Fagbe, Amanze, Oladipo, Oyenuga, and Adetunji, 2015).

WHAT IS THE LIBRARY SOCIETY DOING?

As informational, educational, and social hubs, libraries are essential to society. I can summarize some broad trends and advancements that have shaped libraries in recent years, even though I cannot provide access to real-time information: Digital Transformation: By adopting digital technologies, internet-based tools, and digital services, libraries have been adjusting to the digital age. They extend their collections beyond tangible items by making e-books, internet database servers, and digital archives accessible.

- Information Access: Fair access to information is still a top priority for libraries. By providing computer facilities, internet connectivity, and digital literacy initiatives to marginalized communities, they aim to close the digital divide. Libraries are becoming collaborative venues that encourage creativity, knowledge sharing, and community involvement. To promote interactive learning and creativity, they provide adaptable areas for group projects, study living spaces, maker spaces, and technology laboratories.

- Community Engagement: By holding workshops, events, and programs that address various requirements and passions of their surrounding areas, libraries are becoming community centres. They function as gathering spots, cultural hubs, and locations for open forums and displays.
- Lifelong Learning: By providing educational events, training sessions, and classes for individuals of all ages, libraries are extending their significance in lifelong learning. Through a variety of tools and services, they promote formal education, career advancement, and personal growth.
- Digital Literacy: To assist patrons in successfully navigating the digital world, libraries are aggressively promoting digital literacy abilities. To enable people to use and critically assess digital information, they offer training in information literacy, digital tools, internet usage, and online safety. Libraries continue to preserve and make accessible historical and cultural resources. To ensure their continued protection over time and accessibility for future generations, they transcribe precious books, manuscripts, and archive materials.
- Collaborative Networks: To exchange resources, knowledge, and best practices, libraries are working more and more with other libraries, academic institutions, neighbourhood associations, and governmental organizations. Libraries may increase their influence and provide a wider range of services thanks to collaborative networks. It's crucial to remember that libraries deal with issues including tight budgets, shifting patron demands, and developing technological environments. To satisfy the demands of their constituents and stay alive in the digital age, they nevertheless keep changing and adapting.

WHAT'S AMAZING IN ACADEMIC LIBRARIES IN THE 21ST CENTURY?

Academic libraries have undergone substantial changes in the twenty-first century to accommodate the changing needs of researchers, faculty, and students. The following are some noteworthy advancements and patterns in academic libraries of the twenty-first century:

- Digital Materials and Access: College and university libraries now offer a wide range of digital resources in addition to their physical collections. They give users access to databases, e-books, electronic journals, and other digital resources, enabling them to access information at any time and from any location.
- Virtual Libraries and Internet-Based Services: To increase accessibility and reach, libraries have embraced online services and virtual platforms. They allow users to interact with library materials and assistance from a distance by offering virtual research aid, internet-based reference products and services, along with virtual library tours.
- Learning Commons and Collaborative Spaces: Academic libraries have converted their physical locations into learning commons and collaborative spaces. They promote interactive learning, interdisciplinary relations, and knowledge development by providing multimedia facilities, group study areas, and adjustable seating arrangements.
- Research Support and Data Management: Academic libraries are essential to research and data management efforts. To guarantee both accessibility and sustainability of research data, they help experts with data curation, storage, and management strategies. Academic libraries place a high priority on the development of digital skills and information literacy. To assist users in critically assessing sources, effectively navigating information resources, and developing digital literacy skills, they provide educational events, training sessions, and educational materials.
- Open Access Publishers & Open Educational Resources (OER): The library supports the usage of open educational materials and open access publishing strategies. It helps get scholarly research out there by using institutional repositories and publications that anyone can read. It also helps teachers use open educational resources. Academic libraries prioritize user-centred services, customizing their offerings to match the unique requirements and interests of their patrons. To continuously improve their services and resources, they collect customer feedback, administer user surveys, and work on user experience design. Libraries integrate new technologies into their operations and services. They integrate data analytics, machine learning, and artificial intelligence to improve the

administration of libraries, make resources easier to find, and give patrons tailored recommendations.

- Collaboration and Partnerships: To improve research, teaching, and learning, academic libraries work with faculty, students, and other campus departments. They cooperate with researchers on handling data, educate about information literacy in partnership with teaching staff, and develop creative programs and initiatives with student organizations. These changes demonstrate how university libraries are becoming more dynamic places that foster research, learning, collaboration, and information access in the digital era. To satisfy the evolving demands of the learning community that they serve, academic libraries keep innovating and adapting.

FROM WHAT ARE WE ABLE TO REDESIGN LIBRARIES? "PLACE" FOR THE "PLATFORM"?

Libraries can transform from "place" to "platform" by implementing the following crucial tactics and factors:

- Adopt digital technology: Libraries can use digital technology to change their services and reach a wider audience. This entails providing resources online, creating virtual platforms for interaction, and making use of digital technologies for cooperation and study.
- Encourage Co-creation and Collaboration: Libraries can act as cooperative spaces that promote knowledge co-creation and interdisciplinary contacts. The establishment of maker spaces, innovation laboratories, and collaborative areas where researchers, professors, and students may work together on projects and exchange ideas will help with this.
- Boost Digital Literacy: Libraries may be quite helpful in helping people develop their digital literacy. They can offer assistance and training to help people efficiently use technology, critically assess information, and traverse digital platforms.
- Manage and Support Open Educational Resources (OER): Libraries can actively curate and promote OER, which are digital resources that are freely accessible and aid in teaching and learning. Libraries can give people access to excellent educational materials that meet a range of learning requirements by incorporating open educational resources (OER) into their holdings.
- Facilitate Research Support and Data Management: Libraries can provide services to help researchers with data visualization, analysis, and management. This includes making research data repositories accessible, conducting workshops on best practices for data management, and assisting in the distribution of research findings.
- Build Social Responsibility and Collaboration: Libraries can act as community hubs that encourage cooperation and involvement. They can organize gatherings, seminars, and exhibits that foster communication and knowledge exchange among participants of the academic community.
- Create Strategic Alliances: To improve their services and resources, libraries can form alliances with research institutes, academic departments, and business partners. Working together with stakeholders can result in creative initiatives, pooled materials, and a more complete support system.
- Customize Services: Libraries can tailor services and suggestions for patrons by using data analytics and user input. Libraries can provide specialized resources, support, and suggestions based on the preferences and requirements of their patrons.
- Continuous Assessment and Adaptation: Rethinking libraries as platforms necessitates constant evaluation of user requirements, evolving technology, and shifting educational environments. Libraries must be flexible and agile, regularly evaluating their offerings and modifying them as needed to satisfy changing needs. By using these tactics and embracing the transition beyond "place" to "platform," libraries can become vibrant, easily accessible places that empower patrons, encourage teamwork, and help create knowledge in the digital era.

IN WHAT WAYS DO ACADEMIC LIBRARIES SERVE AS A "PLACE" TO "PLATFORM"?

Academic libraries can transform from a mere "place" to a "platform" through numerous crucial strategies, one of which is the implementation of digital infrastructure. To support internet-based tools and services, academic libraries should make significant investments in a strong digital

infrastructure. Creating user-friendly websites, putting integrated library systems into place, and using cloud-based solutions for digital resource access and storage are all examples of this.

- Online Access and Resources: Providing easy online access to resources and growing their digital collections should be top priorities for academic libraries. This covers open educational resources (OER), databases, e-books, e-journals, and multimedia content. These materials ought to be accessible remotely, from any device at any time.
- Virtual Engagement: To engage patrons outside of the actual library, libraries should set up virtual platforms and services. Digital reference solutions, online chat assistance, online seminars, virtual training sessions, and interactive virtual educational modules are a few examples of this. No matter where they are, customers have access to library resources and knowledge thanks to virtual interaction.
- Collaborative Spaces: While physical library spaces remain crucial, academic libraries should redesign themselves as platforms that foster multidisciplinary collaboration and knowledge creation. Students, instructors, and researchers can work together on projects and experiment with new technologies in these areas, which may include maker spaces, technology laboratories, and group study rooms.
- Digital Literacy Programs: To assist patrons in efficiently exploring and utilizing digital resources, libraries ought to provide extensive digital literacy programs. This involves offering instruction in data literacy, digital research techniques, information literacy, and how to critically assess information found online.
- Data Administration and Scientific Support: By offering services and resources about the handling of data, statistical analysis tools, and scientific data repositories, academic libraries can significantly contribute to the support of research endeavours. Libraries should help researchers manage and share their research data by providing workshops, consultations, and support.
- Community Engagement: By planning activities, exhibits, and seminars that encourage information exchange, scholarly discussion, and multidisciplinary cooperation, libraries can actively interact with their academic communities. These gatherings can take place virtually or in person, allowing for greater engagement and participation.
- Strategic Partnerships: Collaborating with research centres, other academic departments, and external stakeholders can enhance the library's platform capabilities. Libraries ought to form strategic alliances to exchange materials, knowledge, and creative concepts. Partnerships on research projects, cooperative programming, and utilizing outside expertise to improve library services are a few examples of this.
- User-Centric Strategy: By aggressively requesting user input, administering surveys, and examining user behaviour, libraries can embrace a user-centric strategy. This data allows for the customization of platform features, services, and resources to meet the specific needs and preferences of students and professors. Academic libraries may become dynamic platforms that provide a variety of computer-based resources, virtual participation possibilities, tailored services, & collaborative spaces by putting these principles into practice. This change enables libraries to become important participants in the internet-based academic environment, expand their reach beyond geographical borders, and adjust to the evolving requirements of their patrons.

WHAT ADVANTAGES DO LIBRARIES OFFER AS "PLACES" TO "PLATFORMS"?

There are various advantages to libraries moving from "place" to "platform": Enhanced Accessibility: Libraries can reach a larger audience by adopting the "platform" approach and making their resources and services available to more people. Physical location is no longer a barrier because users have access to digital collections, internet-based resources, and virtual engagement possibilities at any time and from any location.

- Improved Cooperation and Knowledge Exchange: Libraries serve as platforms that let users, study participants, and educators work together. Libraries offer virtual places and online platforms that allow users to interact, exchange ideas, and work together on projects. This encourages information sharing and interdisciplinary connections.
- Increased Access to Materials: Libraries' platforms enable them to provide a wide range of digital materials. This includes electronic books,

online journals, databases, multimedia, and free educational resources. Libraries may now offer a wider variety of materials to support research, teaching, and learning thanks to the transition from an actual inventory to a digital archive.

- Personalized Services: By utilizing user data and analytics, the library can tailor recommendations and services to each individual. Libraries may improve the user experience by customizing their offers, recommending pertinent resources, and delivering focused assistance based on the preferences and requirements of their patrons.
- Flexibility and Convenience: Users can access library materials and services whenever it's convenient for them thanks to the platform approach. Users are free to interact with library resources at their own pace and convenience, whether it means using an e-book, participating in an internet-based workshop, or getting help with their research.
- Worldwide Collaboration and Reach: Libraries serve as platforms that facilitate worldwide cooperation and connectivity. By establishing connections with academics, professionals, and colleagues worldwide, users can broaden their networks and promote global cooperation. This worldwide reach makes it easier to learn from different cultures and viewpoints.
- Lifelong Learning along with Skill Development: Through their platforms, libraries can play a critical role in promoting lifelong learning and skill development. They can provide digital literacy programs, tutorials, and online courses that enable users to learn new skills and expand their knowledge at their speed.
- Community Building: As venues, libraries offer chances for interaction and community building. Through online forums, conversations, and library-organized events, users can establish connections with researchers, instructors, and other students. Collaboration, intellectual interchange, and a positive academic atmosphere are all facilitated by this sense of community.
- Sustainability and Cost Savings: Moving to digital platforms may result in financial savings on maintenance, printing, and physical space. By lessening the environmental effect of conventional print collections, it also encourages sustainability.
- Flexible behaviour to Technological Advancements: As platforms, libraries are in a favourable position to adjust to new developments in technology. To increase discoverability, customize suggestions, and improve user experiences, they can use data analytics, machine learning, and artificial intelligence. Libraries may take advantage of technology, broaden their audience, and provide a variety of digital resources, individualized services, and collaborative environments that satisfy the changing requirements of their patrons in the digital age by adopting the "platform" approach.

ARE LIBRARIES A DISADVANTAGE AS A "PLACE" TO "PLATFORM"?

Although switching beyond "place" to "platform" has many advantages, there are a few possible drawbacks to take into account as well: The shift to a digital platform hinge on users having the necessary digital literacy skills and reliable internet access. Despite this, some groups and individuals still lack access to technology or struggle with digital resources. This may make already-existing disparities in access to services and information worse.

- Loss of Traditional Space and Social Responsibility: Physical library locations may become less important as attention is directed toward digital platforms. This might result in fewer face-to-face encounters, community involvement, and the chance finding of materials that frequently take place in conventional library environments.
- Dependency on Technology: Libraries that rely largely on digital platforms are susceptible to cybersecurity risks, system malfunctions, and technical issues. Disruptions may make it harder for users to access resources and services on the platform.
- Possible Privacy Loss: To provide individualized services, digital platforms frequently need to collect and analyze user data. Although user privacy is a top priority for libraries, security and the exploitation of personal data in the digital world might raise worries.
- Limitations of Digital Resources: Although digital resources have grown, some things are still not widely available or easily accessible. Licensing agreements or the unavailability of some publications in digital formats may limit the range of materials accessible through the portal.

- Difficulties with Digital Preservation: Upholding permanent access to digital assets poses particular difficulties in digital preservation and making sure that content is usable and accessible throughout time. To protect digital resources for upcoming generations, libraries must make continuous preservation investments.
- Requirements for Skills and Training: Libraries must make investments in staff development and training to gain proficiency in digital technology, handling information, and user support when they transition to a digital platform. In terms of time and resources, this may be a major task.
- Possible Loss of Hands-on Collections: Libraries may place less emphasis on preserving physical collections as they concentrate on digital resources. This can make it difficult to preserve and make accessible rare or unique materials that are challenging to digitize.
- Digital Divide in the Library Profession: Due to a lack of funding, scarce resources, and disparities in technological infrastructure, libraries may find it difficult to embrace and adjust to digital platforms. A digital divide among the library community itself may arise from this.
- Intellectual Property and the Licensing Procedure Issues: Copyright, licensing contracts, and the equitable use of digital resources can all become more complicated when using digital platforms. To maintain compliance and equitable access to information, libraries must manage these moral and legal issues. Libraries need to carefully think about these issues and try to limit any bad effects to create an integrated strategy that combines the benefits of digital media with the upkeep of traditional spaces, easy access for everyone, data security, and getting people involved in their communities.

THE ROLE OF THE LIBRARY IN LEARNING

Libraries are essential for assisting and improving the educational process. Libraries contribute significantly to learning in the following ways:

- Access to Resources: Books, journals, databases, multimedia, and digital collections are just a few of the many resources that libraries offer. These resources cover a wide range of fields and topics, giving students access to reliable and varied material for their projects, research, and personal development. Libraries provide courses and information literacy programs to assist patrons in acquiring the necessary skills for locating, assessing, and utilizing information efficiently. These courses give students the research, critical thinking, and digital literacy abilities they need to succeed academically and continue learning throughout their lives.
- Research Support: Libraries offer research support to students, guiding them through challenging information environments, identifying pertinent sources, and creating efficient search techniques. Librarians are adept at helping with data retrieval, citation management, and research approaches, all of which help students build excellent research abilities.
- Collaborative Spaces: Libraries provide areas for students to collaborate on projects, have conversations, and share strategies. These areas encourage peer-to-peer learning, teamwork, and creativity, creating a cooperative and engaging learning atmosphere.
- Technology and Modern Skills: Libraries offer computers, internet access, and software programs that facilitate research and education. To assist users in acquiring the digital skills required for success in the classroom and the workplace in a technologically advanced world, they also provide workshops and technology training. Libraries are dedicated to promoting lifelong learning by providing educational events, conferences, and activities for students of all ages. Through the provision of educational resources and the facilitation of learning experiences outside of conventional academic contexts, they promote professional development, personal growth, and ongoing education.
- Cultural and Social Responsibility: Libraries are cultural hubs that host events that encourage learning, literature, and the arts, such as book discussions, exhibitions, and author presentations. By encouraging a love of knowledge and curiosity among library patrons, these programs support a thriving intellectual and cultural community.
- Personalized help: Libraries work to give students individualized help by customizing resources and services to suit their needs. Librarians improve each user's learning experience by providing one-on-one

consultations, research support, and recommendations based on individual interests and objectives. Libraries strive to create an inclusive and accessible learning environment for all their patrons. To promote fair access to educational opportunities, they offer resources in a variety of formats, take into account different learning preferences, and guarantee that both digital and physical environments are usable by people with disabilities.

- Adoption of Emerging Technologies: Libraries welcome new technologies and look for creative methods to improve education. By incorporating artificial intelligence, augmented reality, virtual reality, and other technology into their offerings, they give students fresh, engaging educational opportunities. All things considered, libraries play a major role in education by offering resources, information literacy training, research assistance, collaborative areas, training in technology and digital skills, opportunities for lifelong learning, cultural engagement, individualized support, inclusive settings, and the incorporation of emerging technologies. They serve as more than just information stores; they are essential collaborators in the educational process for scholars, students, and the general public.

WHAT IS ESSENTIAL IS THE PERCEPTION OF PHYSICAL SPACE.

It is crucial to recognize the ongoing significance of the actual location and the encounters that it offers, even while the transition beyond "place" toward "platform" in libraries for academia offers many benefits and opportunities. For many years, the library has been a centre for education, research, teamwork, and community involvement. A digital platform cannot completely replace the special advantages that physical library places provide. They offer a calm and committed setting for concentrated inquiry, study, and introspection. By facilitating unexpected meetings, accidental discoveries, and impromptu user interactions, the physical location promotes intellectual exchange and a sense of community.

Libraries, as physical locations, are also essential for accommodating a variety of learning preferences and methods. They provide a range of resources that might not be easily accessible in digital formats, including printed publications, magazines, archives, and special exhibitions. Furthermore, physical locations frequently host events, training sessions, exhibitions, and guest speakers, providing opportunities for in-person interaction with peers and professionals.

The physical library space's ambience, architecture, and design can stimulate invention and creativity. It offers a concrete and engrossing experience that piques curiosity and promotes investigation. As physical locations, libraries can also represent academic institutions, giving students, staff, and the general public an aura of pride, identification, and belonging. Achieving equilibrium between the virtual and physical worlds is essential, even while digital platforms provide convenience, accessibility, and a wider range of resources.

Academic libraries' future depends on combining the two, utilizing the advantages of technological advances while maintaining the special opportunities and experiences offered by traditional library spaces. We should not redesign libraries from "place" to "platform" without acknowledging the importance of creating hospitable, useful, and motivating physical spaces. Academic libraries may build a comprehensive and accessible ecosystem that satisfies the many demands of their patrons in the twenty-first century by fusing the advantages of the physical and digital worlds.

Trends in Technology for Libraries in the Twenty-First Century

The twenty-first century is the new decade of knowledge, with a boom in information sources and output, claim Emezie and Nwaohiri (2013). Another name for it is the dawn of the knowledge era. As a result, new work patterns and business procedures have emerged, necessitating the development of new types of work requiring new and distinct skill sets. The definition of knowledge has evolved in the twenty-first century, and it is no longer limited to the ideas of specialists, books, and subjects. Today, people view knowledge as an assembly of networks and flows, similar to energy, that either causes or accomplishes things.

The advent of technological innovations has changed the function of libraries in the twenty-first century. Information can no longer be stored on print media alone. CD-ROM database servers, computerized document delivery, automated cataloguing,

distribution systems, and computerized information retrieval (OPAC) have become the norm of the day. There is a reasonable expectation of fresh innovation in library administration and services when the topic of technology improvement is brought up in connection with library services. The library can begin implementing new features to offer its patrons knowledge and information services. For instance, consumers may have found the library's website uninteresting a few years ago. Information-based engines are rapidly expanding these days and can enhance the appearance and experience of websites. People think it's easier to use and more amiable. Additional technological innovations that help libraries serve their patrons in the twenty-first century include RFID, automated checkout systems, and online databases (Haris, 2016). The new cloud computing technology of the twenty-first century is helping libraries.

A system that uses a network of distant servers on the Internet saves information on the website in an alternate location. Cloud technology makes it simple for libraries to store the contents of their websites, and website management is possible from any location at any time. The electronic book offering at the international airport is another example of a new technological implementation.

The new library at Kuala Lumpur International Airport provides travellers with free e-books. Using Bluetooth beacon signals, which are based on geofencing and micro-location technologies, this smart facility functions. It connects to the passengers' smartphone app, giving them access to a unique e-book virtual library. Ostrow (1998), as stated in Eguavoen (2011), acknowledges that by the end of the 20th century, significant changes had also been brought about by the development of the Internet, digitization, and the capacity to obtain library and academic materials from distant locations.

Barathi, Loganathan, and Rajan (2017) assert that the utilization of digital or virtual libraries has emerged as a prominent topic in information service delivery. They went on to define a web-based or digital resource as a collection of library materials in electronic or digital format that is available at multiple locations and that can be easily accessed and utilized with computer information technologies for teaching, learning, research, leisure, and decision-making. Managing the Digital Information System includes all the skills, attitudes, and knowledge needed to create, save, analyze, organize, retrieve, and share digital information (text, images, and sounds) in digital libraries and other types of information. This means that library and information professionals in the modern world should be able to do it. Customers now demand a wide range of automated push and/or grasp services offered by libraries and from a distance, according to Byamugisha (2010), who also notes that customers' expectations for distance service delivery throughout library services have grown.

New developments in information technology for library services

Librarians have a rare chance to greatly improve user-centred services and to encourage and support cooperation among libraries and their patrons thanks to emerging technologies. Library professionals can now identify, gather, organize, customize, and deliver content and services in a variety of formats and varieties to the user community in real-time, both in physical and virtual environments, as well as on-demand, thanks to emerging technologies. Libraries are not dependent on technology because all of their activities are planned and created with the input and opinions of their users. However, new technologies can help libraries create the collaborative and interactive environment needed to provide user-centred library services, create new resources, and build on existing ones by using the intelligence of six users as a whole (Ayo-Ola Fare, 2020).

According to Adams, Cummins, Davis, Jonathan Freeman, Giesinger, Anantha Narayanan, Langley, and Wolfson (2017), new technological trends in libraries have altered how users and librarians obtain information in the current digital era. According to a recent survey by Adams et al. (2017), 77% of Americans aged 16 and up think that computers and the Internet should be available for free at the library. Noting five library technologies that every librarian and information professional should implement—maker space, user-focused graphical user interfaces, digital displays, cloud technologies, and sign-in technology—it is classified as a very significant service, right after the borrowing of books service. To create a maker space, librarians are already making space. Students apply topics they have learned in the learning environment to real-world scenarios when a library provides a maker space program. Technology that enhances library users' experiences through user-focused interfaces will free up librarians' time so they can concentrate on their programs. By encouraging

engagement and greater participation from students and lecturers, user-focused interfaces enhance interactions between customers. Customizing interactions between users and the library system is the aim of these interfaces. By digitally spacing library books using technologies like slideshows, the library can produce a variety of dynamic displays for different titles. It's a great method for learners to see what the library has to offer. Compared to local implementation, cloud hosting offers greater security, better performance, and more dependability. It can assist libraries in getting ready for expansion and the introduction of more affordable technology. Libraries can control user login credentials from a single location, thanks to single-sign-on technology. Automatic logins and upgrades help educators save time.

Ayo-Ola Fare (2020) claims that blogs, social bookmarking sites, podcasting, vodcasting, and streaming media are examples of new IT developments in library services. Libraries will be in charge of archiving and making media accessible as it is produced. Libraries can use podcasting and additional consumer technologies to distribute their services and content. Vodcasting is the delivery of video content, whereas podcasting is the delivery of audio files. Similar to podcasts, vodcasts can be listened to on a personal media assistant (PMA) or a laptop. Blogs are frequently used to start discussions and encourage communication between employees and users. Additionally, library blogs enable personnel and patrons to engage in personal interactions and get to know one another. Through RSS feeds for academic fields or areas of speciality pertinent to them, libraries can use social bookmarking, a technique for saving, organizing, finding, and managing websites' bookmarks using descriptive metadata. Digital tools are being used by forward-thinking libraries to inspire and inform, facilitate the learning of new skills, and provide services that are easy to use and access.

According to Garland (2019), libraries are utilizing the following cutting-edge technologies to provide their services: virtual creative labs, which are opening up in libraries across the UK, and coding clubs, which teach patrons how to create and utilize technology however they see fit. Libraries are collaborating with authors and programmers to develop new interactive narratives, or "digital storytelling." Here, the reader might lose themselves in the story and try to manage its progression. With virtual reality, many libraries are now allowing their patrons to play, study, and explore new locations while lounging in the familiar surroundings of their local library. Mobile apps, RFID technology, cloud printing, robot technology, and streaming services are further developing technologies that Garland (2019) cited. Libraries have recently incorporated technology such as multimedia storytelling, RFID, the use of library bookmark applications, big data, and the Internet of Things (IoT), as demonstrated by Pinch's Blogspot platform (2020), Nag & Nikam (2016), Gupta & Singh (2018), and Kaladhar & Rao (2018).

According to Hoy (2017), the application of blockchain technology to medical and library metadata and networking would significantly enhance information services. Other recently introduced technologies in libraries include augmented reality (AR), virtual reality (VR), Quick Response (QR) technology for bar codes, gamification, and an integrated library management system that houses social media apps, artificial intelligence (AI), and OPAC (Sheik & Olugbenga, 2019). Odeyemi (2019) discusses artificial intelligence and robotics.

According to Massis (2018) and Gul followed by Bano (2019), ambient intelligence together with data mining has recently been implemented in libraries, which has had a hugely beneficial impact on the libraries' intelligence, staff productivity, customer satisfaction, and information gap closure. The public library in Rhode Island now contains an AI lab. The Queensland State Library employs a user-friendly, unstacked application. It facilitates consumers' digital visualization of knowledge resources (Princh Blogspot, 2020). RFID technology is currently being used in Bangladeshi libraries (Rahman & Islam, 2019). R-StaRS is an automated reference service application created by a group of library staff representing the International Islamic University in Malaysia for the University of Windsor in Canada (Ryu, 2019). By giving users access to their minds—also known as customer intelligence—after they peruse vast amounts of data, big data might help libraries provide better services. In the United Kingdom, Halton Libraries are now using augmented reality apps like "Library," which lets users search for literature and find relevant information. Book-O-Mat is a self-service options book lending and usage pattern tracking tool created by the Hillsboro library system in Oregon, USA. This aids them in making

well-informed decisions regarding the book preferences of their patrons (Princh Blogspot, 2020).

Information Technology Trends and Challenges in Libraries in the Twenty-First Century

There are several barriers to the efficient availability and use of information technology in libraries, particularly academic libraries, claim Fagbe, Amanze, Oladipo, Oyenuga, and Adetunji (2015). A lack of skilled information technology (IT) staff, a negative attitude toward technological advances among library staff and users, technical problems during use, the fact that converting analogue information to digital format and storing it puts a lot of stress on the university's bandwidth, computer crashes caused by viruses, malware, hackers, etc., which can lead to data loss and information being seen by people who aren't using it, not enough money, and culture of maintenance are some of the problems that the library faces. The library should take into account the aforementioned limitations when establishing a fully operational IT-compliant library.

Onuoha & Obialor (2015) explain why library IT has not advanced more quickly. One of their reasons is that it's too expensive for libraries to implement new technology. The copyright law from 1976 didn't cover modern technologies, so the publishing and library communities are trying, with varying degrees of success, to find a middle ground between their needs. Other reasons include the lack of standards because different standards have been adopted by hardware manufacturers; the lack of a perceived market because publishers do not see a library market for novel products that use new technologies; and the content of the disc in the sense that a 5-inch CD-ROM contains over five hundred megabytes, which represents a lot of information, along with publishers having problems assessing appropriate categories of information to collect on a disc.

The lack of staff training, coupled with the fact that most library employees lack internet skills and the increasing availability of full-text documents in electronic format, will intensify the copyright issue. Inadequate technical staff, complicated technology interfaces, slow bandwidth and expensive web services, lack of funding, inadequate power supply, and other issues must be looked at and resolved if emerging technologies are to be fully adopted in libraries, particularly in India.

Innovative Technologies: To free up more time for their most vital task, which is to assist enthusiasts, librarians should lead the way in utilizing technology among their peers. Why not become a digital pioneer and utilize new technology and services in libraries? The primary goal of the majority of libraries is to give all residents fair access to information. Libraries can utilize a wide range of relevant and useful design services and technology. We focus on the utilization of technological devices in libraries, not on the potential financial impact of these technologies, including the use of social media for library services, RFID, QR codes, and big data.

Social media: social media includes various platforms such as blogs, Facebook, social media, podcasting, mashups, YouTube, Flickr, RSS, Tag Cloud, Folklore, wikis, Myspace, and Twitter, among others. More people are using sites like Google+, Facebook, Twitter, LinkedIn, and others. Social media users are crucial to libraries in the twenty-first century, and they are posing new problems to libraries to satisfy the expanding requirements of their patrons. This essay explains the function of social media platforms. Data is unrestrictedly accessible from any location at any time in this digital age. Social media encompasses social interactions between individuals who have a specific relationship or participation. We can view it as a technological and social setup that facilitates these kinds of activities. Ethical issues with social media include user exploitation, privacy, friendship, ownership, and surveillance.

Currently, we are not solving the ethical problems associated with social media posts. The most significant finding of our research is that technology itself unquestionably embodies ethical ideals. Broad concepts inform social media conduct guidelines, aiming to create a collection of ideal procedures that regulate human conduct. Common sense views ethics as a personal matter. In Western nations, libraries today employ the newest trends to make their resources well-liked and user-friendly. Experts in Indian libraries are now adhering to these procedures. These days, everyone is discussing Lib 2.0 apps. Social media is one of them.

Libraries and Social Networking Sites

People frequently use social networking sites to share updates, pictures, blogs, chat, and leisure and entertainment content with their friends and family.

Nonetheless, libraries and schools can collaborate to include the most effective use of communication tools in their programs, services, and classrooms. Social media networking sites (SNSs) give users a platform to engage in a range of activities and exchange ideas with others online. Libraries have the chance to connect with their patrons through social networking platforms.

Mobile devices for information and library services

These days, libraries benefit greatly from mobile technologies. By incorporating mobile technologies and applications into its offerings, the library may efficiently reach consumers who live far away. Mobile devices are a necessary tool for information sharing. Members of the community use cell phones to exchange ideas, information, facts, and conversations. In civilized societies, information is frequently disseminated. The preferred method of accessing the internet, particularly for individuals who are constantly on the go, is increasingly mobile technology. If library professionals want to provide better user services, they must follow this procedure and work with the mobile government.

Applications for mobile devices

The term "application" can be shortened to "app." Applications are software programs designed to perform specific tasks for the user. An app for mobile devices is computer software made specifically to run on smartphones, PCs, and other portable electronics. The comprehensive software system does not apply to mobile applications. Social networks, education, gaming, online commerce, calculators, and map sets are only a few of the limited and distant features that each app provides.

Codes for quick response (QR): Two-dimensional barcodes known as Quick Response Codes, or QR codes, can be scanned by a smartphone camera. The default recognition fields frequently utilize QR codes. Such codes can be used to quickly retrieve phone numbers, V-cards, URLs, SMS messages, and any other text that has more information than is typically contained in QR codes. barcode. This essay provides information about the encrypted QR code. The innovative QR technology utilized in contemporary libraries is the main topic of this essay. Smartphones and cell phones with cameras can read the matrix barcode that serves as the rapid response code. These codes are sometimes referred to as mobile codes, bar twofold codes or 2D codes. Although some phones come with a built-in QR code reader, the majority of phones bought in the US require the user to obtain a free app. These days, QR codes are used in many different ways, including books, advertisements, and identity cards, which are examples of contemporary technology.

An app for virtual reality

The truth is that individuals have become interested in this software in a variety of fields, from sports to medicine. As a result, the volume bears no direct connection to the digital realm and lacks relevance to the library context. Prior used an image of a library produced by an Indian expert to illustrate the idea of irrational thought in his paper. Users can look for books featuring real-life conversations at the library. Searching for pertinent literature and educating about the local environment form the foundation of the app's full view.

Apps for library bookmarks

Many users have ceased trying to find books in the library; thus, the solution to this issue is an informative response that can demonstrate that the user belongs to the book. Prior, Kovelkaz provided some examples in his piece presented on the "E-kinder publication" internet site, some of which are currently in the idea stage but may be useful in the future.

The blockchain

One of the hottest things right now is blockchain, which creates records using public keys and cryptographic signatures (Lemieux, 2016). It is a continuous list of records or an ordered chain of blocks connected by cryptography. Cost savings, security and resilience, immutability, and the use of pseudonymity are the primary benefits of blockchain technology. Libraries are developing a metadata system to protect their rights to digital acquisitions. The system is designed to link networks throughout the library network, facilitating digital information sharing among peers. The goal is to foster collaboration among various organizations.

Robots

In the new period, libraries were crucial. There is a lot of activity at the library. For this reason, a large number of libraries currently employ automation in one way or another. Numerous libraries have already

effectively implemented automated technology in one way or another. For instance, the state of Connecticut archives in Westport, which has purchased two robots named Vincent and Nancy, will be utilized in the future to assist in teaching computer skills and coding. It is a terrific method to get an individual's attention and pique their interest in technology and, most importantly, the library. Yes, it is an entirely novel kind of social connection.

Big data

Big data is the term used to describe huge quantities of information that are challenging for standard data processing systems to collect, store, transport, share, and analyse. Machines usually produce vast amounts of data, which can be either structured or unstructured (Sonawane and Sane, 2018). Big data directly impacts libraries because professionals use it to examine massive volumes of data to comprehend their clients and provide fully effective services. But because university researchers and scholars depend heavily on data for their studies, it also has a consequential impact (Ball, 2019). The process involves an analysis of the previous loan history, as well as the modelling and standardization of data. research on user behaviour. expanding the library's collection. monitoring how library resources are being used.

Drone

Drone technology is one of the 192 important developing technologies that will encounter enormous applications in the future, according to Futuristic Speech (Frey, 2014). Drones are Unmanned Aircraft Systems (UAS) that can be remotely controlled by an onboard computer or a human operator (Rouse, 2018). Drones are increasingly being used to transport books from libraries to users and back again. They have been adopted by several libraries throughout the world, such as the NY Public Library, Dubai Library, Florida Library, and Rose Memorial Library. Delivery of books, logistics, security, and photography.

Apps for e-readers

One of the most popular devices is an e-reader, which is a portable device used to read both traditional textbooks and digital e-books. With the aid of a tablet or smartphone, they may read their favourite novels from anywhere. Wi-Fi allows e-readers to connect to the Internet. Windows phones, Android, BlackBerry, iPads, iPhones, Macs, and PCs all have applications for e-readers. The majority of individuals like to read books. With the aid of a tablet or a smartphone, they can read on an electronic device from any location. Periodicals and e-books are available in digital format. Wi-Fi allows students to access the Internet. Android, Blackberry, iPad, iPhone, Windows Phone, as well as Mac desktops and PCs, offer applications for e-readers.

3D printers

Printers that use 3D computer graphics, or 3D computer graphics that compute and generate 2D pictures using a third-party representation of physical information stored on a computer. The public will have considerably greater access to 3D printers in the future. Over the past year, 3D printing has generated a lot of conversation, and the cost of 3D printers has decreased. Numerous libraries have demonstrated this service. All of the libraries that offer 3D printing maps are located here. Applying several norms is crucial, and students comply with them.

Application of Web-Based Technology

Knowledge centres and librarians today have fantastic opportunities because of information and communication technology. It would be appropriate when used properly and to deliver information at the appropriate moment for the appropriate individual. The universe is full of open and commercial resources for study, education, and teaching. The section that follows highlights a few of the most crucial information sources.

SWAYAM PRABHA

The University Grants Commission (UGC) & the Ministry of Human Resource Development (MHRD) are always working to advance higher education and research. The Ministry of Human Resources Development offers two higher education programs: SWAYAM PRBHA Higher Education Satellite Channel and SWAYAM Massive Open Online Courses (MOOCs) are two of the key resources. The Minister of Human Resources, Government of India, has taken a commendable initiative with Swayam Prabha. Because technology is developing so quickly, the education sector must likewise use ICT.

The quick growth of the higher education system has raised many important concerns about its quality standards, as well as the sustainability of higher

education resources and fair opportunities for all societal groups. This channel's curriculum-based undergraduate and graduate course materials cover a variety of topic areas and are intended for students in grades 9 through 12. SWAYAM, the Massive Open Online Courses (MOOC) platform, will approve and prepare every course for comprehensive delivery. From channel 1 to channel 16, Swayam Prabha offers the following channels: economics, commerce, physical education, and mathematical sciences. Physics, Chemistry, Biological Science, Botany, Zoology, Bio Science, Applied Science, associated Physical and Chemical Science, Humanities (Language, Literature, Arts, History, and Philosophical Studies), Social Studies (i-iv Categories), and Engineering. Subjects: Chemical engineering, architecture, civil engineering, software engineering, power engineering, electronics, and electrical engineering. The courses also cover mathematical engineering, humanities, social sciences, and management. Advanced secondary school educational institutions Higher secondary school education, teacher education, the agricultural industry, professional and allied sciences, mechanical engineering professionals, mathematics, metallurgical industries, physics, biology, chemistry, performing arts, liberal arts, humanities, social sciences, and state-open higher education programs are all covered on channels 17 through 32.

NPTEL Portal

One of India's top open courses is the National Program on Technology Enhanced Learning (NPTEL). IITs and IISc are working together to provide online certification programs and courses in many subjects. Learn for free. To attempt an exam and receive a certificate from the Ministry of Human Resources Development, Government of India, candidates must pay a nominal charge. Both online and video courses are offered by NPTEL. The courses can be easily and freely downloaded from the NPTEL portal. The Institute offers over a thousand courses, including engineering, social science, and management courses. Instructors of online courses must also consider the extent of student involvement.

Educational Communication Consortium (CEC)

The Ministry of HRD launched the Vyas channel, an exclusive CEC-UGC Academic Excellence satellite communication program that CEC has created and is currently operating around the clock. The instructional content created in a variety of undergraduate disciplines to support classroom instruction forms the basis of the 24/7 broadcast. One benefit of having such a channel is that it allows education to reach millions of households with a large number of viewers. This technique greatly reduces the competence and information gap resulting from poor communication in remote areas. The network that focuses on colleges and universities was inaugurated on January 26, 2004, to bridge the information and knowledge divide and offer everyone the very best standard of higher education by bringing knowledge to households, students, teachers, and the general public. Undergraduate courses are broadcast on Vyas 24 Hours Higher Education Channel, which is accessible on Doordarshan's DTH platform DD Direct Plus as well as on commercial DTH provider Dish TV. CEC is employing the potent medium of the internet to webcast the channel to guarantee its availability and reach both domestically and internationally.

Information and Library Network (INFLIBNET) Centre

The University Grants Commission of India oversees the independent inter-university INFLIBNET Information and Library Network (INFLIBNET) centre. INFLIBNET serves all Indian universities, science and arts colleges, engineering colleges, and other educational institutions. It works to modernize university libraries and connect them to information centres across the nation via a high-speed data network that uses cutting-edge technologies to maximize information use. The goal of INFLIBNET is to play a significant role in fostering scholarly communication among Indian scholars and academicians. INFLIBNET has undertaken projects and offers a variety of services for higher education, including the Vidwan subject expert database, e-PG Pathshala, N-List, Shodhganga, and INFONET. The following section describes Shodhganga, one of INFLIBNET's offerings.

Shodhganga

Shodhganga is a rich source of Indian theses. It is well known that doctoral theses and dissertations offer a rich and distinctive source of information, frequently the sole repository of research that does not make it into other publication channels. Theses and dissertations continue to be an underutilized and untapped resource, resulting in needless repetition

and duplication that is essentially the antithesis of research and a waste of enormous financial and human resources. Over 2 lakh full-text theses are available on the Shodhganga platform. It is beneficial to the researchers.

Developing Library Network (DELNET)

The National Informatics Centre in New Delhi founded the DELNET Developing Library Network (DELNET). Online journals, free electronic books, theses and dissertations, digital media database servers, full-text databases, US patents, full texts, the Union Catalogue of Documents, the Union Catalogue of Journals, audio and video recordings, the online Cambridge Dictionary, and other online databases are all available through it. With a wealth of resources, DELNET has just released the DELNET DISCOVERY PORTAL. The primary goal of DELNET's establishment was to encourage resource sharing among libraries by creating a network of libraries. In addition to providing customers with computerized services, its objectives include gathering, storing, and disseminating information; coordinating efforts for appropriate collection development; and, whenever feasible, minimizing unnecessary duplication.

The National Digital Library

The National Digital Library (NDL) pilot project has been supported and funded by the Ministry of Human Resource Development (MHRD) through its National Mission on Education through Information and Communication Technology (NMEICT). This pilot project is being managed by the Indian Institute of Technology, Kharagpur. It combines resources available from various government agencies, commercial sector entities, and academic institutions. After gathering all the resources, the programmers process them and distribute them via the server. It offers users both institutional and individual membership.

The contents of the Available Resources Repositories come from a variety of topic areas, including science, technology, agriculture, and the humanities. The repository incorporates information from many institutional repositories in India. There are almost 60 different kinds of educational resources available. Users from elementary school to graduate school can access educational resources. Theses as well as dissertations NDL materials will be accessible in a variety of formats, including text, audio, and video. The user can select the type of media to obtain the content in the format of their choice. Approximately 70 languages are available for the items. Three lakh authors have written 10 million pieces.

Highlighted Sources and Resource Suppliers

The Digital Library of India, or DLI Over 500,000 classical books worldwide LIBRIVOX has Over two million audiobooks The SNLTR digitizes Rabindranath Tagore's literary works. The Information Library Network, or INFLIBNET, hosts about a million thesis and summary reports written by Indian scholars from various universities. KRISHI KOSH The library contains over fifty thousand books, periodicals, papers, and reports about agriculture. The National Council for Education, Research, and Training (NCERT) publishes books in Hindi and English on a variety of disciplines for students in primary school through the 12th grade. The NPTEL National Program on Technical Enhanced Learning is an initiative financed by the MHRD that offers 10,000 video lectures in engineering.

Using software to manage reference resources

The IT era is experiencing a boom in communication technology, leading to the rapid global dissemination of information. Information management is more challenging as the volume of available data increases. Thus, the faculty, students, and research scholars are having trouble locating, gathering, and organizing the data for their studies. There are various kinds of reference managers available to address these issues. They're: 1. The Connotea. 2. The JabRef 3. A librarian 4. Mendeley 5. The Zotero 6. LITEULIKE 7. The RefDB For instance,

Mendeley

Mendeley offers a quick and easy installation process, along with world-class plugins that enhance its functionality. Citation styles with over 1000 formats, journals, rapid search, citation style selection, prompt bibliography, creative, versatile formatting, collaborative bibliography, and bibliography sharing are all aspects of this reference manager. Additionally, it makes it possible to create bibliographies and citations in Word (from Microsoft), Open Office, and LaTeX.

Gathering Resources with Open Access

There are thousands and thousands of information resources on the Internet as a result of the information technology revolution. Any title may be searched online, and in a matter of seconds, hundreds or even thousands of documents on a given subject can usually be located. Both paid and open-access (free) resources are available for efficient use in research and teaching. The internet offers countless open-access resources for study and higher education. In addition to the numerous open-access websites, some of the free sources are the DOAJ (Directory of Open Access Journals) at www.doaj.com and the DOAB (Directory of Open Access Books) at www.doabbooks.com. DOAB allows access to free books in PDF format, whereas DOAJ allows access to free publications in full text.

Citationmachine.net

Both books and online resources offer a variety of methods (types) for writing references and bibliographies. For instance, the Chicago model, MLA style, the American Psychological Association (APA style), and others are adhered to. The APA format is well-known in India for writing bibliographies. According to our request, it provides information on reference bibliography styles for books, magazines, newspapers, websites, journals, and more. Bibliography standards and journal metrics are readily accessible through online tools in the Internet age. There are special online resources for creating the bibliography. Regarding EG. An open-access website for creating bibliographies is www.citationmachine.net. Please convert the references and bibliographies on the www.citationmachine.net website to our specifications. if we choose the appropriate style for conversion following our requirements and input the author names, titles, publication locations, and year. Every journal article, book, research report, and article must have a bibliography and references.

Ethics, Copyright, and Plagiarism

Using ideas or material from another author in your writing without properly citing the sources is known as plagiarism. Plagiarism in academic work is a serious offense. Therefore, authors and publishers should focus on their work. In academic publications and programs, copyright typically relates to the ownership of goods, concepts, or information. Copyright concerns over the right to claim authorship for written material and research findings may arise in educational writing and research. Everywhere there is scholarship, there are concerns over "ownership." We now enter the field of ethics. There are established ethical standards for doing research and presenting findings in educational research. There is a plethora of open-source software for detecting plagiarism, such as Viper, Paper Rater, Dupli Checker, and Copy Leaks.

II. CONCLUSION

In library services, emerging technology has enhanced user-centred service and encouraged collaboration between patrons and libraries. These technologies make it possible to deliver services and content in real time, fostering an atmosphere that is participatory and collaborative. Multimedia storytelling, RFID, cloud printing, robots, streaming services, blockchain, augmented and virtual reality (AR), Quick Response (QR) gadgets, augmented reality, and a comprehensive system for managing libraries are some of the next innovations. Still, libraries have problems, such as a lack of knowledgeable IT staff, negative views of new technologies, technical issues while they're being used, heavy usage of university internet access, computer crashes caused by malware, viruses, and hackers, insufficient funding, and a culture that focuses on upkeep. Librarians ought to set the standard for equitable access to information and peer use of technology. Libraries can use a variety of creative services and technology, including big data, RFID, QR codes, and social networking sites for library services. User exploitation, privacy, relationships, possession, and surveillance are among the ethical concerns with social media.

Social networking sites and libraries can work together to make efficient use of communication tools in services, programs, and classrooms. With many libraries utilizing robotics to teach computing abilities and coding, robots are becoming more and more significant. Large volumes of records that are difficult for conventional data processing tools to handle are referred to as "big data.". The use of drones to deliver materials from libraries to patrons and return is growing. The public will have more access to 3D printers and e-readers in the future. India's knowledge centres and librarians have been greatly impacted by information and communication technology. Through initiatives like Swayam Prabha, which provides curriculum-based learning resources and Massive Open Online Courses (MOOCs), the

Ministry of Human Resource Development and the University Grants Commission are attempting to promote higher education and research. Over a thousand courses in a variety of areas are available on the NPTEL Portal.

The Information and Library Network (INFLIBNET) Centre uses state-of-the-art technologies to modernize university libraries and link them to information centres. Digital media storage devices, full-text databases, internet-based publications, free electronic books, doctoral theses and dissertations, full texts, US patents, and a digital Cambridge University Dictionary are all offered by DELNET.

The Indian Ministry of Human Resource Development is funding a pilot initiative called the National Digital Library (NDL), which provides organizational and individual membership options to users. The Viper, Paper Rater, Dupli Checker, & Copy Leaks are examples of open-source programs that may identify plagiarism and guarantee accurate citation. Libraries must adapt their goals, philosophies, and practices as the format of recorded thought transitions from print to digital.

REFERENCES

[1] (1993). Frames of Mind: The theory of multiple intelligences. New York: Basic Books.

[2] (1999). Intelligence reframed: Multiple intelligences for the 21st Century. New York: Basic Books.

[3] Abdul Latheef, N. (Nov 2018). Gateway for teaching and learning: Role of Swayam Prabha, University News, 56 (47), 11-15. Retrieved resources on 1.12.2018 from: https://www.researchgate.net/publication/279640233_Role_of_ICT_in_the_Process_of_Teaching_and_Learning

[4] Adams, B. S., Cummins, M., Davis, A., Freeman, A., Giesinger, H. C., Ananthanarayanan, V., Langley, K., &

[5] Ayo, C. K. (2021). Information technology: Trends and applications in science and business. Lagos: Concept Publications.

[6] Ayo-Olafare, F. R. (2020). The article discusses global trends and emerging technologies in libraries and information science. Library Philosophy and Practice (e-journal). 3835.

[7] Barathi, S., Loganathan, G., & Rajan, V. R. (2017). The study focuses on the emerging technological innovations in library knowledge management and services. Advances in Computational Sciences and Technology, 10(5), 1479-1486

[8] Barathi, S., Loganathan, G., & Rajan, V. R. (2017). The study focuses on the emerging technological innovations in library knowledge management and services. Advances in Computational Sciences and Technology, 10(5), 1479-1486.

[9] Bearman, D. (2007), “Digital libraries,” Annual Review of Information Science & Technology, Vol. 41, pp. 223-272.

[10] Brand, S. (1995). How buildings learn: What happens to them after they are built. New York: Penguin Books.

[11] Byamugisha, H. M. (2010). Byamugisha (2010) focused on digitizing library resources to facilitate new modes of information use in Uganda. Library Management, 31(1/2).

[12] Carole, M. P. N. (2008). The article highlights the key trends that are affecting librarians. Office of Policy and Analysis, Smithsonian Institutes, Washington, DC

[13] Christopher Edwards (2001). Global knowledge: a challenge for librarians, IFLA Journal: vol. 27, no. 2, 2001, pp. 65-69.

[14] Computer Tech Support Newsletter (2016). This newsletter provides a brief overview of the history of IT. College of Education and Human Services, Southern Illinois University. IT Computer Technical Support Newsletter, 2(29), 1-6.

[15] Dempsey, L. (2010). "Outside-in and Inside-out Redux," Lorcan Dempsey's weblog, 6th June 2010. <http://orweblog.oclc.org/outside-in-and-inside-out-redux/>. [Accessed: 28/12/2016].

[16] Eguavoen, O. E. L. (2011). Attitudes of library staff to the use of ICT: The case of Kenneth Dike Library, University of Ibadan, Nigeria. Ozean Journal of Social Sciences, 4(1), 1.

[17] Emezie, N. A., & Nwaohiri, N. M. (2013). The study focuses on the role of 21st-century librarians in delivering effective information services. Information Impact: Journal of Information and Knowledge Management, 4(1); 30-43.

[18] Fagbe, A. O., Amanze, R. C., Oladipo, S., Oyenuga, E., & Adetunji, O. O. (2015). The study focuses on the role of information technology (IT) in the academic library. Paper presented at the 3rd School of Education and

Humanities International Conference on the Future of Higher Education in Africa held at Babcock University from August 24-26.

[19] Florida, R. (2003). The rise of the creative class: And how it's transforming work, leisure, community, and everyday life. New York: Basic Books.

[20] Freeman, G. T. (2005). "Changes in learning patterns, technology, and use." In: Library as Place: Rethinking Roles, Rethinking Space. Washington, DC: Council on Library and Information Resources.

[21] Gardner, H. (2006). The development and education of the mind: the selected works of Howard Gardner. London: Routledge.

[22] Garland, J. (2019). The article discusses the current technology trends in libraries. http://www.librariesconnected.org.uk/page/singlesign.

[23] Gul, S., & Bano, S. (2019). Smart libraries: an emerging and innovative technological habitat of the 21st century. The Electronic Library, 37(5): 746–783. https://doi.org/10.1108/EL-02-2019-0052.

[24] Gupta, J., & Singh, R. (2018). Internet of Things (IoT) and academic libraries: A user-friendly facilitator for patrons. 5th International Symposium on Emerging Trends and Technologies in Libraries and Information Services (ETTLIS), 21-23 February 2018, IEEE, Noida.

[25] Haris, A. R. (2016). The article discusses the 21st-century library. https://www.researchgate.net/publication/328528041. 1-12.

[26] Hoy, M. B. (2017). The article provides an introduction to the blockchain and its implications for libraries and medicine. Medical Reference Services Quarterly, 36(3); 273–279.

[27] Information Technology: “Robots in libraries: challenge or opportunity? held on the 21st and 22nd of August, 2019, at the Technical University of Applied Sciences Wildau, Germany.

[28] Islam and B. Nachiappan, "Digital Technology and Distraction in the Digital Classroom," International Research Journal of Education and Technology (IRJEDT), vol. 1, no. 5, pp. 101–106, Jan. 2021.

[29] Jenkins H. (2013). Confronting the challenges of participatory culture: Media education for the 21st Century, an occasional paper from The John D. and Catherine T. MacArthur Foundation, MIT. Cambridge: MIT Press.

[30] Jensen, E. (2005). Jensen, E. (2005) discusses teaching with the brain in mind. Alexandria, VA: Association for Supervision and Curriculum Development Books.

[31] Jeyapragash, B. (2015). Reference Management Tools for Effective Research: with special reference to Mendeley, International Journal of Science and Humanities, 1(1A), 387-396.

[32] Kaladhar, A., & Rao, K. S. (2018). Internet of Things: A route to smart libraries. Journal of Advancements in Library Sciences, 4(1); 29–34.

[33] Kaul, H.K. (2002). Knowledge Centres: The key to self-employment and poverty alleviation. The article was published in the DELNET newspaper, volume 9, issue 2, on pages 17-18, in December 2002.

[34] Keller, A. (2015). Research Support in Australian University Libraries: An Outsider View. Australian Academic & Research Libraries, 46(2), 73-85.

[35] King, B. (2013). Too Much Content: a world of exponential information growth. The Huffington Post Tech, 20th May. <http://www.huffingtonpost.com/brett-king/too-much-content-a-world-_b_809677.html>. [Accessed: 20/05/2013].

[36] Kumar, P. A. (2017). Impact of information technology on collection development in university libraries in Assam: A study. http://hdl.handle.net/10603/180648.

[37] Lanke, R. D. (2013). Expect more: Demanding better libraries for today's complex world (p. 32). R. David Lankes.

[38] Lauri lard, D. (2002). Rethinking university teaching: A conversational framework for the effective use of learning technologies. New York: Routledge; Falmer.

[39] Lisbdnetwork (2018). The focus is on information technology and libraries. The focus is on ICT and information.

[40] M. Dhanamjaya, (2018) Digital Libraries, Features, Benefits, Issues, and their Major Trends to Library Design for LIS Professionals in the Digital Era, Journal of Emerging Technologies and Innovative Research (JETIR), Volume 5, Issue 8 www.jetir.org.

[41] Massis, B. (2018). Artificial intelligence arrives in the library. Information and Learning Science, 119 (7/8); 456–459. DOI: 10.1108/ILS-02-2018-0011.
[42] Mayank Trivedi. (2010), "Digital Libraries: Functionality, Usability, and Accessibility," Library Philosophy and Practice.
[43] Mittal, Arvind (2017). Emerging Technologies and their Impact on the Libraries, Indian Journal of Science and Technology, Vol 10(31), DOI: 10.17485/IJST/2017/v10i31/113915
[44] Moghaddam, A. R. I. (2009). Managing digital libraries in the light of staff and users: An approach. International Journal of Information Science and Management, 7 (1).
[45] Muthu, M. et al. (2013). "A Changing Role of Libraries in the Digital Era," "International Journal of Emerging Trends in Library and Information Society," Vol. 1, 2, pp. 55-71.
[46] Nag, A., & Nikam, K. (2016). The article discusses the use of Internet of Things applications in academic libraries. International Journal of Information Technology and Library Science, 5(1); 1–7.
[47] Odeyemi, S. O. (2019). Robots in Nigerian academic libraries: Investigating infrastructural readiness and potential for library services. Paper presented at the IFLA 2019 Conference (Satellite Meeting) on
[48] Onuoha, J. A., & Obialor, D.C. (2015). The impact of information technology on modern librarianship: A reflective study. Information and Knowledge Management, 5(11); 52-58.
[49] Oyelude, A. A. (2017). The article discusses the use of virtual and augmented reality in libraries and the education sector. Library Hi Tech News, 34(4).
[50] Paraschiv, "Innovative Technologies to Implement at the Library of the Future." *Har* Kaur and Preeti Sharda, "Role of Technological Innovations in Improving Library Services," *International Journal of Library and Information Science* 2, no. 1 (2010): 11–16, http://search.proquest.com/docview/818631943?accountid=14777.
[51] Petra Paraschiv, "Innovative Technologies to Implement at the Library of the Future," *Princh Blog* 4, no. 2 (2017): 1–24, https://princh.com/8-technologies-to-implement-at-the-library-of-the-future/#.WcLv461DSlM.
[52] Pope, H. (2018). Pope, H. (2018) provided an introduction to virtual and augmented reality in Library Technology Reports, volume 54, issue 6, pages 5-7.
[53] Princh Blogspot, (2020). The article discusses 10 innovative technologies that the library of the future should implement.
[54] Rahman, H., & Islam, S. (2019). The study focuses on the implementation of RFID in university libraries in Bangladesh. Global Knowledge, Memory and Communication, 68(1/2); 112–124.
[55] Ramzan, M. (2004). Does the level of knowledge impact librarians' attitudes toward information technology (IT) applications? 2nd International CALIBER-2004, New Delhi, 11-13 February.
[56] Rimpi Singroha, "Web 3.0 in Library Services: A Utilitarian Effect" 1, no. 2 (2014): 159–66.
[57] Ryu, M. (2019). The article discusses the trends and issues in library technology. IFLA IT Section Newsletter: July/June Ed. 12.
[58] Suvarna S. Hiremath, Shivakumar Acharya, and Somashekar Lalas Angi, "Technological Trends in Modern Libraries," *IP Indian Journal of Library Science and Information Technology* 4, no. 2 (2019): 63–65, https://doi.org/10.18231/j.ijlsit.2019.018.
[59] T. R. Vignesh, R. Mayandi, and B. Nachiappan, "Web as a Strategy Tool for Development of E-Tourism in India," International Research Journal of Education and Technology (IRJEDT), vol. 1, no. 5, pp. 6-11, Jan. 2021.
[60] Uddin, J., & Hasan, N. (2012). Use of information technology in library service: A study on some selected libraries in the northern part of Bangladesh. International Journal of Library and Information Science, 4(3); 34-44.
[61] Vintage College (2021). The course covers the history of information technology and the evaluation of IT jobs.
[62] Wolfson, N. (2017). What are the emerging trends in library services? NMC Horizon Report: 2017 Library Edition. Austin, Texas: The New Media Consortium.
[63] World Library, "Meeting: 107. Knowledge Management, Continuing Professional Development and Workplace Learning with Information Technology," 2010, 1–12.
[64] www.citationmachine.net
[65] www.doaj.org
[66] www.http://cec.nic.in

[67] www.ndl.iitkgp.ac.in
[68] www.nptel.ac.in
[69] www.swayamprabha.gov.in
[70] Yapa, N.U. (2003). Yapa, N.U. (2003) conducted a study on using ICT for LIS, specifically focusing on Sri Lanka. The papers were presented at the first international CALIBER-2003, which took place in Ahmedabad, India, from 13 to 15 February 2003.