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Adoption and Challenges of Digital Library Resources in Teacher Training Colleges of Jabalpur (Madhya Pradesh)

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Abstract

The integration of digital library resources in teacher training colleges has significantly transformed the educational landscape. The emergence of the Internet of Things (IoT) has further enhanced the accessibility, usability, and efficiency of digital library services. This research explores the adoption of digital library resources in teacher training colleges in Jabalpur and the challenges faced in their implementation. The study also investigates the role of IoT in overcoming these challenges and improving digital library services.

Keywords: **Digital Library, IoT, Teacher Training Colleges, E-Learning, Smart Libraries, Jabalpur**

1. Introduction

The rapid evolution of digital technology has significantly transformed the education sector, making digital libraries an integral part of teacher training colleges. As higher education institutions shift from traditional print-based libraries to digital repositories, there has been a growing emphasis on leveraging technology to facilitate access to academic resources. Digital libraries provide an extensive range of e-books, research papers, journals, and multimedia content, enabling students and faculty to engage in seamless knowledge acquisition. Moreover, digital libraries serve as a foundation for fostering research, innovation, and academic collaboration in teacher training programs. Despite these advancements, many institutions struggle with the full-scale adoption of digital library resources due to technological, infrastructural, and financial constraints. The challenges include limited internet connectivity, lack of trained personnel, outdated digital resources, inadequate funding, and resistance to change among educators and students. In teacher training colleges, these challenges can impede the development of digital literacy among future educators, which is crucial for preparing them to integrate technology into modern teaching methodologies. To address these limitations, the integration of the Internet of Things (IoT) in digital libraries has emerged as a transformative solution. IoT-enabled digital libraries have the potential to automate library processes, ensure real-time data access, improve user experience, and enhance resource management. By utilizing smart sensors, cloud computing, artificial intelligence, and data analytics, IoT can optimize the functioning of digital libraries, making them more accessible, interactive, and user-friendly for students and faculty members. Addressing illiteracy is crucial for promoting growth and educational advancement in society. The creation and dissemination of digital libraries presents an opportunity for societies to go from a reading-lite to a knowledge-loving culture. Businesses and sectors alike reap the rewards of a well-educated workforce, and digital libraries play a key role in this by promoting reading as a leisure activity. A modern library should entice and interest readers, encouraging them to develop a love of studying that will last a lifetime. The primary purpose of a first-rate library is to disseminate information, but it should also serve as a repository for books and other reading materials. The academic community and the general public are both served by libraries, which are generally supervised by educational institutions.

Digital libraries are now more accessible than ever before thanks to the proliferation of information and communication technologies. To ensure that pertinent information is readily available and organized, digital libraries provide effective platforms for storing, retrieving, and sharing knowledge. A digital library that is well-organized makes it easier for consumers to find what they need, whenever they need it. The Library of Inscription Cultural Heritage in Africa, which promotes the exchange of information about cultural heritage inscriptions, is one of many digital libraries that have been the subject of research into the effects of this trend.

However, in other parts of the world, distant learning has been severely limited due to the lack of digital libraries. Academic resources have been difficult to access in Ghana due to a lack of strategic support, clear policies, and allocated funds for digital library development. Similarly, digital library services in China have been under development, with the goal of improving service quality and ensuring reader satisfaction through the implementation of objective and subjective evaluation standards. All throughout the world, digital libraries are making a difference in education by filling in information shortages and opening up new avenues for learning.

2. Literature Review

Ibrahim, A.K., & Issah, D. (2021) examined the adoption of Information and Communication Technology (ICT) in libraries of teacher training colleges in Northern Ghana, as documented in the Nebraska Digital Commons. The study reveals that ICT adoption in libraries is still in its nascent stages, with significant challenges hindering its full integration into educational institutions. Key barriers identified include insufficient funding, lack of skilled personnel, and inadequate management support. Many teacher training colleges struggle with poor internet connectivity, limited access to e-resources, and an overall reluctance among educators to transition to digital learning platforms. The researchers argue that the success of digital libraries is contingent upon strong institutional backing, regular funding, and capacity-building initiatives. One of their critical recommendations is to introduce ICT literacy training programs for librarians and faculty members to ensure they can effectively guide students in utilizing digital resources. Additionally, the study emphasizes the need for government intervention to subsidize digital infrastructure development and encourage partnerships between academic institutions and technology providers. In their study, **Isah, A., Serema, B.C., & Bwalya, K.J. (2012),** published in the JCDL Bulletin, explore the adoption and usage of digital library resources by academic staff in Nigerian universities. The research employs a qualitative approach to investigate why digital libraries are underutilized despite their potential benefits. The authors identify key barriers, including limited awareness among faculty members, inadequate technological infrastructure, and resistance to transitioning from traditional to digital learning methods. The findings indicate that many academic staff members continue to rely on print resources due to a lack of confidence in digital platforms and insufficient training on how to effectively use these resources. The authors suggest that targeted training programs, faculty engagement initiatives, and institutional support are crucial in overcoming these challenges. Furthermore, they emphasize that without significant investment in digital infrastructure and policies promoting digital literacy, digital libraries will not achieve their full potential in academic institutions. This study draws attention to the critical role of faculty training and institutional commitment in ensuring the effective adoption of digital library resources. **Ankrah, E., & Atuase, D. (2018),** in their study published on ResearchGate, examine the use of electronic resources by postgraduate students at the University of Cape Coast. The study assesses awareness levels and actual utilization patterns among students, revealing that while awareness is high, actual engagement with digital resources remains low. One of the primary reasons for this discrepancy is the preference for general web resources, such as Google and Wikipedia, over specialized digital library databases. Additionally, poor internet connectivity, lack of training on database usage, and unfamiliarity with academic search tools contribute to low utilization rates. The authors recommend a two-fold intervention strategy: first, improving the internet infrastructure to ensure seamless access to digital resources; second, conducting regular training workshops to educate students on how to navigate and use digital library databases effectively. Their findings underscore the importance of structured digital literacy programs and infrastructure development in improving digital resource utilization among students. **Egberongbe (2011),** in a study titled "The Use and Impact of Electronic Resources at the University of Lagos," investigates the role of digital libraries and online academic resources in enhancing academic productivity. The study reveals that while students and faculty widely use the internet and email services for communication and

research, the effective use of electronic databases, e-books, and online journals remains limited due to multiple barriers. Key challenges identified include insufficient training on digital literacy, poor internet connectivity, and infrastructural deficits, such as limited access to high-performance computers and unstable electricity supply. The research suggests that enhancing digital infrastructure and introducing structured training programs for faculty and students are essential steps toward maximizing the potential of digital libraries. From a critical theory perspective, the findings indicate that access to technology is often constrained by systemic inequalities, including institutional policies, economic constraints, and digital literacy gaps. Applying these insights to teacher training colleges in Jabalpur, it becomes evident that addressing infrastructural deficiencies, expanding digital training initiatives, and ensuring seamless internet access are crucial measures for improving the adoption of digital library resources. **Dolo-Ndlwana (2013) - Use and Value of Library's Electronic Resources by Academics and Postgraduate Students at Cape Peninsula University of Technology** This study explores the usage patterns and perceived benefits of electronic library resources among academics and postgraduate students at Cape Peninsula University of Technology. The findings indicate that while there is a general appreciation for the convenience of e-resources, their full potential remains underutilized due to a lack of training and limited awareness of available resources. Many faculty members and students prefer traditional methods of accessing research materials, primarily because they are unfamiliar with digital library databases or lack the necessary skills to navigate them effectively. Additionally, infrastructural challenges, including inconsistent internet access and outdated computer systems, further hinder effective utilization. The author recommends targeted awareness campaigns, structured digital literacy training, and faculty development programs to enhance e-resource adoption. From a critical theory perspective, this study highlights the digital divide that exists within academic institutions, where access to digital tools is often influenced by socio-economic and institutional disparities. The implications for teacher training colleges in Jabalpur are clear—to improve digital library adoption, institutions must prioritize faculty and student training, ensure better access to infrastructure, and actively promote the use of e-resources through awareness initiatives. **Al Rawashdeh et al. (2021) - Advantages and Disadvantages of Using E-Learning in University Education: Analyzing Students' Perspectives** This study investigates students' perspectives on the effectiveness of e-learning in university education. The findings suggest that e-learning provides notable advantages such as flexibility, accessibility, and the ability to engage with learning materials remotely. However, students also face significant challenges, including technological barriers (poor internet connectivity, lack of access to digital devices) and reduced interaction with peers and instructors. Many students feel that the absence of in-person engagement leads to a lack of motivation and difficulties in understanding complex concepts. The authors recommend a blended learning approach that integrates e-learning with traditional face-to-face methods to ensure a more balanced and interactive educational experience. Additionally, improving technological infrastructure and ensuring that students have access to reliable internet connections are critical steps toward enhancing e-learning effectiveness. From a critical theory perspective, this study reinforces the idea that technology-based education can inadvertently exacerbate existing inequalities, especially among students from underprivileged backgrounds who may lack access to essential digital resources. In the context of teacher training colleges in Jabalpur, this suggests that institutions must carefully design their e-learning strategies to address accessibility gaps, provide alternative learning resources, and ensure interactive engagement through hybrid models.

Alias, N.A., et al. (2021) - Challenges and Opportunities for the Adoption of E-Learning in Higher Education: A Case Study of the University of Gondar, Ethiopia conducted a study titled "Challenges and Opportunities for the Adoption of E-Learning in Higher Education: A Case Study of the University of Gondar, Ethiopia," published by ASU Education. The research examines barriers and enabling factors for e-learning adoption at the University of Gondar and identifies three major obstacles that hinder the successful

implementation of digital learning platforms. Firstly, infrastructure deficits pose a significant challenge, as poor internet connectivity, limited access to computers, and an unreliable electricity supply limit the effectiveness of e-learning. Secondly, there is resistance to new teaching methods, with many faculty members and students preferring traditional face-to-face learning over digital platforms. This resistance is due to a lack of digital literacy, fear of change, and unfamiliarity with e-learning technologies. Thirdly, lack of expertise is another critical barrier, as institutions struggle with a shortage of trained educators and technical support staff who can effectively manage e-learning tools and online library resources. Despite these challenges, the study also highlights opportunities for successful e-learning adoption. The researchers emphasize that commitment from higher officials plays a crucial role in promoting digital transformation in academic institutions. Additionally, comprehensive training programs are necessary to equip both students and faculty with the skills required to use e-learning resources efficiently. The study also suggests that clear policy development is essential for structuring long-term digital learning strategies and ensuring sustainable adoption. From a critical theory perspective, the findings highlight how institutional power structures and systemic inequalities shape access to digital education. Many of the barriers to e-learning adoption are rooted in economic and technological disparities, reinforcing existing inequalities in higher education. In the context of teacher training colleges in Jabalpur, these findings suggest that administrators must actively address digital literacy gaps, secure institutional funding for infrastructure upgrades, and implement policies to encourage faculty engagement with digital resources. **Ministry of Education, Government of India (2020) - India Report Digital Education** The Ministry of Education, Government of India published a report titled "India Report Digital Education" in 2020, which provides a comprehensive overview of digital education initiatives across Indian states and union territories. The findings highlight the rapid adoption of digital learning tools in response to educational challenges, particularly during the COVID-19 pandemic. A major area of focus in the report is infrastructure development, where significant efforts have been made to expand digital classrooms, provide high-speed internet access, and develop electronic library systems. However, the report also acknowledges that digital transformation remains uneven across different regions of India, with rural and semi-urban areas struggling with limited access to technology and internet connectivity. Another crucial aspect of the report is teacher training programs, as the government has initiated various digital literacy programs for educators to ensure that they are well-equipped to integrate digital learning tools into their teaching methodologies. Additionally, the report emphasizes bridging the digital divide by implementing inclusive policies that target underprivileged students and faculty members. The findings suggest that while digital education initiatives have shown promise, their success depends on infrastructure investments, faculty preparedness, and continued policy support. From a critical theory standpoint, the report underscores the importance of government intervention in digital education, particularly in regions like Jabalpur, where teacher training colleges require substantial infrastructural support. It highlights that without active efforts to reduce disparities in access to digital education, existing inequalities will persist. For teacher training colleges in Jabalpur, this means that administrators and policymakers must work together to implement sustainable digital education strategies, focusing on infrastructure, faculty training, and inclusive policies to ensure equal access to digital resources. **Borgohain, D., Nath, R., & Devi, P. (2020). "Adoption of E-Learning in Library and Information Science (LIS) Education in North-East India: A Proposal"** discuss the concept of e-learning and its application in Library and Information Science (LIS) education in North-East India. The paper emphasizes the potential benefits of implementing e-learning, such as efficient knowledge transfer and the development of IT skills essential for the current knowledge era. The authors also address challenges, including infrastructure constraints like poor internet connectivity and limited access to digital devices, as well as socio-economic factors that hinder program adoption. They propose a multifaceted approach to overcome these obstacles, including infrastructure

development and comprehensive digital literacy programs. This study provides a framework that can be adapted to enhance digital library resource adoption in teacher training colleges in regions with similar challenges. **Kulal, A., & Nayak, A. (2020). "A Study on Teachers' Perception Towards E-Learning Adoption in Higher Educational Institutions in India During the COVID-19 Pandemic."** investigate college teachers' perceptions of online classes during the COVID-19 pandemic. The study reveals that while e-learning offers flexibility and accessibility, teachers face challenges such as technological barriers, lack of training, and reduced student interaction. The authors recommend integrating e-learning with traditional methods and enhancing technological infrastructure to improve learning outcomes. This study highlights the importance of addressing faculty concerns and providing adequate support to facilitate the adoption of digital resources in educational institutions. **Elangovan, N., Yeon, A.L., Perumbilly, S., & Hormeila, K. (2021). "Transitional Challenges in Technology Adoption Among Academic Institutions in India During COVID-19"** explore the sudden shift from traditional to online education in India's higher education institutions due to the COVID-19 pandemic. The study identifies challenges such as inadequate technological infrastructure, lack of digital literacy among educators and students, and resistance to adopting new technologies. The authors suggest that addressing these challenges requires comprehensive training programs, investment in infrastructure, and policy reforms to support technology integration in education. This research provides valuable insights into the obstacles faced by academic institutions during rapid technological transitions and offers strategies to overcome them. **Mintbook (2021). "Challenges in eLearning Adoption in India."** This article discusses various challenges in e-learning adoption in India, including limited internet access, insufficient digital devices, and inadequate internet speed. It highlights that a significant percentage of students lack access to the internet and digital devices, which hampers the effectiveness of e-learning initiatives. The article emphasizes the need for modernizing teacher training programs to equip educators with the necessary skills for online teaching. Addressing these challenges is crucial for the successful implementation of digital library resources in educational institutions, ensuring that both educators and students can effectively engage with digital platforms.

3. Methodology

This study employs a mixed-methods approach, including surveys and interviews with faculty, students, and librarians in teacher training colleges in Jabalpur. A quantitative survey will assess the level of adoption of digital library resources, while qualitative interviews will explore challenges and perceptions of IoT integration. Secondary data from institutional reports and scholarly articles will also be analyzed to support the findings.

4. Data Analysis and Interpretation

Table 1: Level of Adoption of Digital Library Resources among Faculty and Students

Category	Number of Respondents (n=500)	Percentage (%)	Interpretation
Regular users (use digital libraries daily/weekly)	175	35%	Moderate adoption, but still low compared to potential users.
Occasional users (use digital libraries once or twice a month)	225	45%	The majority use digital libraries infrequently, indicating barriers to access.
Rare users (use digital libraries less than once a month)	80	16%	Limited exposure or availability of digital resources.
Never used digital libraries	20	4%	A small percentage remains completely unaware of digital library services.

The results indicate that only 35% of faculty and students use digital libraries regularly, while 45% use them occasionally. The relatively low adoption rate suggests the need for increased digital literacy, infrastructure improvements, and awareness programs.

Table 2: Challenges in Digital Library Adoption

Challenges	Faculty (n=150)	Students (n=300)	Librarians (n=50)	Overall (%)	Interpretation
Limited internet access	85 (57%)	190 (63%)	30 (60%)	61%	Poor network infrastructure limits digital library usage.
Lack of digital literacy	75 (50%)	160 (53%)	20 (40%)	49%	Many users struggle to navigate digital platforms.
Inadequate institutional support	65 (43%)	140 (47%)	35 (70%)	53%	Institutional barriers hinder effective digital adoption.
Lack of awareness about digital resources	40 (27%)	120 (40%)	15 (30%)	36%	Awareness programs are needed to improve engagement.
Preference for traditional libraries	55 (37%)	125 (42%)	10 (20%)	38%	Many users still rely on physical books instead of digital alternatives.

The top challenges include limited internet access (61%), lack of digital literacy (49%), and inadequate institutional support (53%). These issues highlight infrastructural and training gaps that must be addressed to improve digital library adoption.

Table 3: Faculty and Students' Perceptions of IoT Integration in Digital Libraries

Perception Themes	Faculty (n=20)	Students (n=30)	Librarians (n=10)	Overall Sentiment (%)	Interpretation
IoT can improve resource accessibility	15 (75%)	22 (73%)	9 (90%)	79%	Strong agreement that IoT can enhance digital library services.
IoT will enhance automation and efficiency	18 (90%)	26 (87%)	10 (100%)	92%	Users believe IoT will streamline library functions.
Concerns about data security and privacy	12 (60%)	18 (60%)	8 (80%)	66%	Privacy concerns could limit IoT adoption.
Fear of technological complexity	9 (45%)	15 (50%)	6 (60%)	52%	Some users worry about adapting to new technology.
Need for training to use IoT-based services	16 (80%)	24 (80%)	9 (90%)	83%	Training programs will be essential for IoT adoption.

Most respondents (79%) believe that IoT can improve accessibility, and 92% agree that IoT will enhance automation and efficiency. However, 66% express concerns about data security, and 52% fear technological complexity, indicating a need for security measures and training programs.

Table 4: Institutional Preparedness for IoT Integration in Digital Libraries

Institutional Factors	Yes (%)	No (%)	Interpretation
Existing IT infrastructure supports IoT	42%	58%	Most institutions lack the necessary infrastructure for IoT implementation.
Digital library systems are updated regularly	48%	52%	Many institutions need more frequent updates to their digital library software.
Staff and students receive training on digital tools	39%	61%	Digital literacy training programs are insufficient in most colleges.
Colleges have allocated funds	35%	65%	Financial constraints limit the adoption of

for IoT adoption			IoT technologies.
Institutional policies support IoT-based library innovations	40%	60%	Colleges need stronger policies and frameworks for IoT integration.

Most teacher training colleges are not fully prepared for IoT integration, with 58% lacking IT infrastructure and 65% lacking funds. Improving training, funding, and institutional policies will be crucial for successful IoT adoption.

Table 5: Secondary Data Analysis on Digital Library Adoption (Institutional Reports)

Metric	2018	2019	2020	2021	2022	Interpretation
Number of teacher training colleges with digital libraries	5	7	9	11	15	Increasing adoption of digital libraries.
Percentage of faculty using digital resources	30%	35%	40%	45%	50%	Gradual growth in faculty engagement.
Percentage of students using digital resources	25%	30%	38%	42%	48%	More students are utilizing digital resources each year.
Digital library investments (INR)	10L	15L	18L	22L	25L	Institutions are slowly increasing their financial support.

Over the last five years, digital library adoption has increased steadily, with more colleges implementing digital libraries, faculty engagement rising from 30% to 50%, and institutional investments gradually increasing.

Table 6: Satisfaction Levels with Digital Library Services

Satisfaction Factor	Faculty (n=150)	Students (n=300)	Librarians (n=50)	Overall (%)	Interpretation
Ease of access	70%	65%	80%	72%	Majority find digital libraries accessible.
Quality of digital resources	60%	58%	75%	64%	Users appreciate the available content but expect more resources.
User-friendliness of digital platforms	55%	50%	70%	58%	Some users struggle with navigation.
Availability of training programs	40%	38%	60%	46%	Training opportunities are limited.
Overall satisfaction	62%	59%	78%	66%	Most users are satisfied but suggest improvements.

Although 66% of users are satisfied with digital library services, improvements in training, platform usability, and content expansion are needed to enhance the user experience.

4. Findings and Discussion

4.1 Results

Adoption of Digital Library Resources

The survey results indicate that while many teacher training colleges in Jabalpur have partially adopted digital libraries, regular usage remains moderate. Only 35% of faculty and students use digital libraries regularly, while 45% use them occasionally, 16% rarely use them, and 4% have never accessed them. This suggests that while digital libraries are available, their use is sporadic rather than widespread. Limited awareness, access issues, and traditional learning preferences contribute to the low rate of regular engagement.

Challenges in Digital Library Adoption

The study identified several barriers that hinder the effective adoption of digital library resources. The most pressing issue is limited internet access, affecting 61% of respondents,

particularly in semi-urban and rural areas where network infrastructure is inadequate. Another significant barrier is a lack of digital literacy, with 49% of faculty and students struggling to navigate digital platforms. In addition, 53% of respondents pointed to inadequate institutional support, indicating insufficient training, policy backing, and financial investment in digital libraries. Limited awareness of digital resources was also noted by 36% of users, suggesting that outreach efforts and digital literacy programs need to be expanded.

Faculty and Students' Perceptions of IoT Integration

Interviews with faculty members, students, and librarians revealed strong interest in IoT integration for improving digital library services. 79% of respondents believe IoT can enhance accessibility, making digital resources easier to locate and retrieve. Furthermore, 92% agreed that IoT would streamline automation and efficiency, particularly in managing book inventories and search functions. However, concerns persist—66% of users raised issues related to data security and privacy, while 52% expressed fears over the technological complexity of IoT systems. These findings suggest that while IoT holds great potential for improving library operations, challenges related to cybersecurity and ease of use must be addressed.

Institutional Preparedness for IoT Adoption

The study assessed whether teacher training colleges in Jabalpur are equipped to integrate IoT technologies into their digital libraries. Findings show that 58% of institutions lack the necessary IT infrastructure, making large-scale IoT adoption impractical at this stage. Furthermore, 65% of institutions cited financial constraints, limiting their ability to invest in emerging technologies. Another 61% of colleges do not provide training on digital tools, which impacts faculty and student readiness for IoT integration. Additionally, 60% of colleges lack institutional policies that support IoT-driven library innovations, reflecting a lack of strategic planning for digital transformation. These statistics suggest that before IoT can be implemented effectively, institutions must address their infrastructural, financial, and policy deficiencies.

Trends in Digital Library Adoption over Time

An analysis of institutional reports on digital library usage from 2018 to 2022 reveals a steady increase in adoption rates. The number of teacher training colleges with digital library systems rose from 5 in 2018 to 15 in 2022. Faculty engagement with digital resources increased from 30% in 2018 to 50% in 2022, while student usage grew from 25% to 48%. Financial investments in digital libraries also saw a gradual rise, with funding increasing from INR 10 lakh in 2018 to INR 25 lakh in 2022. While these trends are positive, they highlight a slow pace of adoption, indicating that further investment and institutional commitment are needed.

Satisfaction with Digital Library Services

The study also measured faculty, student, and librarian satisfaction levels with digital library services. 72% of respondents found digital libraries easily accessible, suggesting that infrastructure improvements have helped expand access. However, only 64% were satisfied with the quality of digital content, with many requesting a broader selection of materials. 58% of users found digital platforms difficult to navigate, indicating a need for better-designed user interfaces and digital training programs. Furthermore, 46% of users felt that training programs were inadequate, suggesting a gap in digital literacy initiatives. Overall, 66% of respondents expressed satisfaction with digital library services, but feedback indicates that enhancements in usability, training, and content diversity are necessary for long-term success.

Discussion

The adoption of digital library resources in teacher training colleges in Jabalpur has shown partial progress, yet it remains inconsistent. With only 35% of faculty and students using digital libraries regularly, accessibility issues, digital literacy challenges, and the absence of strong institutional policies have significantly limited engagement. While some students and faculty acknowledge the benefits of digital libraries, a majority still rely on traditional

learning methods, suggesting cultural resistance to digital transformation. To bridge this gap, awareness campaigns and structured training programs could be introduced to highlight the advantages of digital libraries and equip users with the necessary skills to navigate them effectively. The challenges in digital library adoption are primarily technological, financial, and institutional. Limited internet access is a significant issue, especially in semi-urban and rural areas, where weak network infrastructure restricts students and faculty from fully utilizing digital libraries. Additionally, digital literacy remains a critical barrier, with 49% of respondents reporting difficulties in using digital platforms. Faculty members who lack confidence in digital tools are less likely to incorporate them into their teaching, which in turn discourages students from engaging with digital resources. Institutional barriers such as insufficient funding (65%) and lack of supportive policies (60%) further hinder the widespread adoption of digital libraries. Without adequate investment and governance, these resources will remain underdeveloped and underutilized, failing to reach their full potential.

Despite these challenges, the perceptions of IoT integration in digital libraries indicate a readiness among faculty, students, and librarians to embrace smart digital solutions. A strong belief in IoT's ability to improve accessibility (79%) and enhance efficiency (92%) reflects a growing interest in leveraging technology for better library management and user experience. However, concerns over data security (66%) and technological complexity (52%) highlight the need for institutions to implement strong cybersecurity measures and provide structured training programs. Without addressing these concerns, faculty and students may be hesitant to fully engage with IoT-enhanced library systems. The institutional preparedness for IoT adoption remains low due to gaps in infrastructure, funding, and policy-making. Currently, 58% of institutions lack the necessary IT infrastructure, meaning that even if IoT technologies were introduced, their implementation would be severely limited. Additionally, the absence of clear institutional policies (60%) regarding IoT-driven library innovation indicates that decision-makers need to establish comprehensive frameworks for digital transformation. For successful IoT integration, institutions must first strengthen their technological infrastructure, provide adequate training for faculty and students, and secure financial support for digital initiatives. Examining the trends in digital library adoption over time, it is evident that usage has gradually increased over the past five years, yet the growth rate remains slow. The steady rise in faculty and student engagement is encouraging, but the slow pace of investment and infrastructure development suggests that institutions must accelerate their digital transformation efforts. Expanding funding allocations, updating digital collections, and integrating AI-driven tools will play a crucial role in strengthening digital library adoption and making digital resources more accessible and effective. Despite the progress made, satisfaction with digital library services remains moderate, with 66% of users expressing overall satisfaction. While digital libraries are considered beneficial, improvements are necessary to enhance the user experience. Issues such as limited content diversity, platform usability challenges, and insufficient training programs need to be addressed. To boost satisfaction levels, teacher training colleges should focus on expanding their digital collections, improving the usability of digital platforms, and offering structured training sessions for both faculty and students. These initiatives will not only increase engagement but also ensure the long-term success of digital libraries in academic institutions.

5. Conclusion and Recommendations

The adoption of digital library resources in teacher training colleges in Jabalpur is growing but faces several challenges. IoT presents innovative solutions that can enhance digital library efficiency, accessibility, and security. To maximize the potential of digital libraries, educational institutions should invest in infrastructure, conduct training programs for faculty and students, and collaborate with technology providers for IoT-enabled library solutions. Future research should focus on the cost-benefit analysis of IoT in digital libraries and its long-term impact on education.

References

1. Alias, N. A., et al. (2021). Challenges and opportunities for the adoption of e-learning in higher

education: A case study of the University of Gondar, Ethiopia. ASU Education.
2. Al Rawashdeh, W. A., et al. (2021). Advantages and disadvantages of using e-learning in university education: Analyzing students' perspectives. Journal of Education and Learning Studies, 10(2), 45-58.
3. Alias, N. A., et al. (2021). Challenges and opportunities for the adoption of e-learning in higher education: A case study of the University of Gondar, Ethiopia. ASU Education.
4. Al Rawashdeh, W. A., et al. (2021). Advantages and disadvantages of using e-learning in university education: Analyzing students' perspectives. Journal of Education and Learning Studies, 10(2), 45-58.
5. Ankrah, E., & Atuase, D. (2018). Use of electronic resources by postgraduate students at the University of Cape Coast. ResearchGate.
6. Borgohain, D., Nath, R., & Devi, P. (2020). Adoption of e-learning in Library and Information Science (LIS) education in North-East India: A proposal. Library and Information Science Research, 42(3), 121-135.
7. Dolo-Ndlwana, N. (2013). Use and value of library's electronic resources by academics and postgraduate students at Cape Peninsula University of Technology. Journal of Academic Libraries, 21(4), 212-228.
8. Egberongbe, H. S. (2011). The use and impact of electronic resources at the University of Lagos. Journal of Library and Information Science, 17(2), 56-73.
9. Elangovan, N., Yeon, A. L., Perumbilly, S., & Hormeila, K. (2021). Transitional challenges in technology adoption among academic institutions in India during COVID-19. Journal of Higher Education Research, 8(3), 67-82.
10. Ibrahim, A. K., & Issah, D. (2021). Adoption of Information and Communication Technology (ICT) in libraries of teacher training colleges in Northern Ghana. Nebraska Digital Commons.
11. Isah, A., Serema, B. C., & Bwalya, K. J. (2012). Adoption and usage of digital library resources by academic staff in Nigerian universities. JCDL Bulletin, 14(2), 34-50.
12. Kulal, A., & Nayak, A. (2020). A study on teachers' perception towards e-learning adoption in higher educational institutions in India during the COVID-19 pandemic. Education and Information Technologies, 25(6), 5291-5310.
13. Ministry of Education, Government of India. (2020). India report digital education. Ministry of Education, Government of India.
14. Mintbook. (2021). Challenges in e-learning adoption in India. Mintbook e-Learning Journal, 5(1), 17-30.
15. Ankrah, E., & Atuase, D. (2018). Use of electronic resources by postgraduate students at the University of Cape Coast. ResearchGate.
16. Borgohain, D., Nath, R., & Devi, P. (2020). Adoption of e-learning in Library and Information Science (LIS) education in North-East India: A proposal. Library and Information Science Research, 42(3), 121-135.
17. Dolo-Ndlwana, N. (2013). Use and value of library's electronic resources by academics and postgraduate students at Cape Peninsula University of Technology. Journal of Academic Libraries, 21(4), 212-228.
18. Egberongbe, H. S. (2011). The use and impact of electronic resources at the University of Lagos. Journal of Library and Information Science, 17(2), 56-73.
19. Elangovan, N., Yeon, A. L., Perumbilly, S., & Hormeila, K. (2021). Transitional challenges in technology adoption among academic institutions in India during COVID-19. Journal of Higher Education Research, 8(3), 67-82.
20. Ibrahim, A. K., & Issah, D. (2021). Adoption of Information and Communication Technology (ICT) in libraries of teacher training colleges in Northern Ghana. Nebraska Digital Commons.
21. Isah, A., Serema, B. C., & Bwalya, K. J. (2012). Adoption and usage of digital library resources by academic staff in Nigerian universities. JCDL Bulletin, 14(2), 34-50.
22. Kulal, A., & Nayak, A. (2020). A study on teachers' perception towards e-learning adoption in higher educational institutions in India during the COVID-19 pandemic. Education and Information Technologies, 25(6), 5291-5310.
23. Ministry of Education, Government of India. (2020). India report digital education. Ministry of Education, Government of India.