

## Perceptions of Post-Graduate Students towards the Use of HEC Digital Library: Evidence from University of Engineering & Technology (UET) Mardan, Khyber Pakhtunkhwa

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### Abstract

In the era of digital transformation, the Higher Education Commission (HEC) has introduced a digital library initiative that provides access to thousands of scholarly databases, journals, e-books, and research materials to universities and higher education institutions across Pakistan. This initiative aims to promote a research culture and facilitate postgraduate students in accessing credible and up-to-date academic resources. However, despite the availability of such vast digital resources, the extent of usage among postgraduate students remains uncertain. This study specifically focuses on analyzing the factors influencing postgraduate students' perceptions to use the HEC Digital Library at the University of Engineering and Technology (UET) Mardan and to understand the barriers that hinder its optimal utilization. The main objectives of this study are to determine the level of awareness among postgraduate students at UET Mardan about the HEC Digital Library, identify the factors affecting their perception to use it, and examine how variables such as perceived usefulness, ease of use, accessibility, and institutional support influence their behavioral intentions. The study employed the Technology Acceptance Model (TAM) as the theoretical framework, emphasizing constructs such as Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Attitude Toward Use (ATU), and Behavioral Intention to Use (BI). Additionally, external factors like awareness, training, and infrastructure support were explored to provide a holistic understanding of user behavior at UET Mardan. A quantitative project approach was adopted, using a structured questionnaire distributed among postgraduate students (MPhil) at UET Mardan. Data were analyzed using descriptive statistics, means and standard deviation to analyze the data. The findings provided valuable insights to policymakers, university administrators, and library professionals at UET Mardan to design effective strategies for increasing awareness, improving accessibility, and enhancing user experience. This research holds great significance as it may assist in improving the overall utilization of digital academic resources in higher education institutions like UET Mardan. Moreover, recommendations from this research can guide HEC and UET Mardan to conduct regular training sessions, awareness campaigns, and interface improvements to ensure that postgraduate students fully benefit from the digital library facilities provided.

**Keywords:** Digital library, Post Graduate Students, UET Mardan.

### Article Details:

Received on 30 Dec, 2025

Accepted on 20 Jan, 2026

Published on 21 Jan, 2026

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## Introduction

Digital libraries are online systems that store information in digital form and can be accessed through networks like the internet (Heeks, 2002). Unlike traditional libraries with physical books, digital libraries allow people to find and use information anytime and anywhere (Yusoff, 2009). Thanks to Information and Communication Technology (ICT), libraries have moved from physical places to virtual ones, changing how we search for and receive information (Sheikhshoaei & Oloumi, 2011). Today, digital libraries are valuable because they gather knowledge from many sources and provide quick, easy access to users worldwide (Yusoff, 2009). However, in developing countries, these libraries are not used as much. Many people in these regions still don't fully benefit from digital library systems (Deb, 2003).

ICT plays a key role in helping economies grow, improving education, healthcare, and access to information (Sheikhshoaei & Oloumi, 2011). Digital libraries are part of this important change, using advanced technology to meet users' research needs (Fox et al., 2007). This idea grew popular in the 1990s when major U.S. libraries started digitizing their collections (Fox et al., 2007). In Pakistan, the Higher Education Commission (HEC) created the "HEC Digital Library of Pakistan" to provide free access to international journals for students, teachers, and researchers (Khan & Ahmad, 2013). However, many Pakistani students still don't use it fully, mostly only for writing research papers (Khan & Ahmad, 2013). Several reasons explain this low use: limited computer skills, lack of awareness about digital libraries, and poor connection between library resources and university courses (Xia, 2003). Many universities don't include digital library materials in their curriculum, so students overlook these resources (Xia, 2003). Money is also a barrier because many journals require paid subscriptions, but the HEC Digital Library helps by giving free access to these journals (Khan & Ahmad, 2013). Despite this, few studies explore why some people don't use digital libraries or how they feel about them (Rahman, 2011). Most research focuses only on current users and ignores those who have not started using digital libraries yet (Rahman, 2011).

In the modern academic environment, digital libraries have become essential resources, providing students with access to vast amounts of information and research materials. The Higher Education Commission (HEC) of Pakistan has developed a digital library system to support higher education institutions, including the University of Engineering and Technology (UET) Mardan, particularly at the post-graduate level. Despite the availability of this valuable digital library resource, there is limited understanding of the factors that influence post-graduate students' perceptions to utilize it effectively. Many students may face challenges such as lack of awareness, technical difficulties, perceived ease of use, or limited motivation to access the digital library services. This gap in usage not only limits the students' academic performance and research capabilities but also hinders the overall objective of HEC's investment in digital knowledge dissemination.

Therefore, this study aims to analyze the perceptions and behaviors of post-graduate students at UET Mardan regarding the use of the HEC digital library. By identifying the key factors that encourage or discourage usage, this research will provide insights to help optimize the digital library system's adoption and enhance academic success at the institution.

## Research Objectives

1. To identify and analyze the key factors influencing post-graduate students' perceptions to use the HEC digital library at UET Mardan.

2. To assess the level of awareness among post-graduate students regarding the digital library services provided by HEC.
3. To evaluate the impact of perceived ease of use and perceived usefulness among students' regarding HEC digital library.
4. To explore the challenges and barriers faced by post-graduate students in accessing and utilizing the digital library.

## The Study Methodology

A descriptive study was conducted to investigate the student perceptions to use HEC digital library at the post graduate level. All students of (2nd and 4th semester) enrolled in the MS/M. Phil Engineering in the disciplines of Electrical, Civil, Mechanical, & Telecommunication were the population of this study. The total population of the study was 158. The sample size for this study was calculated i.e 112 students, setting the confidence level at 95% and margin of error as 5%. The data was collected through questionnaire keeping in view the objectives of the study. The collected data were analyzed by using the software Statistical Package for Social Sciences (SPSS). The percentage, mean, standard deviation and rank order were calculated for the presentation of the results.

## Literature Review

Existing studies provide a range of definitions for digital libraries, reflecting their evolving nature and technological advancements. Generally, a digital library (DL) is understood as an online platform accessible via the internet or other digital networks, designed to store, manage, and disseminate information in digital formats. Unlike traditional physical libraries, which rely on tangible resources such as books, journals, and physical archives, digital libraries offer virtual access to knowledge, often through sophisticated systems integrating databases, multimedia, and interactive tools (Lynch, 2003).

The transformation from physical to digital libraries marks a significant shift in how information is archived and accessed. This evolution aligns with the broader transition to a digital society where the proliferation of Information and Communication Technology (ICT) has revolutionized many aspects of life, including education, research, and communication. Heeks (2002) notes that the gradual decline of traditional libraries' prominence coincides with the rise of digital repositories that enable instant, remote, and often cost-effective access to vast information stores. ICT developments have played a pivotal role in the rise of digital libraries. The integration of high-speed internet, cloud computing, data management systems, and digital storage solutions have made it feasible to create dynamic, user-friendly libraries that transcend physical and geographical limitations (Sheikhshoaei & Oloumi, 2011). These advancements facilitate not only the storage of digitized materials but also enable powerful search algorithms, personalized user experiences, and real-time access to information.

Moreover, ICT has transformed librarianship itself—from manual cataloging and physical shelving to managing digital metadata, digital rights management, and electronic content curation. This paradigm shift has required librarians to develop new competencies, such as digital literacy, information technology skills, and data management expertise, to meet users' evolving expectations (Xia, 2003). Digital libraries today are widely acknowledged as efficient and versatile information sources because they consolidate diverse knowledge types—ranging from text, audio, video, to interactive content—from multiple origins. Yusoff (2009) emphasizes that digital libraries provide a convenient platform for users to rapidly locate and retrieve content that aligns with their academic, professional, or personal interests.

One of the most transformative features of digital libraries is their ability to democratize access to knowledge. Researchers, students, and general users from different parts of the world can tap into valuable resources without the need to physically visit a library. This accessibility is particularly beneficial for individuals in remote or underserved regions, enabling participation in global knowledge economies and fostering lifelong learning. However, despite these clear advantages, digital libraries remain underused in many developing and underdeveloped countries. Deb (2003) highlights that in these regions, the full potential of digital library systems has yet to be realized due to factors such as infrastructural deficits, limited digital literacy, and socio-economic barriers. The broader significance of digital libraries extends beyond academic convenience. ICT innovations—including digital libraries—are instrumental in driving economic and social development. By enhancing information retrieval and dissemination, digital libraries support healthcare improvements, technology-based education, innovation ecosystems, and sustainable community growth (Sheikhshoaei & Oloumi, 2011).

As societies worldwide strive toward the digital age, digital libraries symbolize this transformation. The 1990s saw significant investments and research in this area, notably in the United States, where six major library projects led the way in digitizing vast archives and reshaping access paradigms (Fox et al., 2007). These initiatives laid the groundwork for global digital library models and inspired research on user interaction, digital preservation, and resource integration.

In Pakistan, the Higher Education Commission (HEC) launched the "HEC Digital Library of Pakistan" to provide free access to international journals and academic databases for students, faculty, and researchers. This national initiative is a significant step toward bridging knowledge gaps and improving academic quality. Despite this, the digital library concept remains relatively new within the Pakistani academic community, with many users unaware of its full potential or hesitant to incorporate it into their research routines (Khan & Ahmad, 2013).

However, the literature revealed that there are several key factors contribute to the relatively low adoption of digital libraries in Pakistan:

1. **Limited Computer Literacy:** Many students and faculty lack essential digital skills needed to efficiently navigate and utilize digital libraries. This digital divide restricts their ability to access and benefit from available resources.
2. **Lack of Awareness:** A substantial number of potential users are unaware of the digital library's offerings or how these resources can enhance academic performance and research outcomes.
3. **Curricular Misalignment:** University courses often do not integrate digital library resources effectively, leading to disconnects between available information and students' academic needs (Xia, 2003).
4. **Financial Barriers:** Although the HEC Digital Library provides free access to many journals, the broader academic community still faces challenges due to expensive journal subscriptions and limited institutional support for digital infrastructure.
5. **Librarian Challenges:** University librarians face difficulties in promoting digital resources and adapting traditional roles to support digital content curation and user training effectively.

Additionally, most existing research tends to focus on current digital library users, often neglecting those who have not yet engaged with these systems. This gap limits understanding

of the barriers and perceptions that deter wider adoption. Rahman (2011) points out the urgent need to explore students' attitudes and behavioral intentions toward digital libraries to develop targeted strategies that encourage usage.

## Findings of the Study

### 1. Key factors influencing post-graduate students' perceptions towards the use HEC digital library at UET Mardan.

Table 1 indicated the result of question regarding student intention to use the HEC digital library at the post-graduate level reading of books (weighted score=658, mean value=4.47) was at 1st rank. Tending towards very high. Reading of magazines (weighted score =568, mean value = 4.47) was at 2nd rank. Tending towards very high. Reading of newspaper (weighted score =536, mean value = 3.93) was at 3rd rank. Tending towards high. Reading of previous thesis (weighted score =536, mean value = 3.93) was at 4th rank and tending towards high. To kill the time (weighted score =522, mean value = 3.70) was at 5th rank. Tending towards high. To gain new ideas (weighted score =518, mean value =3.63) was at 6th rank. Tending towards high. To collect valuable information (weighted score =518, mean value = 3.63) was at 7th rank. Tending towards high. To avail friendly interface (weighted score =465, mean value = 2.75) was at 8th rank. Tending towards the medium. To gain multiple access (weighted score =458, mean value = 2.63) was at 9th rank. Tending towards the medium. To visit the different websites (weighted score =453, mean value = 2.55) was at 10th rank. Tending towards the medium. To search the visual and audio media (weighted score =451, mean value = 2.52) was at 11th rank. Tending towards the medium. To get the latest information (weighted score =451, mean value = 2.52) was at 12th rank. Tending towards the medium. To attain educational philosophies (weighted score=441, mean value = 2.35) was at 13th rank. Tending towards the medium. For the preparation of exams (weighted score =437, mean value = 2.28) was at 14th rank. Tending towards the medium. The users of digital libraries must be provided with easy and fast ways to explore the content relevant to their area of interest. Digital librarianship has allowed the entire world to access useful and latest information through the use of digitalized information resources. However, stated that digital libraries are not being utilized effectively in underdeveloped countries. According to previous research, people in developing countries also have not effectively utilized digital libraries. They further stated that developments and innovations in ICT are important for economic and financial growth, easiness in information retrieval, increase in resources to gain knowledge, development in health facilities, the establishment of modern educational systems based on technology and innovations, and overall sustainable development of the community. Moreover, it can be observed that ICT has brought a revolution in human life (Sheikhshoaei and Oloumi, 2011).

**Table 1:** *Students' perceptions regarding the use of HEC digital library at the post-graduate level*

Student's perceptions	Mean	St. deviation	Weighted Score	Rank order
Reading of books	4.47	0.50	568	1
Reading of magazines	4.47	0.50	568	2
Reading of newspaper	3.93	0.63	536	3
Reading of previous thesis	3.93	0.63	536	4
To kill the time	3.70	1.28	522	5



To gain new ideas	3.63	1.31	518	6
To collect valuable information	3.63	1.31	518	7
To avail friendly interface	2.75	1.30	465	8
To gain the multi places	2.63	1.52	458	9
To visit the different websites	2.55	1.31	453	10
To search the visual and audio media	2.52	1.35	451	11
To get the latest information	2.52	1.33	451	12
To attain educational philosophies	2.35	1.26	441	13
For the preparation for exams	2.28	1.25	437	14

## 2. Awareness among students regarding digital library services provided by HEC

The findings indicate that the highest level of awareness among students is related to hearing about the HEC Digital Library through university orientation programs. A total of 68 students (60.7%) reported this source, with the highest mean score (4.25), ranking it first. This suggests that orientation sessions play a crucial role in introducing digital library services to students. The second most significant awareness indicator is students being aware of the online databases and journals provided by the HEC Digital Library. This was reported by 59 respondents (52.7%), with a mean score of 3.98, indicating a relatively high level of familiarity with available digital resources. Furthermore, 53 students (47.3%) indicated that they learned about the HEC Digital Library from their faculty members or supervisors, with a mean of 3.74, ranking third. This highlights the important role of academic staff in promoting digital library usage. Awareness of the login procedures and access methods was comparatively lower, with 45 students (40.2%) and a mean score of 3.28, ranked fourth. This suggests that although students may know about the library, many are not fully familiar with how to access it effectively. Similarly, awareness of available e-books and research resources was reported by only 37 students (33.0%), with a mean of 3.10, ranking fifth. This indicates limited knowledge about the full range of resources offered by the digital library. Lastly, a small but notable proportion of students, 15 respondents (13.4%), reported that they had never heard of the HEC Digital Library, with the lowest mean score (2.15) and ranked sixth. This reflects a gap in awareness that needs to be addressed.

In nutshell, Awareness among postgraduate students is moderate to low. Many students know that the HEC digital library exists but are unaware of specific databases (e.g., IEEE, Springer Link, Science Direct) or how to access them. Lack of orientation sessions or promotion by university librarians contributes to limited awareness. Students who attend research workshops or have supervision emphasizing literature review tend to show higher awareness and usage.

**Table 2:** *Students' Awareness about the HEC Digital Library*

Awareness Indicators	Frequency (f)	Percentage (%)	Mean Rank
Heard about HEC Digital Library through	68	60.7	4.25 1



Awareness Indicators	Frequency (f)	Percentage (%)	Mean Rank
university orientation			
Aware of HEC Digital Library’s online databases and journals	59	52.7	3.98 2
Learned about it from faculty or supervisors	53	47.3	3.74 3
Aware of login procedure and access methods	45	40.2	3.28 4
Aware of available e-books and research resources	37	33.0	3.10 5
Never heard of HEC Digital Library	15	13.4	2.15 6

**3. The perceived usefulness of HEC Digital library**

The table 3 presents students’ perceptions regarding the usefulness of the digital library based on mean scores, standard deviation, weighted scores, and ranking. The findings indicate that the most significant perceived benefit is that the digital library improves the quality of students’ research work, which obtained the highest mean score (4.45), the lowest standard deviation (0.58), and ranked first with a “Very High” interpretation. This suggests strong agreement and consistency among respondents. The second-ranked item, helping in accessing up-to-date information, also received a high mean score (4.22), indicating that students greatly value the availability of current academic resources. Similarly, the ability of the digital library to save time in searching for literature ranked third with a mean score of 4.18, reflecting its efficiency in information retrieval. The role of the digital library in supporting coursework and assignments was ranked fourth with a mean of 4.05, showing that students find it useful for their academic tasks. However, the item related to enhancing academic performance received the lowest mean score (3.88) and the highest standard deviation (0.82), ranking fifth with a “Moderate” interpretation. This suggests that although students generally perceive the digital library as useful, they are comparatively less certain about its direct impact on their overall academic performance. Overall, the results demonstrate a high level of perceived usefulness of the digital library, particularly in improving research quality and facilitating access to information, while indicating a slight gap in its perceived contribution to academic performance.

Perceived usefulness has a strong positive correlation with intention to use. If students see the library as beneficial for research and academic work, they are more motivated to use it. Perceived ease of use indirectly influences intention through usefulness — when the system is easy to use, students find it more useful and thus intend to use it more. This aligns with the Technology Acceptance Model (TAM), which suggests both constructs are critical predictors of technology adoption.

**Table 3: Perceived Usefulness (PU) of the HEC Digital Library**

Perceived Usefulness Items	Mean	SD	Weighted Score	Rank	Interpretation
Improves the quality of my research work	4.45	0.58	650	1	Very High
Helps in accessing up-to-date information	4.22	0.64	620	2	High
Saves time in searching for literature	4.18	0.70	610	3	High
Supports my coursework and	4.05	0.73	590	4	High



Perceived Usefulness Items	Mean	SD	Weighted Score	Rank	Interpretation
assignments					
Enhances my academic performance	3.88	0.82	570	5	Moderate

**4. Perceived ease of use of the HEC Digital Library**

The table 4 presents students’ perceptions regarding the ease of use of the HEC Digital Library, based on mean scores, standard deviation, weighted scores, ranking, and interpretation levels. The results indicate that the highest-rated aspect is that the interface of the HEC Digital Library is user-friendly, which achieved the highest mean score of 3.95, a relatively low standard deviation (0.79), and ranked first with a “High” interpretation. This suggests that most students find the interface easy to navigate and visually accessible.

The second item, searching for materials is simple and clear, received a mean score of 3.78 and ranked second with a “Moderate” interpretation, indicating that while students generally find the search process manageable, there is still room for improvement. Similarly, the ease of downloading articles and journals ranked third with a mean score of 3.62 and a moderate interpretation, suggesting that some users may experience minor difficulties during the downloading process. Furthermore, the statement that the library website loads quickly and efficiently ranked fourth, with a mean of 3.41 and a higher standard deviation (1.00), indicating moderate satisfaction but also variability in user experiences, possibly due to differences in internet connectivity. The lowest-ranked item is that technical problems rarely occur, with a mean score of 2.95 and the highest standard deviation (1.15), categorized as “Low.” This suggests that many students encounter technical issues while using the digital library, and responses vary significantly among users.

Overall, the findings reveal that while the HEC Digital Library is generally perceived as user-friendly, several usability issues remain, particularly related to system performance and technical reliability. This highlights the need for system improvements, better technical infrastructure, and enhanced user support to ensure a smoother and more efficient user experience.

**Table 4:** *Perceived Ease of Use (PEOU) of the HEC Digital Library*

Ease of Use Items	Mean	SD	Weighted Score	Rank	Interpretation
The interface of the HEC Digital Library is user-friendly	3.95	0.79	565	1	High
Searching for materials is simple and clear	3.78	0.85	540	2	Moderate
Downloading articles and journals is easy	3.62	0.91	520	3	Moderate
The library website loads quickly and efficiently	3.41	1.00	495	4	Moderate
Technical problems rarely occur	2.95	1.15	440	5	Low

**5. Barriers or challenges in accessing and using the HEC Digital Library**

The table 5 presents the key barriers faced by students in using the digital library, along with their frequency, percentage, mean scores, ranking, and level of severity. The findings indicate that the most significant barrier is the lack of awareness and training, reported by 67 respondents (59.8%), with the highest mean score of 4.20, ranking first and categorized as a major barrier. This suggests that insufficient user education and training programs

significantly hinder effective utilization of digital library resources. The second major barrier is poor internet connectivity, identified by 61 students (54.5%) with a mean score of 4.05, indicating that technical infrastructure issues also play a critical role in limiting access. Furthermore, difficulty in accessing login portals was ranked third, with 55 respondents (49.1%) and a mean score of 3.85, categorized as a moderate barrier. This implies that procedural and technical complexities in accessing the system create obstacles for users. Similarly, lack of institutional promotion ranked fourth, with 49 students (43.8%) and a mean of 3.62, also considered a moderate barrier, highlighting the need for better awareness campaigns and institutional support. On the other hand, limited technical support was perceived as a minor barrier, reported by 38 respondents (33.9%) with a mean score of 3.25, suggesting that while support services are an issue, they are less critical compared to other factors. Lastly, preference for printed materials ranked lowest, with 27 students (24.1%) and a mean of 2.80, indicating that traditional reading preferences have a relatively smaller impact on digital library usage.

Overall, the results show that the primary challenges are related to awareness, training, and infrastructure, while personal preferences and support services play a comparatively lesser role. These findings emphasize the need for improved training programs, better internet facilities, and stronger institutional efforts to promote digital library services.

**Table 5: Barriers to Using the HEC Digital Library**

Barriers	Frequency	Percentage (%)	Mean	Rank	Remarks
Lack of awareness and training	67	59.8	4.20	1	Major barrier
Poor internet connectivity	61	54.5	4.05	2	Major barrier
Difficulty accessing login portals	55	49.1	3.85	3	Moderate
Lack of institutional promotion	49	43.8	3.62	4	Moderate
Limited technical support	38	33.9	3.25	5	Minor
Preference for printed materials	27	24.1	2.80	6	Minor

## Conclusions

The present study examined postgraduate students' perceptions, awareness, perceived usefulness, perceived ease of use, and barriers regarding the HEC Digital Library at UET Mardan. The findings reveal that the HEC Digital Library is primarily used by students for academic purposes such as reading books, magazines, newspapers, and accessing theses, indicating its strong relevance for scholarly activities. However, its use for advanced academic and research support purposes, such as exam preparation, accessing multimedia resources, and exploring diverse websites, remains relatively limited.

The study also highlights that student awareness of the HEC Digital Library is moderate. While most students learn about the platform through university orientation programs and faculty members, a significant proportion still lack full knowledge of its databases, login procedures, and available digital resources. This indicates gaps in systematic awareness and training initiatives.

In terms of perceived usefulness, students strongly agree that the HEC Digital Library enhances research quality, provides access to updated information, and saves time in literature

searching. Similarly, perceived ease of use is generally positive, particularly regarding interface usability and search functionality. However, technical issues, inconsistent website performance, and system reliability concerns reduce overall user satisfaction. The study further identifies several barriers to effective usage, with the most critical being lack of awareness and training, poor internet connectivity, and difficulties in accessing login systems. Institutional promotion and technical support also play a role, though to a lesser extent.

Overall, the findings indicate that although the HEC Digital Library is a valuable academic resource, its full potential is not being utilized due to awareness gaps, technical challenges, and limited user training.

### Recommendations

Based on the findings of the study, the following recommendations are proposed:

1. **Strengthen User Training and Orientation Programs:** Universities should organize regular training workshops, seminars, and hands-on sessions to improve students' understanding of how to access and effectively use HEC Digital Library resources, including databases such as IEEE, Springer, and Science Direct.
2. **Enhance Awareness Campaigns:** Institutional libraries should actively promote the HEC Digital Library through email alerts, social media platforms, notice boards, and academic meetings to ensure that all students are fully aware of available resources and services.
3. **Improve Technical Infrastructure and Internet Access:** University authorities and HEC should work together to improve internet connectivity, system speed, and server reliability to ensure smooth and uninterrupted access to digital resources.
4. **Simplify Access and Login Procedures:** The login and authentication process should be made more user-friendly. Clear step-by-step guides and video tutorials should be provided to reduce access-related difficulties.
5. **Strengthen Library Support Services:** Dedicated digital library helpdesks should be established to provide immediate technical assistance and guidance to users facing difficulties while accessing resources.
6. **Encourage Faculty Involvement:** Faculty members and research supervisors should actively guide students in using the digital library for assignments, research projects, and thesis writing to increase regular usage.
7. **Discipline-Specific Training Sessions:** Special workshops should be arranged for different academic disciplines, particularly for social sciences and humanities students, to enhance their engagement with relevant databases and resources.
8. **Continuous System Improvement and Feedback Mechanism:** A feedback system should be introduced where users can report issues and suggest improvements, enabling continuous enhancement of the digital library system.

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