

## Technical Institutions in the Knowledge Web: A Study of Formation of Digital Libraries for Information Access

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### **ABSTRACT:**

Present article appraise how the libraries of technical institutions in India are being transformed to digital libraries keeping in view the tremendous growth in the amount of information and resources in the digital format. The scope of the study is limited to seven technical universities in North India. Survey method was adopted to collect the data in a structured questionnaire from the librarians of these institutions. The study shows that all the technical university libraries under study have started digital library service but this transition process is quite slower than hoped.

**Keywords:** Tehnical Institutions; Knoweldge Web; Case Study; Digital Libraries; Informatio  
Access

## **Introduction**

With the 'Industrial Revolution', machines and new technology came into existence and a new era of 'technological civilization' was originated. Coordination of men and machines helped to create suitable conditions for development and as a result new paradigm of information in digital format is being generated at a staggering speed. There has been the sudden onslaught of new digital materials and digitized versions of old materials resulting in the availability of information in numerous forms. This overflow of generation of information shows no signs of abating as tremendous amount of information is being generated and transmitted from every corner of the world in myriad formats. In the present era of information explosion, it is practically impossible for a library to provide all the information needed by its users without embracing the networking and the Internet technologies. Furthermore, there is also a change in the information seeking habits and spiraling expectations of the users. Users are paying keen attention to formerly arcane electronic environment to grab the facilities available through it. They want every single bit of information to be available to their desk in a structured form. In such a situation, the digital resources have opened up many exciting opportunities and potentials for the academia because of associated advantages. Consequently, many libraries all over the world are in process of developing their libraries to knowledge hub in the form of digital libraries. It is stated in manifesto for digital libraries by IFLA/UNESCO (2012) that a digital library is an online collection of digital objects, of assured quality, that are created or collected and managed according to internationally accepted principles for collection development and made accessible in a coherent and sustainable manner, supported by services necessary to allow users to retrieve and exploit the resources. Thus it could be understood that a digital library supports the teaching and research mission of the institution and serves users through the creation and delivery of Web-accessible digital collections. This could either be done by subscribing to born-digital resources (online-databases, e-journals, e-books, e-newspapers, library catalogue (OPAC), etc.) or by creating text-based collections into digitized format (digital reformatting). For scholarly communication, the availability of paraphernalia in terms of digital resources is indispensable. Obtaining these resources and organizing them systematically, so as to make these available to the users, constitute the core of contemporary libraries.

### **Purpose of the Study**

In the present scenario, academic libraries are facing two major threats, a global digital environment and availability of information in myriad forms. In order to survive, these libraries are trying to improve the quality of their services by re-engineering themselves from just the academic libraries to digital academic libraries. Digital resources are being added to library collections at exponential rates and libraries are doing extensive work to make digital resources available without the need for individuals to enter the library complex. The access and utility of these sources will depend on how effectively the library system is making these available for the users and helping to bridge digital divide for achieving the Millennium Development. Conventionally, libraries were well equipped with plans and policies to properly organize and manage printed material but with the introduction of digital resources, the libraries have to deal with the complexities associated with their collection development; access management; bibliographical control; archiving etc. The main purpose of this research is how the technical university libraries are organizing and managing digital libraries, keeping in view the following objectives:

- To find out factors prompting the initiation of digital library
- To analyze the problems related to management of digital libraries
- To check the availability of infrastructure for making digital library function
- To review provisions of training of library staff
- To evaluate the provisions of user education
- To ascertain promotional activities related of digital library

### **Scope of the Study**

The scope of this study is limited to the libraries of seven technical universities in North India namely Dr B R Ambedkar National Institute of Technology, Jalandhar (**NITJ**); National Institute of Technology, Kurukshetra (**NITK**); National Institute of Technology, Hamirpur (**NITH**); PEC University of Technology, Chandigarh (**PEC**); Thapar University, Patiala (**TUP**); National Institute of Technology, Srinagar (**NITS**) and Sant Longowal Institute of Engineering and Technology, Longowal (**SLIET**).

## **Methodology**

The study being empirical in nature has been designed to know the facilities and issues related to the development of digital libraries in technical university libraries of North India. The core of the paper is a comprehensive survey carried out in the months of March and April 2012, to assess the facilities for providing seamless access of digital resources in the above mentioned libraries. A structured questionnaire was used as the tool for the survey and mailed to the Chief Librarian/Librarian-in-charge of each library and the response rate was 100%. Besides, discussions were held with many librarians for clarifying a few responses. The filled in questionnaires were subjected to further analysis, and data is presented in tabular form with interpretation.

## **Data Analysis**

An analysis of the present scenario of various facilities for developing digital libraries in these seven libraries is presented below:

### **1. Profile of Technical University Libraries**

All the Institutes under study have a central library equipped with technical literature available in print and electronic forms. General information about libraries under study is given in table-1. It is depicted in the table that the libraries have floor area ranging from 12000 sq. feet (NITS) to 36700 sq. feet (NITK). All the libraries have spacious reading halls for the users, with NITK having highest number of seats (450) for its users and TUP having least number of seats (142) for its users. All the libraries extend the timings of opening of their reading halls for the users during examinations days. In NITK, SLIET and TUP reading hall services are available round the clock for facilitating the users. NITK library has the highest collection of print resources (1,60,177), followed by PEC (1,08,028). All the libraries have been automated and these are using various library management software.

**Table-1. General Information about Libraries**

<b>Assets</b>	<b>NITH</b>	<b>NITJ</b>	<b>NITK</b>	<b>NITS</b>	<b>PEC</b>	<b>SLIET</b>	<b>TUP</b>
<b>Area</b>	13000 Sq. Feet	14000 Sq. Feet	36700 Sq. Feet	12000 Sq. Feet	27000 Sq. Feet	22700 Sq. Feet	25000 Sq. Feet
<b>Seating Capacity</b>	150	100	450	150	250	184	142
<b>Library Hours (Routine)</b>	9.00 am to 9.00 pm	9.00 am to 9.00 pm	8.30 am to 6.00 pm	9.00 am to 9.00 pm	9.00 am to 8.00 pm	8:30 am to 9:00 pm	8.00 am to 8.30 pm
<b>Library Hours (Exam days)</b>	8.00 am to 12.00 midnight	9.00 am to 12.00 midnight	24 hours	9.00 am to 12.00 midnight	9.00 am to 11.00 pm	24 hours	24 hours
<b>Total Collection</b>	68,712	1,25,520	1,60,177	85,228	1,08,028	66,326	50,756
<b>Library Software</b>	LibSys	LibSys	LibSys	Koha	LibSys	Alice for Windows	Soul

### 1. Commencement of Digital Libraries Service

Table-2 depicts the year of establishment of the institute, year of launching the Internet connectivity and year of activating the digital library service in libraries under study. It is clear from the table that majority of libraries (5 out of 7) have started the digital library service in 2003. Except for NITJ and NITS where the digital library service was started in respectively 2002 and 2005.

**Table-2. Year of Commencement of Digital Library Service**

Technical University Libraries	Year of		
	Establishment of Institute	Launching of Internet connectivity in library	Start of Digital Library Service
NITH	1986	2003	2003
NITJ	1987	2002	2002
NITK	1963	2003	2003
NITS	1960	2005	2003*
PEC	1953	2002	2003
SLIET	1989	2003	2003
TUP	1956	2003	2004

\* Digital Library service was started in the institute using the infrastructure available with computer centre of the institute but library got Internet connectivity in 2005

## **2. Factors Responsible for Starting of Digital Library Service**

The scenario in the libraries under study is very congenial for the growth of digital library supported by many factors like demand of users for more digital content and formation of library consortia. Librarians were asked to give rank to the various factors, which led to the start of digital library service in their libraries, starting from '1' for the most preferred. To analyze this question, their preference ranking has given different points based on the choice counts such as rank 1 (6 points), rank 2 (5 points), rank 3 (4 points), and so on. Various factors are analyzed based on the cumulative points given to each choice and presented in Table-3.

It is depicted in the table that librarian's initiative has obtained the maximum points as 31, followed by demand of the users for more digital content (25 points), formation of Consortium (24 points) and planning of the Head of the institution (23 points).

**Table-3. Factors Responsible for Start of Digital Library Service**

Technical University Libraries	Factors					
	Demand of users	Librarian's initiative	Planning of Head of Institution	Need of the Hour	Special grants received	Formation of Consortium
NITH	1	5	3	4	2	6
NITJ	4	5	3	2	1	0
NITK	4	5	3	1	2	0
NITS	5	2	3	1	4	6
PEC	3	5	4	2	0	6
SLIET	3	5	4	0	0	6
TUP	5	4	3	2	1	0
<b>Total</b>	<b>25</b>	<b>31</b>	<b>23</b>	<b>12</b>	<b>10</b>	<b>24</b>

### 3. Various Components of Digital Library

The most important component of a digital library is the digital collection of various resources it holds or has access to. Librarians of the libraries under study were asked about the collection of various components building a digital library, their responses are given in table-4. All the libraries under study have collection of *e*-journals, online databases and CDs/DVDs. It is also clear from the table that only 4 out of 7 libraries are having collection of *e*-books for the benefit of users. Only 2 libraries are providing access to *e*-thesis. All the libraries under study have put the bibliographic records of all their print collections in a database and provided in the form of Online Public Access Catalogue (OPAC) for users. In this digital age, it is quite surprising that none of the libraries have collection of any type of in-house digitized content.

**Table-4. Collection of Various Components of Digital Library**

Technical University Libraries	Digital Library Components						
	e-Journals	e-books	Online databases	e-Theses	CDs/DVDs	OPAC	In-house digitized content
NITH	√	√	√	-	√	√	-
NITJ	√	-	√	-	√	√	-
NITK	√	√	√	√	√	√	-
NITS	√	-	√	-	√	√	-
PEC	√	√	√	-	√	√	-
SLIET	√	-	√	-	√	√	-
TUP	√	√	√	√	√	√	-

#### 4. Availability of Computer and Network Infrastructure

To provide hassle free access to full text of an article, technical and back end support mechanism are very important requirements. The number and types of computing facilities can enhance or hinder the use of digital resources. Table-5 gives the details of the computers and other network infrastructure available in the library.

The technical university libraries under study have Internet connection from different service providers like BSNL, Reliance, Bharti Infotel, Tulip etc. In majority of libraries, Internet bandwidth is less than 10 Mbps. It is clear from the table-5 that NITK has maximum numbers of computers i.e. 40 and all the computers are with Internet connectivity. Only two libraries i.e. NITJ and TUP are providing printing facility to their users with both the libraries having three computers each. Whereas in NITJ, the printing facility is free of cost, TUP is charging Rs. 1 per page. Antivirus software is a program that helps to protect the computer against most viruses that can hamper the working of the computer. To keep computers virus free, installation of proper antivirus is must. 4 out of 7 libraries have their computers installed with antivirus. Only four out of seven libraries have the provisions of uninterrupted power supply



for seamless access to digital library components. Other ICT facilities and requirements for students to enhance the access of digital resources in some of these libraries include availability of wireless network connection called Wi-Fi in various locations of the campus like hotels, library departments etc.; mandatory laptops and so on. Five out of 7 institutes have their campus Wi-Fi enabled and laptops are compulsory for the students only in two Institutes.

**Table-5. Details of IT Infrastructure**

IT Infrastructure	Technical University Libraries						
	NITH	NITJ	NITK	NITS	PEC	SLIET	TUP
Server (Number)	No server	IBM (1)	IBM (1) NAS (1) Web (1)	IBM (1)	IBM (1) HCL (1)	HCL (1)	IBM (1) Xeon (1)
ISP	BSNL	BSNL	Reliance	BSNL	TULIP	BSNL	Bharti Infotel
Bandwidth	≥ 100 Mbps	Between 10 to 50 Mbps	≤ 10 Mbps	≤ 10 Mbps	≤ 10 Mbps	≤ 10 Mbps	≤ 10 Mbps
No. of computers available	12	30	40	5	22	36	30
Printers for users	-	3	-	-	-	-	3
Printing Charges	-	No charges	-	-	-	-	Rs. 1 per page
CD/DVD writing facility	√	√	√	√	√	Only CD	√
USB Ports for Pen drives	-	-	√	√	√	-	√
Antivirus	-	-	MacAfee	MacAfee	MacAfee	-	Symantec
Uninterrupted	√	-	√	√	√	-	-

<b>Power Supply</b>	.						
<b>Wi-Fi enabled Campus</b>	-	√	√	√	√	-	√
<b>Compulsory Laptops</b>	-	-	√	-	√	-	-

### 5. Developing separate Digital Library Section

Provision of a separate section consisting of a number of networked terminals within the library helps to provide easy access to digital resources. It was enquired from the libraries whether these are developing separate digital Library sections for the facilitation of the users. It is clear from the table-6 that 5 out of 7 libraries are having separate digital library section for users with NITK and SLIET having maximum number of computers i.e. 30. NITH and NITS are not having this facility.

**Table-6. Developing Separate Digital Library Section**

Technical University Libraries	Digital Library Section						
	NITH	NITJ	NITK	NITS	PEC	SLIET	TUP
Name of Separate section, if any	-	E-media Resource Centre	E-Resource Library	-	Multimedia Resource Centre	Digital Library	Digital Resources Laboratory
No. of computers	-	10	30	-	12	30	20

### 6. Requisition for Digital Library Components

All the libraries under study are subscribing to Digital Library components by analyzing the needs of the users. 5 out of 7 libraries are also subscribing to these on the recommendations of the library committee. NITJ has also set up a special committee for giving recommendations for digital resources, and 2 out of 7 libraries subscribe to e-journal resources on anticipation of demand of users based on the syllabi of various departments.

**Table-7. Requisition of Digital resources**

Technical University Libraries	Methods			
	Recommendation of Library Committee	Set up special committee	Anticipation of demand based on syllabi	Analysis of the needs of the users
NITH	√	-	√	√
NITJ	-	√	-	√
NITK	√	-	√	√
NITS	-	-	-	√
PEC	√	-	-	√
SLIET	√	-	-	√
TUP	√	-	-	√

As all the libraries are analyzing users' needs for developing a balanced collection of digital resources, it was further enquired, which method these libraries are following for this purpose and their response is furnished in table-8.

It is clear from the table-8 that all the libraries under study are subscribing to Digital Library Components based on the recommendations of the faculty. Only 2 libraries i.e. PEC and NITJ are fulfilling the wish list made by the students as well. User survey is not carried out in any of the libraries for ascertaining users' needs.

**Table-8. Modes of analyzing the users' needs**

Technical University Libraries	Modes		
	Survey method	Wish list made by students	Recommendations of faculty
NITH	-	-	√
NITJ	-	√	√
NITK	-	-	√
NITS	-	-	√

PEC	-	√	√
SLIET	-	-	√
TUP	-	-	√

### 7. Selection of Digital Library Components

It is essential for librarians to select quality digital resources based on various criteria such as comprehensive curriculum coverage, peer-reviewed status of the contents, reputation of the publisher/aggregator and importance for the ongoing research at the institute. In addition, one of important criteria in case of digital resources is duration of archival access. Table-9 reveals the various selection criteria implemented by the technical university libraries for selecting digital resources. 5 out of 7 libraries are seeking for comprehensive curriculum coverage and 4 out of 7 libraries looked out for relevance with the syllabus. It is surprising to note that only one library is paying attention to the peer-reviewed status of the digital resources.

**Table-9. Selection Criteria for Digital Library Components**

Technical University Libraries	Selection Criteria				
	Comprehensive curriculum coverage	Reputation of publisher/aggregator	Peer-reviewed status	Importance for ongoing research	Access to back files for e-journals
NITH	√	-	-	√	√
NITJ	√	-	-	-	-
NITK	√	-	-	√	√
NITS	√	-	-	-	-
PEC	-	√	-	√	-
SLIET	√	√	√	-	√
TUP	-	-	-	√	-

### 8. Provisions for Training of the Library Staff

Benefits of digital resources can only be reaped through IT trained library staff. Details of the staff members, who got IT training during the last five years in the libraries under study, are given in table-10. In PEC, 100% professionals and semiprofessionals have got IT training, followed by NITS, where 75% of staff has undergone training for IT. In NITJ and SLIET, only 50% staff is formally trained in ICT. Details of the methods adopted by different institutions for providing ICT training to staff are also mentioned in the same table. Majority of the libraries under study are organizing onsite training for the staff (5 out of 7). Four out of 7 libraries are also organizing publishers' demo and sending staff to other institutions for training. Three out of 7 libraries are providing consultation with other professional librarians.

**Table-10. Provisions of Training of the Library Staff**

Technical University Libraries	Total number of professional(s) and semi-professional(s)	No. of professional(s) and semi-professional(s) who received ICT training	Methods of providing ICT training			
			Sending staff for training	Organizing onsite training	Consultation with librarians	Publishers' Demo
NITH	7	4(57%)	-	√	√	-
NITJ	6	3(50%)	-	√	√	√
NITK	16	11(69%)	-	√	-	√
NITS	8	6(75%)	√	-	-	-
PEC	6	6(100%)	√	√	-	-
SLIET	4	2(50%)	√	-	-	√
TUP	6	4(67%)	√	√	√	√

## 9. User Education

Keeping users informed about digital resources is a big challenge. To make full use of digital resources, users are not only to be made aware of their availability, but also they should be provided education on how to access the required material. Due to technical complexities involved in accessing digital resources like plethora of interfaces and intricacies of varied value-added features, it is not easy for the users to retrieve exact information from the chaos of the net. Therefore, the education of users to effectively access digital resources is very vital. Rigorous user education programs should be part of access management strategies for digital resources.

It is clear from the table-11 that frequency of providing user education is not at all satisfactory. Only 2 out of 7 libraries are providing user education on regular basis and similar number of libraries is providing it only on demand of the users whereas 3 out of 7 libraries are providing it rarely. There are a number of methods suggested by the experts for imparting user education. Majority of the libraries (6 out of 7) are providing hands-on training, 4 out of 7 libraries are using the method of lecture cum demonstration, whereas 2 out of 7 libraries are either making use of printed material or audio-visual aid for providing education to users on digital resources. Only NITK is making use of ICT training as a method of providing user education.

**Table-11. User Education**

Technical University Libraries	Frequency	Methods				
		Lecture cum Demonstration	ICT Training	Audio-Visual Aid	Printed Material	Hands-on training
NITH	On-demand	-	-	-	-	√
NITJ	Rarely	√	-	√	-	√
NITK	Regularly	√	√	√	√	√
NITS	Rarely	-	-	-	-	-

<b>PEC</b>	On-demand	√	-	-	-	√
<b>SLIET</b>	Rarely	-	-	-	-	√
<b>TUP</b>	Regularly	√	-	-	√	√

### 10. Promotion of Digital resources

Ashcroft (2000) has stated that the access for digital resources can be assured only through effective promotion. There is a clear need for marketing strategies which go beyond mere notifications if users are to earn the full benefits of digital resources. Librarians were asked to indicate types and methods employed in promoting the use of the digital resources. Table-12 indicates the use of a variety of offline promotional activities in the technical university libraries under study.

**Table-12. Promotional activities (offline)**

<b>Technical University Libraries</b>	<b>Offline Promotional Activities</b>				
	<b>Circulating Table of contents</b>	<b>Printed FAQs</b>	<b>Printed Posters</b>	<b>Workshops/ class presentations</b>	<b>Publishers' presentations</b>
<b>NITH</b>	√	-	√	√	√
<b>NITJ</b>	-	√	√	-	-
<b>NITK</b>	-	-	√	√	√
<b>NITS</b>	-	-	-	-	-
<b>PEC</b>	-	-	-	-	-
<b>SLIET</b>	-	√	-	-	√
<b>TUP</b>	√	√	√	√	√

Out of the 7 libraries under study, only 4 libraries are arranging publishers' presentations and providing printed guides/posters for users' awareness. 3 out of 7 libraries are using both the methods of organizing workshops/class presentations and distributing FAQs related to e-journal resources in print form. Only two libraries are circulating table of contents.

Table-13 depicts the use of online promotional activities for dissemination of digital resources. Majority of the libraries, 4 out of 7 are notifying new developments on their web sites. NITK and SLIET are using RSS feeds and E-mails as alerting service to promote the digital resources subscribed. Use of advanced technologies such as web 2.0 is less popular as only one library (NITJ) has employed this technique for promoting the e-journal service. Web tutorials are not well established practice of promoting digital resources as only one library (NITK) is making use of this technique.

**Table-13. Promotional activities (online)**

Technical University Libraries	Online Promotional Activities			
	Alerting service (Email)	Web-tutorials	Notifications on website	Use of advanced technologies
NITH	-	-	√	-
NITJ	-	-	-	√
NITK	√	√	√	-
NITS	-	-	-	-
PEC	-	-	√	-
SLIET	√	-	-	-
TUP	-	-	√	-

### 11. Problems Related to Management of Digital resources

Librarians were asked what sort of problems they face in day-to-day working related to management of digital library. Their responses are consolidated in table-14, which shows that for majority of librarians (6 out of 7) lack of consolidated platform to search all digital resources is quite a predicament, as it is cumbersome to search information from different databases using different platforms. Further, maintaining IT infrastructure is the major problem being reported by 5 out of 7 librarians followed by budget constraints opted for by 4 out of 7 librarians and lack of ICT trained staff, which is selected by 3 out of 7 librarians.



**Table-14. Problems Related to Management of Digital resources**

Problems	Technical University Libraries						
	NITH	NITJ	NITK	NITS	PEC	SLIET	TUP
<b>Budget Constraints</b>	-	√	-	√	√	√	-
<b>Maintaining IT Infrastructure</b>	-	√	√	√	√	√	-
<b>Lack of ICT trained</b>	√	√	-	-	-	√	-
<b>Fear of loss of Access</b>	√	√	-	-	√	-	-
<b>Educating user</b>	-	√	√	-	-	-	-
<b>Maintaining a large number digital components</b>	-	-	-	-	√	√	√
<b>Lack of consolidated platform to search all digital resources</b>	√	√	√	√	√	-	√

### **Discussion and Conclusion**

Academic scenario, over the years, has undergone a remarkable change assuming new dimensions influenced by the technology driven applications. ICT has developed information to the extent that information is now omnipresent and no longer confined to four walls of a library. Instead of a building that holds books, the librarians are now trying to develop an electronic portal with a growing global collection of digital content. Digital libraries are developing worldwide to provide instant access to information available globally. But building and maintaining a digital library is a Herculean task, which requires new models of digital technology and trained library professionals. While older paradigms are to be replaced whole in part by the emerging new one and transpiring of new paradigm is bound to affect the older traditions. Compared to the different developed countries, there is slow development of digital libraries in India.

Compared to the developed countries, this study depicts a slow development of digital libraries in India. If the technical libraries want to move forward for catch up the modern

digital library trends and facilities with a motive to satisfy the users, this is the time to march ahead. All the library professionals must have to understand the benefits and process of digitization. It is very essential that libraries must put some separate budget for digitization every year or apex bodies such as AICTE should provide financial support to carry over the digital library mission of technical university libraries. Further, Library professionals must be provided some training to adopt the latest technology. This could be done either by introducing different types of training programs at the master's level in Library and information science teaching and training institutions or by organizing training programme for working library professionals. In this way they can overcome their fear about digital technologies and can enjoy the blessings of the ICT.

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