Content Evaluation of Indian Institutes of Technology Library Websites in India

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Abstract

This study evaluates the content features of select library websites of Indian Institutes of Technology (IITs) in India and uses a mixed-method approach that combines both quantitative and qualitative analyses of IIT library websites evaluation with the help of a specially designed checklist.

The various content features of the websites of twelve IIT libraries (IIT Kharagpur, IIT Bombay, IIT Madras, IIT Delhi, IIT Guwahati, IIT Roorkee, IIT Ropar, IIT Hyderabad, IIT Gandhinagar, IIT Rajasthan, IIT Indore, and IIT BHU) are evaluated. A structured checklist was designed keeping in view of the stated objectives and available literature. The qualitative part of the checklist contains 11 features pertaining to homepage of the IIT libraries websites, which serve as a recording device for descriptive data. The quantitative part of checklist contains 90 dichotomous questions relating to content features. A quantitative five-point rating scale was implemented to provide a meaningful numerical rating for each individual feature of the IIT library websites and rank them based on the features.

The study has revealed that the websites are lagging behind in exploiting the full potential of web/library 2.0 features. Findings show that many of the study IIT library websites in India are ranked above average mainly providing general information of the library and their services and resources. The highest scored study IIT library website is IIT Madras with 78.88 per cent (71/ of 90) and least scored study website is IIT- Gandhinagar with 33.33 per cent (30/90).

The findings of the study will not only guide the studied libraries to improve their web-based services, particularly, Web2.0-based features, but also provide a model for newly established IIT libraries in India. These findings open the door for librarians of studied IIT libraries to explore the possibilities of communication, promotion, text responses, and catalogue access via mobile technology with the help of library websites.

Keywords: Library Websites, Evaluation, IIT libraries, India

1. Introduction

The role of the library website in the delivery of library and information services has never been more prominent as it is now. Library websites have grown from static information to evolving, comprehensive gateways to digital materials, instruction, and services in the present day. Indian Institutes of Technology (IITs) Libraries in India have extensive experience in providing web-based library services and great deal of efforts have been invested in transforming useful information and services into web access. They have dynamically created websites with frequent improvements on the design, content, and layout of the websites and are providing access to valuable electronic resources (e-resources) for technical education and research purpose. The users are allowed to access the library's e-resources across the network in a manner that is independent of location or time. As a result of these developments, IITs have been in a more privileged position than other types of libraries in India. Their presence on the Web implies the desire of IITs to provide better and more services to their web users. Although many resources have been committed to creating and maintaining IIT library websites, there have been little efforts in evaluating these sites.

Evaluation is a worthy judgement of its utility with several of the component elements of a website that facilitates browsing, navigation, and searching and locating of the desired information. Largely, evaluation means testing the service or system for its effectiveness and efficiency. As the Web becomes increasingly prevalent as an information source and finding tool, evaluation of the content continues to be crucial (Notes, 2006). Traditional evaluation criteria endorsed and applied by librarians over the years are not sufficient for the evaluation of today's hypermedia website environment. There are many other criteria, which can be used to evaluate the library websites.

The study aims to evaluate websites with the help of qualitative and quantitative features manually and investigates how studied libraries are adopting content features in their library websites more user-friendly.

2. Review of related literature

Evaluations of content of websites have been conducted over the years and for many domains. However, most of them are exclusively quantitative and pertain to academic libraries. CSIR (1996) evaluated websites and the checklist covers only seven criteria: accuracy, currency, relevancy, structure, presentation, maintenance, and features. A noteworthy study by Clyde (1999) analysed the contents of the websites of 50 public and school library websites by applying quantitative method. The study analysed the various features found in school library websites. Kirkwood (2000) examined 75 sites, focusing on five general aspects of the sites: organization, terminology, instructional elements, integration of resources across formats, and annotations. Lee and Teh (2001) developed a comprehensive evaluation checklist more pertinent to the content and design of academic library websites in Malaysia. The qualitative part was limited to 12 items. The quantitative part was limited to 25 aspects of content, structure, and navigation, pertaining to accountability for content, accuracy, authority and design control, currency, instructional support, marketing, objectivity, reliability of links, and information.

A similar study conducted by Smith (2001) developed criteria for the evaluation of government websites with the help of previous studies by Eschenfelder et al., (1997). Criteria were divided into two groups: (i) Information content criteria, which covered orientation to website, content, currency, metadata (facilitates retrieval, navigation, services, accuracy, and privacy), and external recognition (ways in which the value of the site is recognized by users, wider Internet community), and (ii) Ease of use criteria. Santorio (2002) designed comprehensive criteria for evaluating the quality of library websites. The checklist was in three sections:

the library's internal Internet resources, i.e., (i) how the library presents its services; (ii) the electronic catalogues (OPACs) provided; and (iii) the full-text resources available. The second area of evaluation covers library links to external websites and finally, it looked at website graphics display and technical functions.

Dragulanescu (2002) propose some basic criteria to evaluate website quality. The checklist covers accuracy, authority, coverage, currency, density, interactivity, objectivity, and promptness. Sasikala (2003) developed evaluation criteria in terms of structure and content to check the validity of information, coverage, currency, appropriateness, links, and structure of the website. In 2004, Clyde (2004) revisited the sites and she examined in 1996 and 1999 to identify the changes in school library websites. The longitudinal analysis identified that offering electronic resources, searching library OPAC and link to other OPACs were some of the key changes found in school library websites (Clyde, 2004). In a similar study, Jurkowski (2004) focused on the content of school library websites. The study suggested that links to web resources, policies, mission statements, library news, and print journal lists should be made available in all school library websites.

Sieverts et al. (2005), investigated websites for a range of facilities including presence of a search engine, accessibility, and method of displaying information. Ease of use was considered the most important criterion. The survey found that most libraries offer access to online databases via their websites. Michalec (2006) highlights the design and content of art library websites in the USA. The checklist includes the address, telephone number, hours of operations, the library's resources, and its mission statement; and descriptions of services, subject resources, library online catalogue, subscription databases, journals, current links, and updated date of the websites.

Poll (2007) discusses the quality of a library website with different aspects, such as contents, language, structure, design, navigation, and accessibility. In a similar study by Raju and Harinarayana (2008), 30 library websites of top science universities from around the world were studied, with special reference to design and usability features. Hasan and Abuelrub (2008) propose general criteria for evaluating the quality of any website. The dimensions of the evaluation criteria are content quality, design quality, organization quality, and user-friendly quality.

Mustafa and Al-Zoua'bi (2008) identified 23 website usability evaluations of Jordanian academic websites and classified into five categories: (i) content, organization, and readability, (ii) navigation and links, (iii) user interface design, (iv) performance and effectiveness, and (v) educational information.

Pathak, Pal, and Rai (2008) evaluated the contents brief evaluation of seven IIT's library websites. The checklist covers general information available in website, information and pays no attention to qualitative aspects, other content related features, web/library 2.0 features, accuracy, relevancy, organization, structure, coverage, intended audience, links, maintenance, usability features, and quantitative ranking of IIT library websites. A similar study by Vijayakumar, Kannappanavar, and Mestri (2009) aims to determine the information content on the library web portals of IIT's in India for better accessibility. The checklist covers basic information, information on sections, information about collections, journals, databases, and electronic resources, information search in portals, information on library services and special collections. This checklist pays no attention to qualitative aspects, other content related features, web/library 2.0 features, accuracy, relevancy, organization, structure, coverage, intended audience, links, maintenance, usability features, and quantitative ranking of IIM library websites.

Raju and Harinarayana (2010) performed a content analysis of 135 Indian university library websites. The study examines 46 variables (content features) divided into five categories:

library general information, library services information, library resources information, Web 2.0 features, and other content-related features. Konnur, Rajani, and Madhusudhan (2010) evaluate the content and quality of academic library websites in five areas: currency, accuracy, and relevance; organization and structure; presentation; maintenance; and different features of the library website. Savina Kirilova (2010) evaluated the content and design of academic library websites of Bulgaria, which is carried out based on their function, design, originality, professionalism, and efficiency. Tsai, Chou, and Lai (2010) developed relevant criteria for assessing national park websites. The website quality evaluation criteria include navigation, speed, links, relevancy, richness, currency, attractiveness, security, personalization, and responsiveness.

Furthermore, previous studies have identified relatively new and second-generation web pages and offer suggestions on how to build websites to achieve the best results in Web 2.0 features and to find out how Web 2.0 features have been integrated in IIT library websites. Maness (2006) addressed the issues related to how Web 2.0 technologies such as asynchronous messaging and streaming media, blogs, Wikis, social networks, tagging, RSS feeds, and mash-ups might inform changes in how libraries provide access to their collections. Studies (Boeninger, 2006; Fichter, 2006) have looked at the use of Wikis as a knowledge base for libraries. Harinarayana, Kumbar, and Pradeep (2007) have studied the application of RSS in 30 libraries. Nguyen (2008) reports that among Web 2.0 technologies utilized by Australasian University libraries, RSS was the most widely applied, and instant messaging was the least used technology.

On the other hand, the presence of Web 2.0 applications was found to be associated with the overall quality, and in particular, service quality of library websites (Chua and Goha, 2010). Very recently, a survey of the application of new generation web technology, social media,

and Web 2.0 features among technological university library websites in south India has been the current web development technologies and deploying for mainstream web information services is not widespread as web information services are yet to take off widely in academic libraries. The majority of university libraries are found to be working in the conventional library settings and the diffusion rate of web information services is relatively low.

Further, Raju and Harinarayana (2010) developed a comprehensive checklist based on the previous checklists. The evaluation approach taken in this study is similar to that of Lee and Teh, (2001), Vijayakumar, Kannappanavar and Mestri (2009), Raju and Harinarayana (2010), and Konnur, Rajani and Madhusudhan (2010) with minor modifications.

3. Indian Institute of Technology (IIT)

The IITs are a group of 16 autonomous engineering and technology-oriented institutes of higher education established and declared as Institutes of National Importance by the Parliament of India. In order of establishment, they are located in Kharagpur (1951), Bombay (now Mumbai) (1958), Madras (now Chennai) (1959), Kanpur (1959), Delhi (1963), Guwahati (1994), Roorkee (2001), Ropar (2008), Bhubaneswar (2008), Gandhinagar (2008), Hyderabad (2008), Patna (2008), Jodhpur (2008), Mandi (2009), Indore (2009), and Varanasi (2011). The IITs were created to train scientists and engineers, with the aim of developing a skilled workforce to support the economic and social development of India.

4. Objectives of the study and methodology

This main objective of this study was to evaluate the websites of IIT libraries in India. In particular to:
- Determine the different features related to content of different IIT library websites in India;

- Identify the criteria for the content evaluation of library websites under study;
- Evaluate the study websites with the help specially designed criteria for verification of the validity, reliability and usefulness; and
- Compare the different features of IIT library websites under study and rank them based on content features.
- Suggest the information content of study library websites in an academic environment.

The present study is confined to 12 IIT library websites in India. The selection of the sample was done based on functional library website facility provided to their respective users at the time of study. The scope of the evaluation criteria restricted to qualitative and quantitative content features of study library websites in India, such as general features, library services offered, library resources found, Web/Library 2.0 features, and evaluation aspects related to content, viz., currency, accuracy, relevance, organization, structure, coverage, intended audience, links and maintenance.

A structured checklist was designed keeping in view of the stated objectives and literature available to examine the various qualitative and quantitative features of study library websites. It comprises 101 dichotomous and open-ended questions, categorized as two main parts, preceded by a Rating Table, viz. *Part-I: Technical Description* (11 descriptive questions), and *Part-II: Content analysis and evaluation* (90 questions). Table 1 presents the list of IIT library websites in India with their Universal Resource Locators (URLs).

Table 1: Library Websites of Indian Institute of Technology in India

Sl. No	Name of the IITs	Library	URL of the Library
1.	IIT, Kharagpur	Central Library	http://www.library.iitkgp.ernet.in/
2.	IIT, Bombay	Central Library	http://www.library.iitb.ac.in/
3.	IIT, Madras	Central Library	http://www.cenlib.iitm.ac.in/docs/library/index.php
4.	IIT, Delhi	Central Library	http://library.iitd.ac.in/
5.	IIT, Guwahati	Central Library	http://www.iitg.ac.in/rs/lib/public_html/index.html
6.	IIT, Roorkee	Central Library	http://www.iitr.ac.in/centers/library/pages/History_of_Library.html
7.	IIT, Ropar	Central Library	http://www.iitrpr.ac.in/html/centrallibrary.shtml
8.	IIT, Hyderabad	Central Library	http://library.iith.ac.in/
9.	IIT, Gandhinagar	Central Library	http://www.iitgn.ac.in/library.htm
10.	IIT, Jodhpur	Central Library	http://www.iitj.ac.in/library/
11.	IIT, Indore	Central Library	http://www.iiti.ac.in/Library/about_central_library.html
12.	IIT, BHU	Library	http://www.itbhu.ac.in/library/

5. Data analysis and interpretation

The data analysis phase took place from 20 February 2012 to 20 March 2012.The qualitative and quantitative responses were received from the evaluation checklist. Each time a cell (i.e., specific feature in the checklist) was checked (marked " ✔ "), one point was assigned to the respective feature of the IIT library website concerned. The score for a system is the total number of cells checked for that library website. Each part has a set of related questions and the responses of the each part and their sub parts were analysed with the help of tables followed by interpretation of data.

5.1   Qualitative evaluation

The qualitative part of the checklist contains eleven features pertaining to IIT library websites, which serves as a recording device for descriptive data. For the most part, this information is obtained from the homepage of the website (Table 2).

Table 2: Qualitative evaluation of the IIT library websites

Sl. No	Technical description	1*	2	3	4	5	6	7	8	9	10	11	12
1.	Name of the IIT	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
2.	E-mail	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
3.	Fax no.		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
4.	Phone no.	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
5.	Address	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
6.	Type/Genre	ac^	ac	ac	ac	ac	ac	ac	ac	ac	ac	ac	ac
7.	Language of site	Eng.	Eng.	Eng.	Eng.	Eng.	Eng.	Eng.	Eng.	Eng.	Eng.	Eng.	Eng.
8.	Plug-ins required	Java, Adobe acrobat Reader (AAR), Streaming media Player (SMP)	Java, AAR and SMP	Java, AAR	Java, AAR	Java, AAR	Java, AAR	Java, AAR	Java, AAR	Java, AAR	Java, AAR	Java, AAR	Java, AAR
9.	Browser and level required	IE 6.0 and above	IE 6.0 and above	IE 6.0 and above	IE 6.0 and above	IE 6.0 and above	IE 6.0 and above	IE 6.0 and above	IE 6.0 and above	IE 6.0 and above	IE 6.0 and above	IE 6.0 and above	IE 6.0 and above
10.	Language of site contents	Eng.	Eng.	Eng.	Eng.	Eng.	Eng.	Eng.	Eng.	Eng.	Eng.	Eng.	Eng.
11.	Other	Interactive Image (Flash)			Interactive Image (Flash)			Scroling news					

Note: Eng= English, ac^=Academic
*1. IIT-Kharagpur, 2. IIT-Bombay, 3. IIT-Madras,
4. IIT-Delhi, 5. IIT-Guwahati, 6. IIT-Roorkee,
7. IIT-Ropar, 8. IIT-Hyderabad, 9. IIT- Gandhinagar, 10. IIT- Jodhpur, 11. IIT- Indore, 12. IIT- BHU.

Table 2 depicts the qualitative information features found in IIT library websites under study. As expected, the contact information, email, and phone numbers appeared on the main page of all the study websites. Besides these, fax number of the library found in 83 per cent of the study websites. The other common features like academic network, software plug-ins, type of browser, and language of the site are found in all of the study websites. While examining the study websites, the investigators found that streaming and VLC media player features were found in two study websites (IIT-Kharagpur and IIT-Bombay). This Internet technology allows IIT library websites to receive not only text or picture messages, but also sound and videos.

The qualitative analysis part of the checklist does not give any numerical value. Therefore, these values are not considered for final ranking of evaluation of study IIT library websites. However, it is valuable to know the details of the sites for browsing and contacting them for further details.

5.2 Quantitative evaluation: Content

The quantitative part of checklist contains 90 dichotomous questions relating to various evaluation aspects of *Content* deals with general features, library services, library resources, Web/Library 2.0 features, currency, accuracy, relevance, organization, structure, coverage, intended audience, links and maintenance, etc.

Content is the primary consideration in evaluating any referencing source and quality of library website is determined mainly by its content. The quality of information relies on the how the information is being managed. Keeping in view of the fact, the content analysis and evaluation features were carried out more comprehensively with highest 95 points in the Part-II of the checklist. In the process, the validity and usefulness of the criteria for evaluation of the content of IIT library websites could be established. The content analysis and evaluation of study websites is presented in Tables III through VI.

5.2.1 General features offered via library websites

General information features help users to know the basic information about the library, contact information, working hours, library rules, services, staff, mission statement and help features offered by the libraries.

Table 3: General features of the IIT library websites

Sl. No.	Content analysis and Evaluation	Indian Institutes of Technology Library Websites*											
	General features	1*	2	3	4	5	6	7	8	9	10	11	12
1.	Contact information	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
2.	Opening hours	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
3.	Staff directory	✔	✔	✔	✔	✔		✔	✔		✔	✔	✔
4.	Library rules			✔	✔		✔	✔	✔		✔	✔	
5.	News and events		✔	✔	✔	✔	✔	✔	✔		✔	✔	✔
6.	Mission statement	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔
7.	FAQs	✔	✔	✔	✔	✔	✔		✔		✔	✔	✔
8.	Annual reports		✔						✔				
9.	Floor map	✔	✔	✔	✔	✔			✔		✔		
10.	Newsletter					✔							
11.	Web counter		✔	✔	✔		✔		✔				

Contd.

Sl. No.	Feature	1	2	3	4	5	6	7	8	9	10	11	12
12.	Library history	✔	✔	✔	✔		✔	✔	✔		✔	✔	✔
13.	Library committee	✔	✔	✔	✔		✔	✔	✔		✔	✔	✔
14.	Photo gallery	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔
15.	Help	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Total scores (Max.15)	**10**	**13**	**13**	**13**	**10**	**11**	**10**	**14**	**03**	**12**	**10**	**09**

Note: *1. IIT-Kharagpur; 2. IIT-Bombay; 3. IIT-Madras; 4. IIT-Delhi; 5. IIT-Guwahati; 6. IIT-Roorkee; 7. IIT-Ropar; 8. IIT-Hyderabad; 9. IIT- Gandhinagar; 10. IIT- Jodhpur; 11. IIT- Indore; and 12. IIT- BHU.

Table 3 reveals that contact information, opening hours, and help were common features of all study websites. On the other hand, except Ropar and Gandhinagar all study library websites provided the FAQs, annual reports are provided by only two library websites, i.e., IIT Bombay and Hyderabad. Newsletter is provided by only single library website (Guwahati). Web counter (41.66 per cent) and library committee (66.66 per cent) features found in study library websites. The other important features like; floor map (58.33 per cent) and links for staff directory, news and events, library history (83.33 per cent), and photo gallery and mission statement features were found in 91.66 per cent of the study websites.

Library rules are to provide comprehensive resources and services in support of the research, teaching, and learning needs of the library community and contents and design of their websites in line with their missions. Table 3 shows that library rules are provided by seven (58.33 per cent) study website. The findings of this study too correlate with the findings of Jurkowski (2004) who recommends that features like mission statement, library rules, and library news should be made available in all types of library websites.

5.2.2 Library services offered via library websites

Library services offered via IIT websites vary in form and content, depending on the nature of the institution, its mission, size, and programs offered. They serve as a window to the World Wide Web.

Table 4: Library services offered via IIT library websites

Sl. No.	Content analysis and Evaluation	Indian Institutes of Technology Library Websites*											
	Library services offered	1*	2	3	4	5	6	7	8	9	10	11	12
1.	Inter library loan/ document delivery service	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	
2.	Online instructional tutorials										✔		
3.	Citation style guides and tools											✔	
4.	Evaluating web resources and websites												

Contd.

		1	2	3	4	5	6	7	8	9	10	11	12
5.	Information literacy												
6.	Plagiarism	✔	✔	✔	✔	✔	✔	✔	✔			✔	
7.	Web search guides			✔				✔	✔			✔	✔
8.	New arrival list		✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
9.	Newspaper clippings		✔	✔		✔	✔	✔					
10.	Photocopying		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
11.	Ask a librarian services provided via email		✔	✔	✔	✔	✔		✔		✔	✔	
12.	Ask a librarian services provided Via online form			✔	✔								
13.	Ask a librarian services provided via chat (IM)	✔	✔						✔				
14.	Library services for faculty			✔	✔			✔		✔		✔	
15.	Other services	✔	✔	✔	✔			✔					✔
Total scores (Max.15)		04	07	10	09	04	06	08	08	03	05	08	04

Note: *1.IIT-Kharagpur; 2. IIT-Bombay; 3. IIT-Madras; 4. IIT-Delhi; 5. IIT-Guwahati; 6. IIT-Roorkee; 7. IIT-Ropar; 8. IIT-Hyderabad; 9. IIT- Gandhinagar; 10. IIT- Jodhpur; 11. IIT- Indore; and 12. IIT- BHU.

Table 4 shows that Inter library loan/ document delivery service, new arrival list found in 83.33 per cent library websites. Plagiarism (75 per cent) and photocopying services (91.66 per cent) were found in study websites. Web search guides/ tips and newspaper clippings are provided by 41.66 per cent study websites. Interestingly only IIT Indore provides citation style guides and IIT Rajasthan offered online instructional tutorials. In contrast, none of the study websites offered information literacy and Evaluating web resources and websites,

It is worth to note that 8 out of 12 libraries provided facilities for Ask-a-librarian through email, two library websites through email and online form both, and three library through instant messaging. Other services like virtual reference services and user awareness (IIT-Bombay); requisition form for text and general books (IIT-Kharagpur); i-Portal(book search), and catalogue through Z39.50 gateway (IIT-Madras); CD-ROM search, abstracting and reference services (IIT-Delhi); LibWeb services and e-papers (IIT-Ropar); bindery, consultation and printout services (IIT-BHU) found in 50 per cent websites.

5.2.3 Library resources found in library websites

Library resources in IIT websites varies from one IIT library website to another from very simple to complex ones, depending on the existing type

of resources, its accessibility, and environment. IIT library websites were customized means of access to the large variety of e-resources and library consortia-based e-resources.

Table 5: Library resources found in IIT library website

Sl. No.	Content analysis and Evaluation	Indian Institutes of Technology Library Websites*											
	Library resources found	1*	2	3	4	5	6	7	8	9	10	11	12
1.	Links to e-journals	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
2.	Bibliographic databases	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
3.	Subject guides												
4.	Web-based OPAC	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔
5.	Web-based Union Catalogue		✔	✔	✔	✔	✔	✔	✔				
6.	Special collections	✔	✔	✔	✔	✔					✔		
7.	Electronic theses and dissertations	✔	✔	✔	✔								
8.	Links to open access resources	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔
9.	Links to other Web reference sites		✔	✔	✔			✔				✔	
10.	Links to e-books	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔
11.	Links to institutional repository	✔	✔		✔	✔	✔	✔	✔				
12.	Links to back volumes	✔	✔		✔			✔	✔				
13.	Links to search engines	✔	✔	✔	✔			✔	✔		✔	✔	
14.	Link for library Consortia (e.g. INDEST-AICTE/UGC-Infonet Digital Library Consortia)	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
15.	Book recommendation			✔	✔		✔						
16.	Web master email address	✔	✔	✔	✔		✔	✔	✔			✔	
17.	Link to librarian's personal homepage			✔	✔		✔	✔	✔			✔	✔
18.	Privacy statement	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔
19.	Book reviews and other web resources					✔							
20.	Links to subject specialists												
21.	Remote access information			✔	✔			✔	✔		✔	✔	✔
22.	Information for disabled users												
23.	Job opportunities												
24.	Other library resources	✔	✔	✔	✔	✔		✔	✔			✔	✔
	Total scores (Max. 24)	14	15	17	19	13	11	15	16	06	09	13	10

Note: *1.IIT-Kharagpur; 2. IIT-Bombay; 3. IIT-Madras; 4. IIT-Delhi; 5. IIT-Guwahati; 6. IIT-Roorkee; 7. IIT-Ropar; 8. IIT-Hyderabad; 9. IIT- Gandhinagar; 10. IIT- Jodhpur; 11. IIT- Indore; and 12. IIT- BHU.

Table 5 reveals that bibliographic database, links to e-journals and Link for library Consortia e-journals, consortia-based e-resources were common library resources and found in all of the study websites. In contrary, subject guides, job opportunities, information for disabled user, links to subject specialist were uncommon and not found in any of the study websites. Except IIT Roorkee, all the study library websites provided links to e-books. Seven libraries offered links to Web-based Union Catalogue to help the students and research scholars in exploring, finding and organizing their academic/research related articles.

Connecting the web with the online catalogue is a natural and unavoidable goal for libraries today. OPACs have improved significantly over the years and currently library resources are made accessible remotely through a web-based OPAC via a graphical browser (Madhusudhan and Shalini, 2011). It is worth to note that 8 of the 12 libraries that provided access to their OPACs through Web interface, however three of them provided intranet access only. While six libraries provided links to special collections, such as books for children, whereas, four library websites libraries provided electronic theses and dissertations, It is found that except IIT-Roorkee all the study websites provided links to open access resources and five study library websites provided links to other web reference sites. Links to institutional repository are provided by 58.33 per cent study websites. Link to librarian's personal homepage are provided by 58.33 study library websites. Book reviews and other web resources are only provided by the IIT-Guwahati.

Other content-related features include book recommendation, web master email address, privacy statement, and job opportunities, etc., which enable website more informative and useful to their clientele. Table 4 reveals that maximum (91.66 per cent) websites provided privacy statements, followed by book recommendation feature (25 per cent), and library services for faculty (41.66 per cent).

In addition to providing library resources, IIT-Kharagpur provided a digital library, IIT Bombay provided archives of workshop reports and a book bank; IIT-Madras provided an iPortal, links to a virtual reference desk, and links to IIT libraries in India and abroad. IIT-Delhi offered library brochures, an in-house database, and local digital resources; IIT-Guwahati provided a link to the ACM digital library; IIT-Ropar offers links to WWW virtual library and virtual bookshop; IIT-Hyderabad provides bibliographic tools; IIT-Indore offered emerald online journals; and IT-BHU provides web of science, chemical abstracts, The *Encyclopaedia Britannica*, and a book bank .

5.2.4 Web/Library 2.0 features in library websites

Library websites are changing in their content and structure, with the introduction of Web 2.0 features and integrated into library websites, such as Really Simple Syndication (RSS) feeds, blogs, wikis, user tagging sites, instant messaging (IM), social networking sites, etc.

Table 6 depicts that RSS feeds, social bookmarking and tagging, file sharing, image sharing, calendaring, collaborating authoring, wiki, and social networking sites were Web 2.0 tools found in IIT library websites. Of which, five library websites (IIT-Bombay, IIT-Madras, IIT-Roorkee, IIT-Hyderabad, IIT-Rajasthan, and IIT-Indore) implemented RSS feeds for altering users about library news and another library used Facebook for publicizing their library services. The Web 2.0 mantra allows users to be involved in the continuous process of change, providing feedback and critical evaluation. These bottom-up approaches could inspire and encourage library staff everywhere, but implementing

Table 6: Web/Library 2.0 features in IIT library websites

Sl. No.	Content analysis and Evaluation	Indian Institutes of Technology Library Websites*											
	Web/Library 2.0 features in IIT websites	1*	2	3	4	5	6	7	8	9	10	11	12
1.	RSS feeds		✔	✔			✔		✔			✔	
2.	Blogs								✔		✔	✔	
3.	Wikis											✔	
4.	Social networking sites (Face-book, My Space, Orkut, Twitter, etc.)		✔	✔			✔		✔			✔	
5.	Social bookmarking and tagging		✔	✔			✔						
6.	File sharing			✔			✔		✔				
7.	Image sharing			✔					✔				
8.	Calendaring								✔				
9.	Video sharing												
10.	Collaborative authoring											✔	
11.	Podcasts												
	Total scores (Max.11)	0	03	05	0	0	04	0	06	0	01	05	0

Note: *1.IIT-Kharagpur; 2. IIT-Bombay; 3. IIT-Madras; 4. IIT-Delhi; 5. IIT-Guwahati; 6. IIT-Roorkee; 7. IIT-Ropar; 8. IIT-Hyderabad; 9. IIT- Gandhinagar; 10. IIT- Jodhpur; 11. IIT- Indore; and 12. IIT- BHU.

web 2.0 features in study IIT websites was not up to mark. Only 41.66 per cent study websites provided social networking sites, followed by 16.66 per cent study websites provided file sharing, image sharing, and calendaring. Blogs are provided by 25 per cent study websites whereas wiki and collaborating authoring are provided by only IIT Indore.

5.2.5 Currency, accuracy, and relevance of library websites

Currency refers to the timeliness of information and an important consideration of use of information. One of a top-ranking criterion, date of last update should always be present in home and sub-pages of the website; otherwise, the number of audience will be reduced because of obsolete information. It is depicted from the Table 7 that 75 per cent of the study websites were provided the last revision of date on sub-pages of their websites.

The presentation of hypertext links and the design of how a link is defined and included in the text helps users to access the right information. It is noted from the Table 7 that besides IIT-Gandhinagar, all the hyperlinks were relevant and appropriate to needs of online reference desk in all of the websites. However, it was noted at the time of evaluation that in some libraries, the links were not checked regularly to ensure that they are still active.

Copyright in relation to electronic information is a complex area and its general considerations are beyond the scope of this research work. However, one consideration in terms of evaluation is the availability of copyright

Table 7: Currency, Accuracy and Relevance of IIT library websites

Sl. No.	Content analysis and Evaluation	Indian Institutes of Technology Library Websites*											
	Currency, accuracy, and relevance	1*	2	3	4	5	6	7	8	9	10	11	12
1.	All the hyperlinks retrieving in the web page?	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔
2.	All the hyperlinks appropriate and relevant for an online reference desk?	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔
3.	Copyright status is clearly stated?	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
4.	Are dates of update provided in the Home page?	✔	✔	✔	✔	✔	✔	✔	✔		✔		
5.	Does each page of site include information about the date of the last update?	✔		✔		✔	✔	✔	✔		✔		✔
6.	Is there any official logo of the organization present on the site?	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
7.	There are no spelling or grammatical errors found in the website?	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Total scores (Max.7)		07	06	07	06	07	07	07	07	03	07	05	06

Note: *1.IIT-Kharagpur; 2. IIT-Bombay; 3. IIT-Madras; 4. IIT-Delhi; 5. IIT-Guwahati; 6. IIT-Roorkee; 7. IIT-Ropar; 8. IIT-Hyderabad; 9. IIT-Gandhinagar; 10. IIT-Jodhpur; 11. IIT-Indore; and 12. IIT-BHU.

information. User may want to re-use textual or graphical materials, such as in a publication or presentation. However, as a basic rule, any information, which is published via the Internet, will be covered by copyright, including images, the text of web pages. It is therefore useful if the authors or webmasters provide a statement of the copyright ownership of materials, details of how materials should be cited in a publication or attributed to an author mention the institute official who should be contacted to obtain copyright permission where required. Copyright status and official name or logo of the IIT was clearly found in all of the study websites.

Accuracy generally refers to correctness of the source of information. In many respect, the need to determine accuracy underpins the whole process of evaluation, it is often the reason for looking critically at any information and relevance being an important part of the evaluation process. Surprisingly, no spelling errors or grammatical errors were found in any of the study websites.

5.2.6 Organization and structure of IIT library websites

Organization is an important factor that should be done in such a fashion that each web page will be independent of the other. Proper linking must be maintained so that the user can have provision to come back again to any one of the earlier pages.

Interestingly, all the websites were accessed from the different web browsers. The other common features were found in all websites; loading image files on home pages, content organized according to principle of arrangement obvious to the users and appropriate

Table 8: Organization and structure of IIT library websites

Sl. No.	Content analysis and Evaluation	Indian Institutes of Technology Library Websites*											
	Organization and Structure	1*	2	3	4	5	6	7	8	9	10	11	12
1.	Is the site accessible from different web browsers?	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
2.	All images/icons/graphics presents when the web page loads?	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
3.	Is the content organized according to alphabetical, numerical, chronological, subject etc.?	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
4.	Is the principle of arrangement obvious to the users?	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
5.	Is the organizational scheme appropriate to the resource?	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
6.	Is the table of contents or site map present at the sites home page?			✔			✔		✔		✔	✔	✔
7.	Does the site not require proprietary software or password to access the information?	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Total scores (Max.7)	06	06	07	06	06	07	06	07	06	07	07	07

Note: *1.IIT-Kharagpur; 2. IIT-Bombay; 3. IIT-Madras; 4. IIT-Delhi; 5. IIT-Guwahati; 6. IIT-Roorkee; 7. IIT-Ropar; 8. IIT-Hyderabad; 9. IIT- Gandhinagar; 10. IIT- Jodhpur; 11. IIT- Indore; and   12. IIT-BHU.

organizational schemes to their resources. Half of the study websites were provided table of contents or site map and access the information without any proprietary software or password.

5.2.7 Coverage and intended audience of IIT library websites

Coverage of available information in websites is a more important concern for users. Intended audience is a key factor in evaluating the information found in the site. Information needs to be at the level that the user can understand and assimilate (Table 9).

Table 9 summarizes that coverage coincides with the intended mission and exhaustive was common and found in all the study websites. It has been observed from the Table 9 that the statement of intended audience and terminology used in the sites was familiar to intended audience were common and found in all the study websites. However, from an examination of the information within the site, it is apparent that it is likely to appeal to a much wider audience. Half of the study websites had provided the visitor information, which was used to track number of unique visitors to the website and informs the number of hits during a specified time period, and indicates site's popularity.

Table 9: Coverage and intended audience of IIT library websites

Sl. No.	Content analysis and Evaluation	Indian Institutes of Technology Library Websites*											
	Coverage and intended audience	1*	2	3	4	5	6	7	8	9	10	11	12
1.	Does actual coverage coincide with the intended mission?	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
2.	Is the scope and coverage aligned to the need of users?	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
3.	Is coverage of subject matter exhaustive?	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔
4.	Is there a statement of intended audience is mentioned in the site? Example: Students/Corporate/Enterprisers/Others	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
5.	Is the terminology used familiar to the intended audience?	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
6.	Are Visitor numbers mentioned?	✔	✔	✔	✔	✔			✔				
	Total scores (Max.6)	06	06	06	06	06	05	05	06	04	05	05	05

Note: *1.IIT-Kharagpur; 2. IIT-Bombay; 3. IIT-Madras; 4. IIT-Delhi; 5. IIT-Guwahati; 6. IIT-Roorkee; 7. IIT-Ropar; 8. IIT-Hyderabad; 9. IIT- Gandhinagar; 10. IIT-Jodhpur; 11. IIT-Indore; and   12. IIT-BHU.

5.2.7 Links and maintenance of IIT library websites

Maintenance of the library website is on-going practice and tedious job of the webmaster. One factor to be considered is the currency of all hyperlinks. Few sites were incorporated a policy regarding the updating process. Table 10 presents the links and maintenance features of study libraries.

Table 10: Links and maintenance of IIT library websites

Sl.No.	Content analysis and Evaluation	Indian Institutes of Technology Library Websites*											
	Links and maintenance	1*	2	3	4	5	6	7	8	9	10	11	12
1.	Are the links described in an appropriate way?	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
2.	Are links clearly labelled?	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
3.	Are internal links reliable?	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
4.	Responsibility of the site display is given?	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
5.	Facility of feedback/comment to the library is available.	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	Total scores (Max.5)	05	05	05	05	05	05	05	05	04	05	05	05

Note: *1.IIT-Kharagpur; 2. IIT-Bombay; 3. IIT-Madras; 4. IIT-Delhi; 5. IIT-Guwahati; 6. IIT-Roorkee; 7. IIT-Ropar;   8. IIT-Hyderabad; 9. IIT- Gandhinagar; 10. IIT-Jodhpur 11. IIT-Indore; and 12. IIT-BHU.

Table 10 shows that all the study IIT library websites got 100 per cent, except IIT-Gandhinagar in links and maintenance aspects of the website. Interestingly, links described clearly, proper site display, responsibility of the site display, facility of feedback were common features and found in all study library websites. It has been observed that reliable internal links not found in IIT-Gandhinagar.

In fact, the most exciting and useful feature of the website is the implementation of feedback form, the librarian plays an active role in the library–patron relationship. The suggestions should be the integral part of the website development, especially in the initial stages.

It helps in correcting the design, as the suggestions are the views and reactions of the end users. "Web-based forms, which are effective tools for library user interaction and communication" (Ahmed, 2002). Interestingly, all the study websites had provided the facility of feedback/comment to the library for users to express their views, suggestions, and comments.

6. Total score, rating scale, and ranking of study websites

The total score of the study IIT library websites is presented in Table 9 on the basis of previous respective Tables III to X.

Table 11: Total score of content analysis and evaluation features of IIT library websites

IIT Library Website	Content analysis and evaluation features score adapted from Tables III to X								Total Score (out of 90)
	T-III#	T-IV	T-V	T-VI	T-VII	T-VIII	T-IX	T-X	
IIT-1[+]	10	04	14	0	07	06	06	05	52
IIT-2	13	07	15	03	06	06	06	05	61
IIT-3	13	10	17	05	07	07	06	05	70
IIT-4	13	09	19	0	06	06	06	05	64
IIT-5	10	04	13	0	07	06	06	05	51
IIT-6	11	06	11	04	07	07	05	05	56
IIT-7	10	08	15	0	07	06	05	05	56
IIT-8	14	08	16	06	07	07	06	05	69
IIT-9	03	03	06	0	03	06	04	04	29
IIT-10	12	05	09	01	07	07	05	05	51
IIT-11	10	08	13	05	05	07	05	05	58
IIT-12	09	04	10	0	06	07	05	05	46

Note: T-III# General Features of the IIT library websites, T-IV Library services offered via IIT library websites, T-V Library resources found in IIT library websites, T-VI Web/Library 2.0 features in IIT library websites, T-VII Currency, Accuracy and Relevance of IIT library websites, T-VIII Organization and Structure of IIT library websites, T-IX Coverage and Intended audience of IIT library websites, T-X Links and Maintenance of IIT library websites.

1. IIT-Kharagpur; 2. IIT-Bombay; 3. IIT-Madras; 4. IIT-Delhi; 5. IIT-Guwahati; 6. IIT-Roorkee; 7. IIT-Ropar; 8. IIT-Hyderabad; 9. IIT- Gandhinagar; 10. IIT-Jodhpur; 11. IIT-Indore; and 12. IIT-BHU.

A quantitative *five point rating scale* was designed to determine the evaluation checklist whether or not it effectively served its intended dual purpose i.e. to provide a meaningful numerical rating for each individual feature of the IIT library website and to aid in distinguish quality among IIT library websites with similar information content. Its purpose is best served when comparing and ranking the IIT library websites with similar purpose, scope, and content to rank from "excellent" to "needs improvement". The five points rating scale was fixed equally based on the maximum score of 90 quantitative evaluation points. The range for the rating scale was as follows:

- 73–90: Excellent
- 55–72: Above Average
- 37–54: Average
- 19–36: Below Average
- 01–18: Needs Improvement

A cursory glance at Table 12 reveals that out of 12 study libraries, none of the study website had ranked "Excellent". All the study websites were ranked with "Above average, Average or Below average", of which Indian Institute of Technology, Madras (IIT-3) got highest total score of 70 out of 90 (77.77 per cent), followed by Indian Institute of Technology, Hyderabad (IIT-8) with 69 score (76.66 per cent). Interestingly, Indian Institute of Technology, Gandhinagar (IIT-9) got lowest total score with 29 (32.22 per cent). It is generally true that the IIT libraries ranking higher on the website comparison tend to have a specific team dedicated to either web issues or technology issues, whereas lower ranked libraries tend to have fewer personnel dedicated to web issues. The rating system proved to be an efficient and effective means of representing data collected in each part of the instrument. The ranking table was especially helpful in bringing together all of the individual scores and then in generating a final composite rating. The system performed extremely well in accomplishing its original two goals: (i) to provide quantitative indicators of quality, and (ii) to serve as a means of justification for qualitative data.

Table 12: Ranking of study IIT library websites in India

IML Websites in India	Total Score (Max.90)	Rank
Indian Institute of Technology, Madras (IIT-3)	70	Above Average
Indian Institute of Technology, Hyderabad (IIT-8)	69	Above Average
Indian Institute of Technology, Delhi (IIT-4)	64	Above Average
Indian Institute of Technology, Bombay (IIT-2)	61	Above Average
Indian Institute of Technology, Indore (IIT-11)	58	Above Average
Indian Institute of Technology, Roorkee (IIT-6)	56	Above Average
Indian Institute of Technology, Ropar (IIT-7)	56	Above Average
Indian Institute of Technology, Kharagpur (IIT-1)	52	Average
Indian Institute of Technology, Guwahati (IIT-5)	51	Average
Indian Institute of Technology, Jodhpur (IIT-10)	51	Average
Indian Institute of Technology, BHU (IIT-12)	46	Average
Indian Institute of Technology, Gandhinagar (IIT-9)	29	Below Average

7. Conclusion

The library website is a mirror of the library and it represents the library across the globe by internet. Thus, it should be well developed, organized, and maintained with rich content, so that needs and expectations of its users can be fulfilled. The study has revealed that study websites were lagging behind in exploiting the full potential of web/library 2.0 features. Findings show that many of the study IIT library websites in India were ranked above average, average, and mainly providing general information of the library and their services and resources. It is hoped that study libraries will attend the lacunae and develop soon more interactive, up-to-date dynamic contents, web 2.0 and web 3.0-based features, instant messaging (IM) reference services, virtual library tours, floor maps, online library calendar, FAQs, bulletin boards, discussion forums, Listserve, web counter, effective searching features, etc.

The present study analysed the Web/library 2.0 features in study websites as per the checklist and found very meagre features. The web generation learners are likely to be most attracted to these developments. The study suggested the following web 2.0 tools based on the findings of the study to improve the quality of the content of the study websites in collaborative age and active way to use the web 2.0 tools: Flickr enable users to contribute, organize, share, and discuss photos; Facebook as a tool for sharing digital media; Podcasting and blogs to alert patrons to new library acquisitions, database updates, events, book readings and other services etc.; Social networks enable messaging, blogging, streaming media, and tagging; Website like Library Thing enables users to catalogue their books and view other users share those books; RSS feeds and other related technologies provide users a way to syndicate and republish content on the Web; Tagging essentially enables users to create subject headings for the object at hand; library wiki as a service can enable social interaction among librarians and patrons, essentially moving the study group room online, etc. Librarians of study IIT libraries will explore the potential for communication, promotion, text responses, and catalogue access via mobile technology with the help of library websites.

The major limitation of the study was sample size, i.e., only twelve functional IIT library websites were evaluated. Another limitation of the study was not undertaken the multimedia features and online evaluation of these websites. More importantly, it should be noted that the evaluation of website features are very much subjective process and is not intended to defame or discredit any study IIT library website. These findings open the door for improvement of the study IIT library websites and model for remaining IIT library websites development in India.

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