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## **Academic Library Websites in Bangalore City, India: An Evaluative Study**

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### **Introduction**

The academic libraries in India, in particular the University Libraries of today, are improving their service base especially with application of Information technology for access and delivery of e-content to their clients. In this process they are also adapting to the change, altering their image, by executing new functions and providing varieties of services in an evolving continuum. The rapid developments in information technologies have already laid a solid foundation for a new innovative evolution of university in the on going digital era. Impacted by new advances in emerging and cutting-edge technologies, however, "academic libraries have already transformed their specific functions in today's changing world as; information center, learning center, training center, publication center" (Lilili, 2009). The World Wide Web (WWW), the invention of Tim Barnes Lee, has also created tremendous influence in the transformation of libraries as knowledge resource centres, rather than store house of print media. The impact of this change is all pervasive and affecting all the aspects of library operations, information resources and services, staff skills requirements and users expectations. The accelerating pace of technological developments has tremendously increased the ability to access, store, process, communicate and deliver information services to the desk-tops of the libraries' clients. The vast majority of library services are now Web-enabled and so attention is being focused on designing user-friendly and easily managed and maintained library websites. According to Diaz (1998), "a library website can play different roles; it can serve as a workstation where a user finds databases, electronic texts, and the online catalog. It is a way to make library-made products available, it is used as a window to the WWW by making Internet resources available on a selective basis, and it is a communication tool where information about services, people and facilities and collections can be found." Considering these face books as excellent user interfaces to provide access to vast knowledge resources and services offered by the Academic libraries, a review of some Websites of Academic Libraries are taken as cases for evaluation in this paper.

## Review of Related Literature

It is now an accepted fact that Libraries have undergone a mini revolution in the way that they operate and provide information services to users. A vast amount of literature on various aspects of library websites is being generated and published in learned journals. A brief review of related literature is made here for a succinct factorization of evaluation process.

A comprehensive resourceful library website to provide access to the following: (i) orientation of the library resources, services and facilities; (ii) access to online databases and e-journals subscribed by the library; (iii) link to other open source databases and institutional repositories available in different subjects; (iv) access to a world of information from e-books, e-theses, e-dissertations, e-prints and web-based reference sources, etc; (v) computerized library housekeeping operations; and (vi) other resources and services.

In this context of change, the libraries have brought in revolutionary changes in the concept of organization/institution, functioning and management of library and information systems throughout the world (Houghton, 2000). The convenience and availability of *e-information sources* from the Web, have dramatically altered the information landscape and the functioning of libraries (Kuchi, 2006). Website serves as the primary tool in the delivery of services (Shropshire, 2003) to market the library (Balas, 1998) – a fact which needs to assess the quality of academic libraries on the web (Chao, 2002). The library's home page represents a new platform for the delivery of varieties of library services (Bao, 2000) and give academic libraries the leverage and ammunition they need to outperform competitor websites and regain the loyalty of students, teachers, and researchers alike (Detlor and Lewis, 2006 ).

On the evaluation of the website it is said that, "Evaluation is basically a worthy judgment of its utility with several of the component elements of a website, that facilitate, browsing, navigation and search and locate the desired information". In other words, It means an assessment of the worth or value of the unit to the people; it is a means of assessing of performance against users' expectations. It could also be interpreted in the narrower sense whether or not the output (the expectation) is commensurate with the input. In this context website as of a system of organized information, it is the degree of usefulness of the set-up in meeting various objectives of the system that has to be achieved. By and large, evaluation means testing the service or system for the 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). The evaluation criteria, namely the validity of information, coverage, currency, appropriateness, links and structure of the web site, and variations and so on, exist among the websites in terms of their structure and content (Sasikala, 2003; Sapa,2005). Accessibility and usability are the yardsticks to examine the inhibitors and methods of evaluating the sites (Yates, 2005; McGillis and Toms, 2001). The design, usability, and functionality of the website are critical if the libraries are to continue for providing essential services to the patrons in a timely and efficient manner (George, 2005). This also facilitates user access (Li, 1999). The most popular suggestion made by Macmillian and Toms (2001) based on usability study for improving the site was to reduce the amount of text and make links more significant since users do not want to spend the time in reading. According to Callicott (2002) the basic hierarchy of the library website is to bring about certain links closer to the homepage as well as rename and reorganize certain tags that make sense to all users, not just libraries. The descriptive account in short show a set of parameters that for basis for the evaluation of websites in general and libraries in particular.

## Statement of the Problem

The library website continue to evolve as a gateway for providing web-based library services to the students and faculty members. In the transition, it has added the facilities of the Internet, providing remote access to information more easy and viable and is also becoming more economical and to keep it up-to-date. There is thus increasing demand for the web-enabled services to be provided by the libraries

Hence most of the academic libraries in India and elsewhere have designed and developed websites to present their resources and services.

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 these. However, so far in-depth studies relating to evaluation of these websites have not been undertaken except rating the websites on the basis of number of hits only. In view of this, there is a necessity to take up the aspects of in-depth *Evaluation of Select Academic Library Websites* and an such attempt is made in this paper for a useful presentation and perusal of the concerned in the area. A mechanism for the design and development of effective and efficient functionin of library websites of select academic library websites in Bangalore city (India) is attempted in this paper.

### **Objectives of the Study**

The study aims at achieving the following objectives:

- To identify the academic library websites in Bangalore city;
- To know the different features in the Academic Library Websites in the geographical setting
- To identify criteria for the evaluation of academic library websites;
- to evaluate the academic library websites with the identified criteria for the verification of validity, reliability and usefulness ; and
- to rank the selected academic library websites based on the identified criteria.

### **Scope and Limitations**

The study is limited to the five select academic library websites of Bangalore city and based on the evaluation criteria of the currency, accuracy, relevance, organization and structure, presentation, URL maintenance and features etc. and manual evaluation.

The evaluation of select academic library websites is carried with a purpose of verifying the validity, reliability and the usefulness of identified criteria. Which can be considered as broad-based criteria for evaluation of academic library websites in India. The following are the list of academic libraries selected for the study:

- Bangalore University (BU) < <http://library.bub.ernet.in>>
- Indian Institute of Science (IISc) < <http://www.library.iisc.ernet.in> >
- Indian Statistical Institute (ISI) <<http://www.isibang.ac.in/library/library.htm> >
- Indian Institute of Information Technology (IIITB)< <http://www.iiitb.ac.in/library.htm>>
- National Law School of India University (NLSIU)< <http://www.nls.ac.in/library.html> >

### **Methodology and Evaluation Checklist**

The study adopted evaluation methodology to bring-about the factors of usefulness on the basis of criteria identified for evaluation of academic library websites In this context the following particularly devised evaluation checklist is found to be suitable for this purpose.

The checklist inherently are closed questions (dichotomous type) relating to various evaluation aspects such as: currency, accuracy, relevance, organization and structure, presentation, URL maintenance and features etc. To gather more relevant data, however a few open ended questions were also included in order to have descriptive data and extra information / data relating to the subject. The checklist was divided into five main parts preceded by a Rating Table.

The average scores are tabulated from each of the five categories. The averages are added together and the library websites are compared and contrasted based on those scores for ranking. The reviewer's subjective and objective comments about the select library websites are being used to discuss the evaluations based on a broad set of criteria.

The quantitative rating system (ten point scale) was designed to determine 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 select academic library websites and to aid in distinguishing quality among study of websites with similar information content. The rating scale 0-10 with rating 0 is being assigned to the least and 10 to the highest rate by the evaluator of the study. The rating table allows the evaluator to assign numerical value to select Academic Library websites in Bangalore. Its purpose is best served when comparing and selecting sites similar in purpose and scope. Testing of the checklist was performed on 12 th March 2009. In this exercise, a total of ten hours was spent for evaluation of five select academic library websites with the help of the checklist.

### Analysis of the Data

This study evaluates the study websites in five areas: currency, accuracy and relevance; organization and structure; presentation; maintenance; and different features of the library website. The phase of data analysis took place from 13 th March to 23 rd March 2009. Qualitative and quantitative results were analyzed and presented in the following sections. The comparative statement for ranking of academic library websites is presented in the Table VII.

### Currency, Accuracy, and Relevance of the Library Websites

Currency refers to the timeliness of information. Accuracy generally refers to the information content to get the information source and the 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. Table I shows the evaluation of academic library websites in term of retrieval efficiency, contact information, updation, copyright status, and online reference desk assistance. Table I: Currency, Accuracy and Relevance of Academic Library Websites

Currency, Accuracy and Relevance criteria	Library websites*					Scores
	BU	IISc	ISI	IIITB	NLSIU	
Retrieving all the hyper links in the webpage	09	10	06	10	10	45(90 percent)^
Given all the contact information	08	10	07	06	06	37(74 percent)
Copyright status are clearly stated	10	10	00	00	10	30(60 percent)
All hyper links appropriate and relevant for an online reference desk	08	10	05	00	00	23(46 percent)
Last time the site was updated	03	00	05	00	00	8(16 percent)
Total Score ( Max. 50)	38 (76 percent)	40 (80 percent)	23 (46 percent)	16 (32 percent)	26 (52 percent)	

Note: \*BU- Bangalore University, IISc - Indian Institute of Science, ISI- Indian Statistical Institute, IIITB- Indian Institute of Information Technology, NLSIU - National Law School of India University. Figures in parentheses indicate the percentage.

It is observed from the Table I that 90 percent of study websites retrieve all the hyper links in the webpage, followed by 74 percent provide contact information, 60 percent provide copyright status, and 46 percent are providing appropriate and relevant hyper links for reference desk, and only 16 percent of study websites have provided the information about the date of last updating the site.

It is noted that the date of last revision is very important aspect of the website content otherwise the number of audience will be reduced because of obsolete information. Currency is an important consideration because outdated information can become useless as well inaccurate or misleading, most of the study home pages with the date of last update were updated sometime in the last 25 days before being examined for this study. 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 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 and the contents of e-mail and Usenet messages. 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 as well as the individual who should be contacted where copyright permission is required.

Looking at the total efficiency of study websites (Table I), only one study website (IISc) got the highest score i.e. 40. Even this score is also not the highest because the total score obtained here is 40 out of 50 only. That means none of the sites have 100 percent in terms of retrieval efficiency, contact information, updating, copyright status, and online reference desk assistance. IISc has topped with higher score (40), followed by BU (38), NLSIU (26), ISI (23), and IIITB (16). However, this is not the final assessment. The final assessment should take into account all the features of the websites. Therefore, the scores obtained in this table are consolidated with the scores of other tables (means transferred to final ranking table, i.e. Table I score) to final ranking table VII entitled, Ranking of Academic Library Websites.

### **Organization and Structure of Academic Library Websites**

The web page content needs or rather demands the hierarchical, linear and randomly interlinked combinations of the two styles. The structure used to organize the contents of a web page is easy for users to navigate. Organization is an important factor which should be done in such a fashion that each web page will be independent of the other. Each web page has appropriate images, icons and graphics and these should load the home page very fast in any web browser. Proper linking must be maintained so that the user can have provision to come back again to any one of the earlier pages. However, every page should include some information also and not only the links. Table II presents the analysis of organization and structure of study websites in term of accessibility, web browser, loading of images and graphics, and fast retrieval of web pages.

Table II: Organization and Structure of Academic Library Websites

Organization and Structure criteria	Library websites*					Scores
	BU	IISc	ISI	IITB	NLSIU	
Site is accessible from all the Browsers	10	10	10	10	08	48 (96 percent)
How fast does the web page paint?	10	10	10	08	10	48(96 percent)
All images, icons and graphics paint when the web page loads	09	10	09	00	10	38 (76 percent)
Total Score (Max. 30)	29 (96.6 percent)	30 (100 percent)	29 (96.6 percent)	18 (60 percent)	28 (93 percent)	

Note: \* For full forms of the abbreviations, please refer to Table I. Figures in parentheses indicate the percentage

The data in Table II is related to organization and structure of the study websites, 96 percent each study websites are accessible from all the web browsers, "the web page designed should be accessible by a variety of browsers" (Prasad, 2001). 76 percent sites are properly loading images, icons and graphics on their home page. All the homepages of study websites with image files did not take more than 25 seconds to appear completely on the computer screen, "for web pages with images files, the loading time was less than 20 seconds" (Lee and Teh, 2001).

Logos, photographs, images, and icons of the library were common features of all the study websites. Two of these sites have additional photographs of librarians. Surprisingly, all the study websites are organized and structured well but one of the academic library websites (IITB) is poor.

From the above table it is clear that only one website (IISc) got the cent percent in this criterion, followed by BU and ISI (96 percent) respectively, NLSIU (93 percent), and IITB (60 percent). The criteria wise study reveals that the study websites scores highest percentage in accessible from web browser and web page retrieval fast (96 percent), and loading images and graphics (76 percent).

This indicates that 80 percent of the study websites are "excellent". Only average website has a total score of 18 (60 percent). Therefore, the scores obtained in this table are consolidated with the scores of other tables (means transferred to final ranking table, i.e. Table II score of the ranking table) in the final ranking Table VII.

### Presentation of Academic Library Websites

The presentation and arrangement of information on the screen very much matter for the ease of assimilation. This includes whether screens are clearly laid out and aesthetically pleasing, whether there is too much information on each screen, whether the text is easy to read and whether heading stands out. Care should be taken that the page is clearly laid out and all the links are easily displayed on one screen. It is possible to navigate from one section to any of the major sections of the service and the resources that are linked to each hyper link are self-evident. It is also worth considering whether a source is consistently, logically presented and arranged. Table III explains the graphics, text and easy navigation, and presentation of study websites.

Table III: Presentation of Academic Library Websites

Presentation criteria	Library websites*					Scores
	BU	IISc	ISI	IITB	NLSIU	
The graphics and texts are most clear and easy to read	10	10	10	10	10	50 (100 percent)^
Web pages are easy to navigate	10	10	10	10	10	50 (100 percent)
Every page included way to turn the home page for the site	10	10	08	10	10	48 align="center">(96 percent)
Graphics are the most appropriate middle group	10	10	10	00	10	40 (80 percent)
Total Score (Max. 40)	40 (100 percent)	40 (100 percent)	38 (95 percent)	30 (75 percent)	40 (100 percent)	

Note: \* For full forms of the abbreviations, please refer to Table I. Figures in parentheses indicate the percentage

Table III shows that among the study websites, BU, IISc and NLSIU scores cent percent, followed by ISI (95 percent) and IITB (75 percent). Further, the criteria wise study also reveals that it scores cent percentage in graphics; text is easy to read and navigation way to turn homepage (96 percent) and graphics are of middle group (80 percent).

In addition, "good presentation" is often a matter of personal taste. Some of us will feel a particular feature is essential while others may feel the same feature is redundant. However, a comprehensive perspective should include every aspect. Further considerations are: the number of clicks required to locate relevant information, whether steps are unnecessarily repeated, and whether useful shortcuts are available, such as a "home" icon to take directly to the start of a document or resource. In addition, some web pages are extremely long and users must scroll painstakingly through them to find what they want. One alternative is providing links between different sections of the same page or splitting a document into parts by providing links between the different sections. However, the opposite extreme might have many separate pages for small sections of the same document, continually forcing users to download different parts but without offering the option to scroll through larger sections. Obviously, the length of a page is a highly subjective issue but it might consider whether a useful balance has been achieved and whether the organization is appropriate to the content.

The above table indicates that 80 percent of the study websites are "excellent". Only "above average" website has a total score of 30 (75 percent). Therefore, the scores obtained in this table are consolidated with the scores of other tables and transferred to final ranking Table VII.

### Maintenance of Academic Library Websites

Maintenance of the library website is ongoing practice and tedious job of the webmaster. One factor to be considered is the currency of all hyper links, some sites include a policy regarding the updating process. Such a policy may include details of whether an individual or group is responsible for maintenance, their knowledge and expertise, and their motivation for doing so. If individuals or groups maintain a site voluntarily, they may be more likely to lose interest and therefore fail to maintain the site effectively in the long term. Contact information for site maintainers is also a useful feature and suggests a concern for site maintenance.

In fact, the most exciting and useful feature of the web site is the implementation of web forms. Forms provide a way for collecting detailed information from Web users. With the feedback from, 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).

Speed of access is of particular concern and factors affecting speed include the location of sources, the number and size of any images. In addition, "sites are faster to access if it is possible to view a text-only version of the information". This ensures that pages are meaningful to any user irrespective of the fact whether the images are viewed or not. The maintenance of the study websites in term of maintenance, feedback and speed of access is presented in Table IV. Table IV: Maintenance of Academic Library Websites

Maintenance criteria	Library websites*					Scores
	BU	IISc	ISI	IIITB	NLSIU	
Persons responsible for the site display	10	10	02	00	00	22 (44 percent)^
Allows a user to send feed back or comments to library	00	10	10	00	00	20 (40 percent)
Server appear to be fast	09	10	10	10	10	49(98 percent)
Total Score(Max.30)	19 (63.3 percent)	30 (100 percent)	22 (73.3 percent)	10 (33.3 percent)	10 (33.3 percent)	

Note: \* For full forms of the abbreviations, please refer to Table I. Figures in parentheses indicate the percentage.

It is observed data from the Table IV that the IISc website scores (100 percent) highest among the study websites, followed by ISI (73.3 percent), BU (63.3 percent) and IIITB and NLSIU (33.3 percent). The study reveals that score highest percentage in the criteria of servers appear fast (98 percent), persons responsible (44 percent) and feedback or comments (40 percent).

This indicates that 20 percent of the study websites are "excellent", followed by 40 percent are "above average". The "below average" websites have a total score of 10 each (40 percent). Therefore, the scores obtained in this table are consolidated with the scores of other tables and transferred to final ranking Table VII.

### Features of Academic Library Websites

Web-based Public Access Catalogue (Web PAC) is the most widely provided information service on library websites. It is hardly the case that a library has a web page without Web PAC. It helps users to browse/search the library catalogue remotely, even from homes. It also gives an idea to the users about the status of the document whether it is issued or available and searches the online database for articles and act as a gateway to additional resources on a variety of subjects, such as: e-books, e-reference resources, e-newspapers, e-journals, open access journals, consortia-based e-resources, proceedings of conferences, local and internationals library and information resources, etc. If the user is looking for specific information this is not reflected in the contents pages of the website, an additional search facility will be of great help. The table V presents the different features of study websites as prescribed by the evaluation checklist.

Table V: Features of Academic Library Websites

Features of Library Websites criteria	Library websites*					Scores
	BU	IISc	ISI	IIITB	NLSIU	
An option to request reference assistance	08	10	10	10	07	45 (90 percent)
An option to search a library's OPAC	10	10	10	00	10	40 (80 percent)
Hyper links to e-journals and databases	10	10	10	00	10	40 (80 percent)
Hyperlinks to open access resources	03	10	10	00	00	23 (46 percent)
Search Engine functionality	10	10	00	00	00	20 (40 percent)
Hyper links to other web reference sites	00	00	10	00	00	10 (20 percent)
Total Score ( Max. 60)	41 (68.3 percent)	50 (83.3 percent)	50 (83.3 percent)	10 (16.6 percent)	27 (45 percent)	

Note: \* For full forms of the abbreviations, please refer to Table I. Figures in parentheses indicate the percentage.

It is observed from the Table V that 90 percent of the study websites as an option to request reference assistance via e-mail, followed by 80 percent study libraries had incorporated access to the library catalogue through the library website “the same fact attested by the recent studies conducted by Mirza and Mahmood (2009, p. 3); Aman (2004, p.68)”. The one academic library that did not provide access to its Web PAC through internet was the library which had OPAC that can be accessed remotely through Campus Wide-Area Network, 80 percent study websites provided hyperlinks to e-journals and databases. The study libraries have their own e-subscription to e-journals and databases and also providing consortia-based e-resources of UGC-Infonet Digital Library Consortium and Indian National Digital Library in Engineering and Science and Technology (INDEST) consortium, 46 percent of study websites having hyperlinks to open access resources. Only 40 percent study websites have incorporated the search facility. Hyper links to other web reference sites is the least feature (20 percent).

This indicates that 40 percent of the study websites are "excellent". Only "above average" website has a total score of 41 (68.3 percent), followed by "average" website has a total score of 27(45 percent). Only "needs improvement" website i.e. IIITB has a total score of 10 (16.6 percent). However, this is not the final assessment. The final assessment should take into account all the features of the websites. Therefore, the scores obtained in this table are consolidated with the scores of other tables and transferred to final ranking Table VII.

A website's primary function is to provide a search engine for gathering and reporting information available on the internet or a portion of the internet. A search engine is essential for an academic library website of any size. The survey indicates that, out of five websites under the study only two have incorporated this feature; the same fact is attested by the recent study conducted by Detlor and Lewis (2006). The main function of an academic library web site is to provide access to research tools and full-text databases for education and research purpose” (Lee and Teh, 2001), but meager hyperlinks to open access resources and other web reference sites by the study websites.

## Rating Scale for Academic Library Websites

Using data gathered from the study websites analysis and the evaluation checklist, a numeric score was generated for each study website in the study.

The five point rating scale was fixed equally based on the maximum score 210 of currency, accuracy and relevance (Table I and 50 points); organization and structure (Table II and 30 points); presentation (Table III and 40 points); maintenance (Table IV and 30 points); and features of library websites (Table V and 60 points), to rank the study the study libraries, the rating scale was designed to rank "Excellent" to "Needs Improvement" based on the five point scale below (Table-VI): Table-VI: Rating Scale for Academic Library Websites

Range (Score)	Rank
169 - 210	Excellent
127 - 168	Above Average
85 - 126	Average
43 - 84	Below Average
01 - 42	Needs Improvement

## Ranking of Academic Library Websites

Ranking of the study websites on the basis of five point rating scale (Table VI) and points taken from the Table I through V is presented in the following Table VII. Table VII : Rankings of Academic Library Websites

Sl. No.	Library Website*	Evaluation criteria and Points*					Total Points (210)	Rank
		Currency, accuracy and relevance (Table I, 50)	Organization and structure (Table II, 30)	Presentation (Table III, 40)	Maintenance (Table IV, 30)	Features of library websites (Table V, 60)		
1	IISc	40	30	40	30	50	190 (90.47 percent)	Excellent
2	BU	38	29	40	19	41	167 (79.52 percent)	Above Average
3	ISI	23	29	38	22	50	162 (77.14 percent)	Above Average
4	NLSIU	26	28	40	10	27	131 (62.38 percent)	Above Average
5	IITB	16	18	30	10	10	84 (40 percent)	Below Average

Note: \* For full forms of the abbreviations, please refer to Table I. Figures in parentheses indicate the percentage.

It is observed from the Table VII that the rankings based on the points assigned to the academic library websites and a cursory glance at the table reveals that IISc got 190 points (90.47 percent) and is ranked "excellent", followed by BU 167 points (79.52 percent), ISI 162 points (77.14 percent) and NLSIU 131 points (62.38 percent) are ranked as "above average". The only website that has ranked "below average" is IITB with 84 points (40 percent). The graphical representation of the same is depicted in

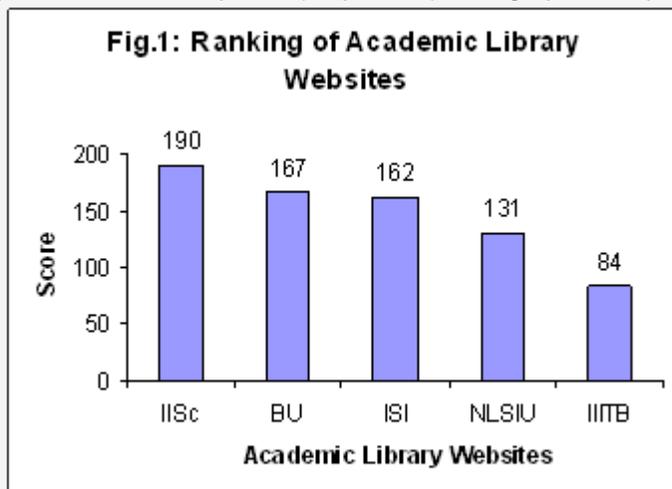


Fig.1.

Note: \* For full forms of the abbreviations, please refer to Table I.

It is generally true that the 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: 1) to provide quantitative indicators of quality and 2) to serve as a means of justification for qualitative data.

These ranks clearly indicate that there is a need to develop academic library websites in the above features. To survive in the present web 2.0 and Library 2.0 environment, there is no substitute or escape to avoid. Only developing their websites and meeting the web challenges to strengthen their vital web-based library services is imminent.

## Suggestions

The evaluation of study websites and the subsequent analysis of the data and the findings of the study have enabled the investigator to provide some practical suggestions about starting and improving the web-based library services expected from study websites. The main suggestions for improvements are as follows:

1. Academic library websites should be developed into a more dynamic and interactive and compatible with Web 2.0 or Library 2.0 and Web 3.0 technologies. Library 2.0 is offering dynamic websites for the libraries which embedded with semantic web and interoperability of various tools and techniques.
2. Academic libraries must provide dynamic contents, RSS feeds, instant messaging (IM) reference services, virtual library tours, online library and floor maps, online library calendar, FAQs, bulletin

boards, discussion forums and Listservs represent the new ultimate level of power for web-based library services.

3. Blogs, or web logs, are versatile platforms for presenting information to academic library patrons. When combined with academic library web sites, they are capable of enhancing existing web presence and providing opportunity for conversation and communication (Schrecker, 2008).
4. Academic libraries should make the portal interactive by hosting the announcements about new library resources and services, links to the websites of interest to the academic and research studies.
5. Every effort should be made on a consistent basis to update the library portal frequently. This will certainly entice users to library portal and then to the library resources and services.
6. While uploading any web page to web server the Webmaster must test the web pages thoroughly using different browsers. He/she should ensure that the page should be seen similar in all the browsers.
7. Web forms in each web-based library service should be provided in the study websites to attract the suggestions, comments about the pages. In case of library websites the feedback mechanism will enable the Librarians to know about user requirements and accordingly improve the user services.
8. The Library websites should be a knowledge resource portal to give one stop answer to their user community. Hence, the open access information relevant to the user group must be classified and presented in the library websites.
9. Remote access is one of the biggest advantages of digitizing local sources and making them available online in the websites.
10. There should be a regular and continuous user-oriented evaluation of websites as to adjust the site depending upon the requirements of the users.
11. Each study library on a regular basis should compare its own website with those of similar websites in order to simulate the continuous development of the site.
12. All the study websites must and should evaluate their websites with online tools.

## Conclusion

The academic library websites are mirror of their collection, services and user-focused gateways to rich, quality content and they play a key role in the learning and research processes. The users are more accessible from the library websites than to the physical library itself. In this way, "academic library websites will become user-focused gateways to rich, quality content and, in doing so, re-establish the campus library's central role in the learning and research process" (Detlor and Lewis, 2006 ) and academic library will be everywhere they need it to be ( Bailin and Grafstein , 2005). The dynamic library websites and web-based library services will enable the users to be attracting the libraries. Hence, the study undertaken to reflect the need for well organized, dynamically maintained library websites for the study libraries. The most important single aspect of any website is its usability. The website of academic library should reflect users' needs and expectations. The library website content, structure, and design need to reflect with changes in user behaviour, technology, and information resources.

Based on the findings, academic library websites in Bangalore city have not come up to expectations as virtual expressions of the quality level of the academic excellence. There is a lack of information organization in most of the study websites. Hence, it is essential for these libraries to implement internal as well as external and manual and automated periodic evaluation of their websites. Such a kind of evaluation will give fool proof evaluation that critically reflects the defects of every website.

The study has revealed that study websites are lagging behind in exploiting the full potential of the library portal. Findings show that many of the study websites are yet to exploit full potential of the web-based forms, which are effective tools for library-user interaction and communication. It is hoped that libraries at the academic institutions will attend to the lacunae and develop soon a fully functional, interactive, dynamic content web portal with Web 2.0 and Web 3.0 technologies because academic community would expect information professionals as one of several professions vying for leadership in

the information age to organize and present information in a way that best fits the users attention and knowledge.

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