
Development of Health Sciences Digital Library Using Greenstone Digital Library Software at Baba Farid University of Health Sciences

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Abstract

The enforcement of change happening in the knowledge creation and information management force to traditional library becomes a digital/ hybrid library (Yadav and Chidambaram, 2008). There are a number of university and institutional libraries, which are in the process of conversion of traditional library system into modern digital library systems. The credit for this movement is gone to Open Source Digital Library Software (OSDLS). Due to the OSDLS, digital library planning and development in practice has been increased in the world. The university library of Baba Farid University of Health Sciences (BFUHS) has also started digital library initiative and development of the Health Sciences Digital Library (HSDL) using open source Greenstone Digital Library Software (GSDL). The objective of this article is to give the analogy of road map for the plan and development of HSDL. It also narrates the digital library activities carried out in BFUHS university library.

Keywords: Digital Library Initiatives, Digital Library Design & Development, Health Sciences Digital Library, Greenstone Digital Library Software, Open Source Software.

1. Introduction

The Information & Communication Technology (ICT) revolution during the last decade has had a drastic and far-reaching impact on all aspects of professional endeavor, particularly in the knowledge and information sectors. The Internet has added a new dimension to Information Technology (IT) and knowledge-sharing platforms, giving rise to rich concepts such as Digital Library (DL), e-learning, knowledge management, and archiving of indigenous culture and heritage. DLs can help move the nation towards realizing the enormously powerful vision of any time-access to the best and the latest of human thought and culture, overcoming all geographical barriers, so that no classroom or individual is isolated from knowledge resources.

In India, several institutions, as well as universities, private bodies, and others have initiated national and regional level capacity building initiatives on digital libraries. The University Library of Baba Farid University of Health Sciences has also initiated the Health Sciences Digital Library Project using open source Greenstone Library Software. The present article exhibits the university library system, digital library planning & design, selection of open source digital library software and some other related aspects of digital library development at BFUHS.

2. Literature Review

Krishnamurthy (2003) conducted a study in Indian Statistical Institute, Bangalore. The study exhibits the development & design of digital library in the institute using Greenstone Digital Library Software. The study outlines the practical issues and key stages involved in digitizing process.

Sonkar et al. (2005) exhibited in their article about the development of digital library of newspaper clippings using GSDL. The article also described the implementation process of GSDL and steps involved in creation of digital library using the GSDL.

Zhang (2006) conducted a case study on building digital library collections using Greenstone Digital Library Software and described that since 2002, Washington Research Library Consortium has created twenty-two digital collections using GSDL. The study also exhibits the reason why GSDL has been used for digital library development, silent features of software and usefulness of software for an organization.

Jose (2007) conducted a survey on adoption of open source digital library software packages. The survey emphasized the need of making library professionals aware of application of information technologies in library & information science. The survey reported that the DSpace is the most popular and used open source digital library software followed by Eprints and Greenstone.

Satpathy (2007) in his study highlighted the National Institute of Technology Silchar Digital Library Project. The paper exhibits the objectives of digital library project, methodology adopted for the implementation of the project and outcomes of the project.

Sharma, Kumar and Kumar (2007) conducted a comparative study of open digital library software. The study compares the features of three mostly used open source digital library software viz. DSpace, Greenstone and Eprints. The results of the study showed that Greenstone has more features compare to other two open source digital library softwares.

Yadav and Chidambaram (2008) in their paper described the planning and development process of digital library using GSDL at NIPFP library. The paper described the reason for why GSDL has been chosen as digital library initiative at NIPFP library. It also exhibits the main characteristics of the GSDL, architecture & key components and framework of guidance for building good digital collections.

3. What is Digital Library?

The word digital library could be inferred as computerized network system where all the information is stored in electronic format, which can be accessed and transmitted through network enabling retrieval of desired information by large number users. Users will normally access the information they desire using a web browser from any terminal computer at their place of work (Satpathy, 2007).

Lesk (2005) defines digital library as a collection of information that is both digitized and organized and which offers capabilities beyond those of the traditional library. In the same way Larson defines a digital library as a global virtual library – the library of thousands of networked electronic libraries.

The digital library should have following elements:

- ◆ Collection in the form of electronic format.
- ◆ It is not a single entity.
- ◆ The linkages between the many digital libraries and information services are transparent to the end users.
- ◆ Universal access to digital libraries and information services is a goal of many digital libraries.
- ◆ Digital library collections are not limited to documents surrogates: they extend to digital artefacts that cannot be represented or distributed in printed formats (Jain, Jindal and Parveen, 2007).

3.1 Planning of Digital Library

Essentials of digital library are to provide increased interaction and personalisation options to the users and continuing improvements in computing and networking special and storage capabilities. Technology will continue to mature and change over time, which will continue to affect library patrons' needs and expectations. Digital library integration work touches most areas of library operation, library leaders have often addressed it by creating cross-functional teams that can work together to design system and solve problem. Yadav and Chidambaram (2008) have suggested the following points which are important for planning digital library system in an organization:

1. The institute and the library goals should drive digital library initiative work.
2. Based on the goal of the organization explains and narrates the possibilities that data are created by digital technology can solve easily.
3. Long-term planning: Based on the continuously evolving nature of digital environment library should make detail technical plans that forecast the feature ahead.
4. Librarians and library need to position themselves to deal with the change.
5. Collaborative network: The best practice of social networking with community-wise participation to develop is known the standards, resources and services for the institutions as the whole.

6. Learned experience: Library should look to research organization and its development in the DL planning.
7. Develop digital library society with inter and intra organizational knowledge sharing networking.

3.2 Development of Digital Library

Some of the important points to be considered while developing a digital library system are:

- ◆ Digital collection or material selection
- ◆ Access to external digital collection
- ◆ Conversion of existing print, audio and video into digital format
- ◆ Storing
- ◆ Creating portals or gateway to the electronic collection available on the web
- ◆ Integrated access interface

3.3 Selection of the Digital Library Software Package

The software selection based on set parameters is a difficult task, as the technology itself is still emerging only. There are no strong role models too from the Indian side, to be relied upon, though lot of initiatives have been started. The university library & information system of BFUHS wanted a system that is flexible enough to fit the current digital information system as above and to accommodate future migration. The software should address all major digital library related issues such as 'design criteria', 'collection building', 'content organisation', 'access', 'evaluation', 'policy and legal issues' including 'intellectual property rights'. It should provide two important user interfaces: a public user interface for presentation and a metadata creation interface for administration. The system should also provide a powerful search engine and the interface should be easy to navigate and there should be provision for customisation (Shreekumar, 2008).

The authority of the university decided not to go for proprietary digital library software and as per the recommendations of the university authority; the library evaluated some of the popular Open Source Software for digital libraries, which are in use internationally. Out of 'Eprints', 'Fedora', 'Greenstone', and 'DSpace', Greenstone outscored the group and the university library formally adopted this software for creating the BFUHS Health Sciences Digital Library.

3.4 Why Greenstone Digital Library Software Package?

In order to develop a Health Sciences Digital Library of BFUHS, Greenstone Digital Library software was opted due to its features like full text searching, open source system for the construction and presentation of information collections. It builds collections with effective full-text searching and

metadata-based browsing facilities that are attractive and easy to use.

The Greenstone Digital Library Software is a top of the line and internationally renowned Open Source Software system for developing digital libraries, promoted by the New Zealand Digital Library project research group at the University of Waikato, headed by Dr. Ian H. Witten, and is sponsored by the UNESCO (Shreekumar, 2008). The Greenstone was originally released in 2000 under the GNU public license with its current version 2.80, released in December 2007 and *Greenstone3* version is parallel release (Witten, Bainbridge, 2008). *Greenstone3* is a complete redesign and reimplementations of the original Greenstone digital library software (Greenstone2).

The GSDL software is very easy software with menu driven step-by-step process. Moderate computer literacy people can install and use the software option existing in GSDL. Transformation mode of digital library like local library and then web library is also advantage. GSDL is only software that has the simple windows operating system. Greenstone has two separate interactive interfaces, the Reader interface and the Librarian interface. End users access the digital library through the Reader interface, which operates within a web browser. The Librarian interface is a Java-based graphical user interface that makes it easy to gather material for a collection (downloading it from the web where necessary), enrich it by adding metadata, design the searching and browsing facilities that the collection will offer the user, and build and serve the collection. The following are the some of the silent features of GSDL relating to digital library context:

- ◆ Access and distribution – Web and CD-ROM
- ◆ Multiplatform availability: It suits with both Windows (3.1/ 3.11, 95/98/me, NT/2000) and Unix (Linux Sun OS). Any of these systems may be used as a web server.
- ◆ Powerful Indexing
- ◆ Full-text searching: It builds collection with effective full-text searching and metadata-based browsing facilities. Collections containing millions of documents, up to several gigabytes can be built. Full-text searching is fast because compression is used to reduce the size of the indexes and text users can browse the list of authors, titles, date, class no. etc.
- ◆ Field-based indexing
- ◆ Automatic derivation, explicit assignment
- ◆ Support for Dublin Core and other metadata
- ◆ Boolean and ranked retrieval
- ◆ Case folding, stemming
- ◆ Browsing – Field-based and hierarchical document browsing

- ◆ Support for several documents formats such as Text, HTML, Word, PDF, PS, Bibliographic, E-Mail, PPT, etc. and plugins can be written to accommodate new document types, the collection can contain pictures, music, audio, video clips, contain pictures, music, audio, video clips, etc.
- ◆ Common interface for different DL collection
- ◆ Configurability – indexing, browsing presentation
- ◆ Multilingual support – documents and interfaces
- ◆ Advanced compression for text and indexes
- ◆ Collection administration
- ◆ Access & updating security, activity log
- ◆ Interoperability
- ◆ Z39.50 is supported for accessing external servers and for presenting Greenstone collection to external clients.
- ◆ Open Archives Initiatives
- ◆ Good documentation & support (e-mail)
- ◆ Strong R&D based development group
- ◆ Collection can be updated and new one brought online any time with out bringing down the system.

Furthermore, emphasis on choosing character can be cited here from UNESCO web page says about the aim of software “is to empower users, particularly in universities, libraries, and other public service institutions, to build their own digital libraries. Digital libraries are radically reforming how information is disseminated and acquired in UNESCO’s partner communities and institutions in the fields of education, science and culture around the world, and particularly in developing countries. We hope that this software will encourage the effective development of digital libraries to share information and place it in the public domain”.

3.5 Software Requirements

- ◆ Operating System Windows/ Linux
- ◆ Apache web server / IIS
- ◆ PERL
- ◆ Java 2 Runtime Environment (version 1.4.2_03)

- ◆ Web browsers – Netscape Navigator or Internet Explorer
- ◆ SDL 2.41 or latest

3.6 Steps for Installation of Software

Installation of GSDL on Windows (Web Library)

The following steps are needed for installation:

1. Install the web server IIS/Apache
2. Install the Java 2 Runtime Environment from the internet (latest version)
3. After installing J2RE, Go to GSDL Folder “gsdl-2.41-win32” (Setup file) from the Internet “MyComputer-GSDL-”gsdl-2.41-win32.exe”
4. Choose Setup Language. English [United States] is the default
5. The Install Shield Wizard will begin the installation of GSDL software. Click <next>
6. Accept all the terms of license agreement by clicking on <yes> button
7. Choose the type of installation you need and choose the collection/s that you want to be installed.
8. Set the admin password (The above step will install web library edition of GSDL and any other sample collection/s and/or GSDL documentation, CD exporting function depending on what was checked or unchecked)
9. Check the Greenstone Directory Structure:
 - D: gsdl/Collect
 - Cgi-bin
 - Micros
 - Gli etc.

4. Baba Farid University of Health Sciences (BFUHS)

Baba Farid University of Health Sciences established at Faridkot under an Act of Punjab State Legislature (Punjab Act No. 18 of 1998) in the name of great Sufi Saint Sheikh Farid for purposes of affiliating, teaching and ensuring proper and systematic instruction, training and research in Modern Systems of Medicine and Indian Systems of Medicine. With jurisdiction over the whole of Punjab it is the first University of its kind in the entire Northern and North-Western region of India. It is not only an affiliating and examining body but also a teaching and research centre in health sciences. It is expected to play a vital role in improving the standards of medical and health education in the state and conduct relevant research in all aspects of health sciences, basic as well as applied, which

ultimately would ameliorate the health standards of the people of Punjab. It is believed that the University would be a pace setter in developing appropriate modes and models of health care suited to give quality health care to the people.

4.1 University Library & Information System at BFUHS

The university library of BFUHS is located in ground floor of administrative block. It is in an easily accessible and in a central position of the university campus. It is managed by highly qualified team of library & information and computer science professionals. All the library operations have been automated with the help of e-Granthalaya (<http://www.e-granthalaya.com>) software of National Informatics Centre (NIC), New Delhi. All the books, theses, journals and other print resources have been bar-coded. The bar-coding technology has also been used for circulation purposes.

The university library & information system of BFUHS can be accessed online through its website <http://library.babafariduniv.com>. It provides access to its collection through online web OPAC (Online Public Access Catalogue). It is partially air-conditioned. Besides comfortable seating and reading environment, facilities such as Internet surfing, document scanning, printing, CD-ROM facilities, online literature searching, on request literature search, subject bibliography, articles database searching, document delivery services, inter-library loan (university library is member of Developing Library Network, New Delhi and library network of Association of Commonwealth Universities, London), photocopying services have been provided. Figure 1 shows home page of the university library & information system of BFUHS.

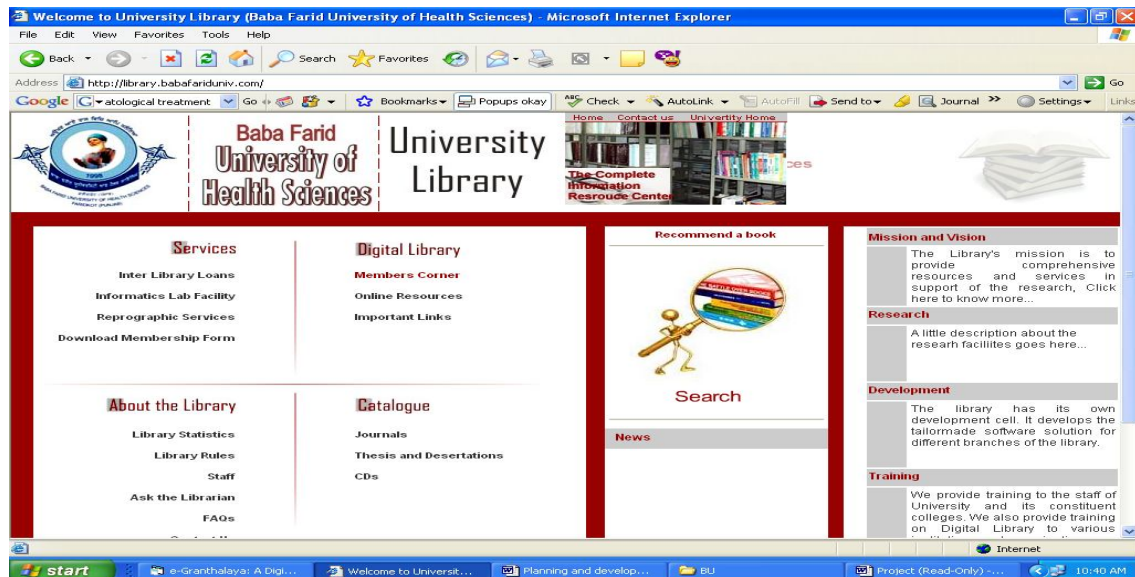


Figure 1 University Library & Information System of BFUHS

4.2 The Mission and Objectives of the University Library & Information Systems are:

The University Library's mission is to acquire, manage and to assist physicians, health professionals, students and medical research scholars in finding health and scientific information to improve, update, assess or evaluate health care, patient care and related to their field of interest. To fulfill this mission, the university library commits to:

- ◆ Support university to impart quality education in the field of Health Sciences;
- ◆ Establish appropriate linkages with other regional, national and international libraries and network;
- ◆ Enhance resource sharing and networking among the libraries of affiliated colleges in the region;
- ◆ Automate & modernize the university library activities;
- ◆ Ensure the preservation and long-lasting availability of library collections and resources.

To ensure quality and proper functioning of University Library, the system has been divided into following divisions:

1. **University Library & Knowledge Centre (ULKC):** - This division provides access to all the electronic and physical resources available with the library. It works like a local knowledge centre and portal for national and international knowledge for the local and research community.
2. **University Computer & Informatics Division (UCID):** - The university library system has an excellent computing infrastructure including 22 desktop computers, 02 color laser printers, 02 laser printers, 01 color inkjet printer and two scanners. All the computers are connected to the campus-wide network. The leased line with 512 kbps from BSNL has been installed in the division for fastest access to information and up-gradation into 1 mbps fiber optics line is under process.
3. **Health Sciences Digital Library (HSDL):** - This division is taking care of all digital library development activities.
4. **Resource Sharing & Networking Division (RSND):** - The main function of the division is to develop and make policies related to the networking of libraries and resource sharing. Presently the division is developing proposal for consortium of health sciences libraries of affiliated colleges of university viz. Health Sciences Library Network (HSLIBNET).
5. **Research & Consultancy Division (RCD):** - The function of this division to do further research for the adoption of new softwares and implementation of new techniques in

the university library & information system and to provide consultancy services for digital library development and library automation related activities. This division will also develop new standards and projects for the university library & information system.

6. **Software Development Division (SDD):** - This division develops new softwares for the university as well as for constituent colleges of university.
7. **Training & Publication Division (TPD):** - The TPD provides training on all the aspects of computer, information and library. This division also publishes the various publications related to Health Sciences and activities of university library system of BFUHS.

4.3 Health Sciences Digital Library Initiative at BFUHS

BFUHS's University Library and Knowledge Centre (ULKC) blends digital, audio, video and print media with cutting-edge technology. The library started functioning in the year 2007. The ULKC aims at providing state-of-the-art information resources and value-added information services in all areas of health sciences and related disciplines. The ULKC is a learning and resource centre catering to the faculty, students and research scholars. It houses around 2000 books, 5000 theses, 50 print journals, over 100 e-books, around 1000 e-theses and 10 electronic journals. The Web enabled Online Public Access Catalogue (OPAC) is available via Internet. A fairly good Internet connectivity (512 kbps leased line, powered by BSNL) and a state-of-art structured LAN with fibre-optic network backbone supports the information access/retrieval requirements of the users. The objectives of Health Sciences Digital Library Project are as under:

4.4 Objectives of the Project

- ◆ To establish a digital library in the field of Health Sciences;
- ◆ To create, acquire or purchase and make available the electronic or digital resources to the research community of university;
- ◆ To setup an excellent knowledge centre for national as well as international information and cost-effective way of providing resources and services locally and remotely;
- ◆ To preserve the rare documents on Health Sciences;
- ◆ To enhance the resource sharing and networking among the affiliated colleges of university;
- ◆ To evolve a financial model to enhance, extend and sustain HSDL collection and services;
- ◆ To support and supplement evidence based teaching, learning, research and practice in Health Sciences.

First of all, university library started developing digital library of newspaper press clippings. The digital form of newspaper clips related to health sciences were added in the collection. The project

was initiated in the June 2007. At present collection can be accessed on the intranet (<http://library/greenstone/library.exe>). The teachers, students, residents, doctors and health sciences professionals can search the information in various fields like title, creator, subject and keywords, name of newspaper, date of publication.

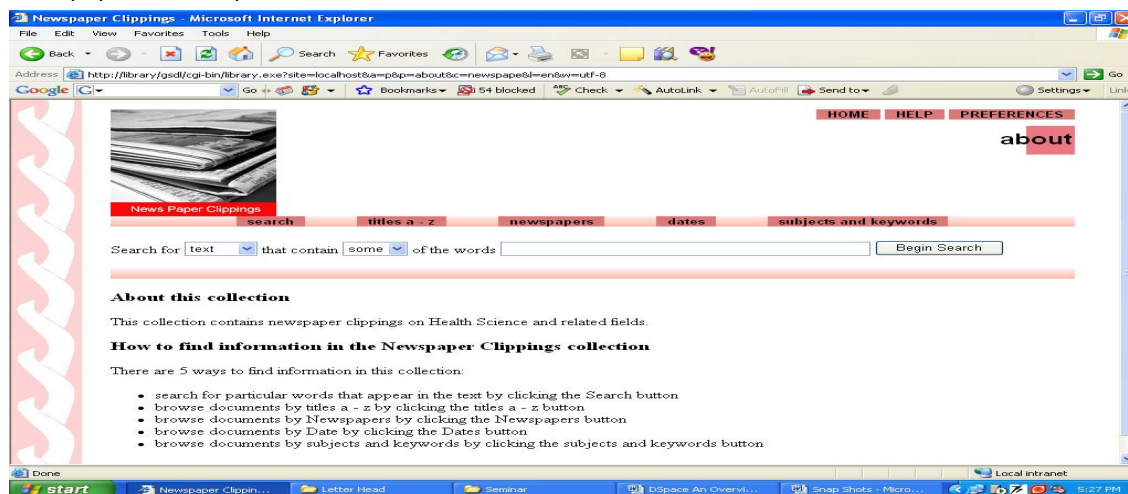


Figure: 2 Digital Library of Newspaper Clippings of BFUHS

The university library has now started digitizing the newspaper clippings and using following steps to digitize:

1. Selection : The library staff scans the contents of newspapers and selects only those articles pertaining the information related to health sciences.
2. Scanning : Selected articles are scanned and saved in a required format indicating the name of the newspaper and publication date.

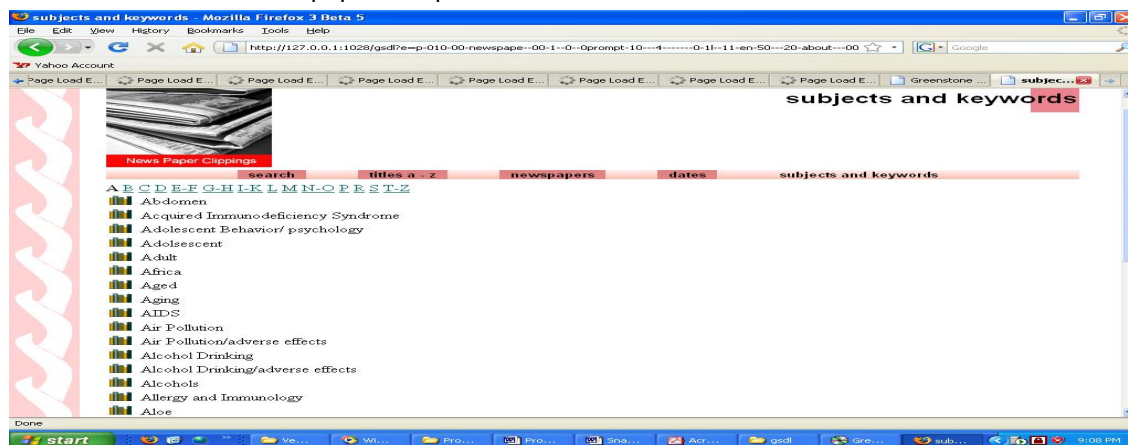


Figure :3 Subject-wise Collection of Newspaper Clippings

3. Creation of Digital Object : The scanned clips are save as in format like pdf, jpg, and doc.
4. Access and Retrieval : The digital library provides browsing and search facility. It also provides advance searching facility in various fields like headline, creator, date of publication and source etc.

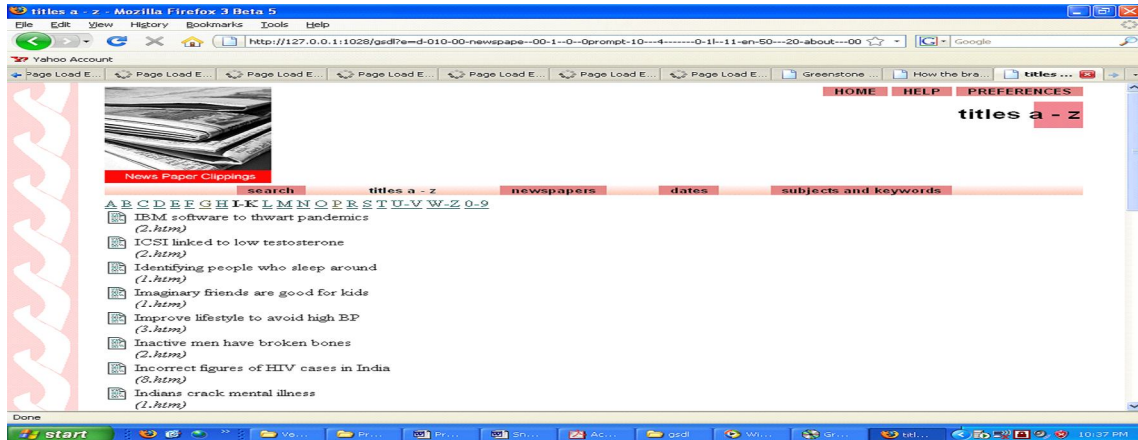


Figure: 4 Title-wise Collection of Newspaper Clippings

Figure 2 shows the digital library of press clippings of BFUHS. Figure 3 shows the subject and keywords-wise collection of newspaper press clips related to health sciences and allied subjects. Figure 4 shows the title-wise collection of newspaper press clips.

In health sciences digital library system, there is a separate collection of theses and dissertations. At present, forty theses on various subject fields of health sciences viz. surgery, dermatology, ophthalmology, social and preventive medicine, radiology have been added. These theses have full text search facility and are accessible through intranet only. The following are the some of the snapshots of theses collection of health sciences digital library system of BFUHS:

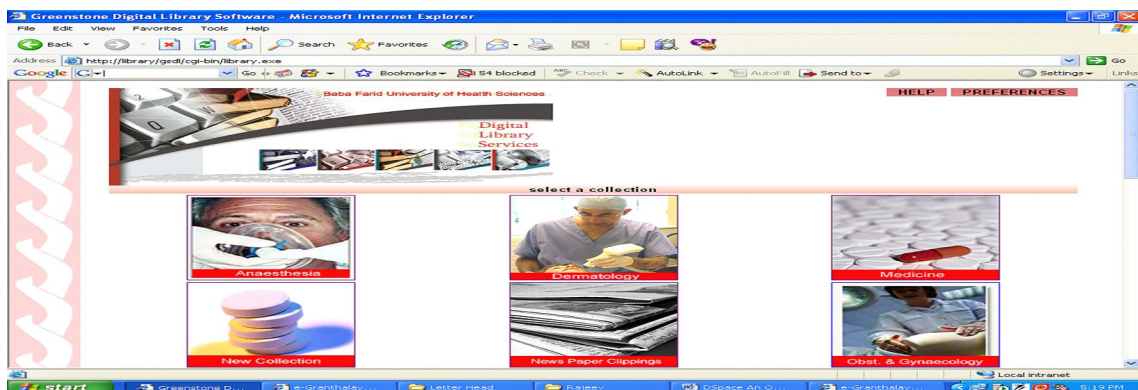


Figure : 5 Theses Collection of Various Subjects

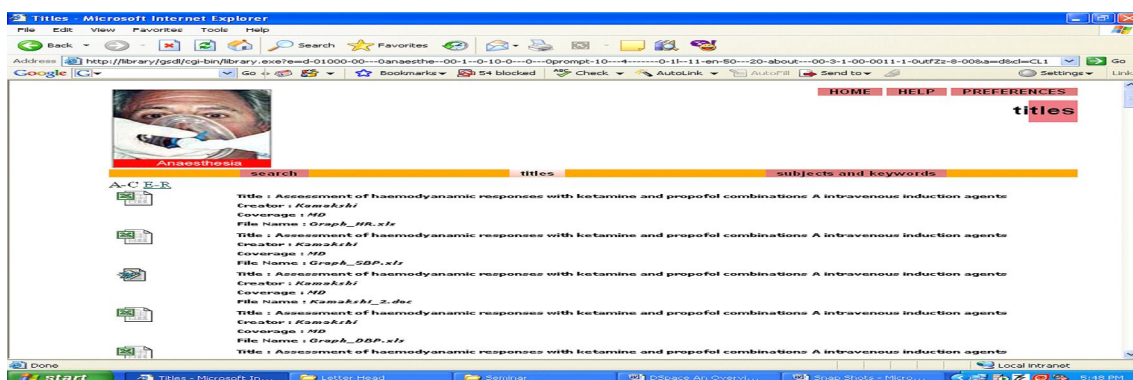


Figure :6 Title-wise Theses in Anaesthesia

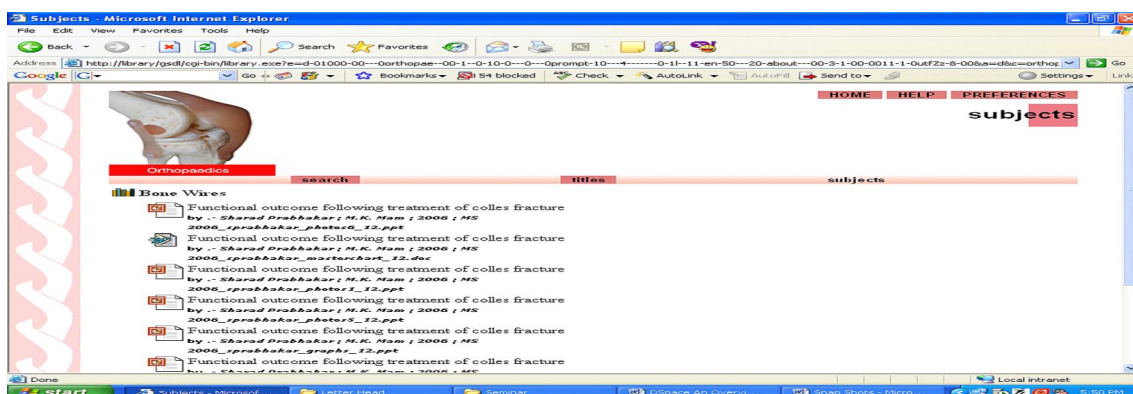


Figure : 7 Subject and Keywords-wise Collection in Orthopaedics

5. Conclusion

Digital libraries are evolving from an experimentation stage to institutionalisation. Next generation digital libraries will supply a comprehensive range of services on network, not as an institutional prerogative, but as a universal search library. The library that meets the information needs with the collections and services which were previously maintained in-house. The approach towards setting up the digital library standards, software technologies and best practices is definitely taking a shape. The information professional has to keep constant watch for new developments and noticeable changes in the field of their concern. To cope up with the information needs with speed and relative accuracy and reliability, the digital library has emerged as the most important and reliable resort, and so knowledge discovery in these type of libraries becomes a predominant factor. Greenstone offers scores of collection and represents the cutting edge of digital library research using greenstone as a vehicle for dissemination. It helps to create different types of collection like audio, Video, image, text and multimedia collection. The digital libraries arena offers a unique challenge to an emerging breed of digital librarians, to combine principles, practices and tools of information

management to create new information product and service. The GSDL offers a dynamic platform for knowledge organization and retrieval (Sonkar et. al., 2005) . Findings from one and half years, looking back and ahead based on the hybrid library movement at BFUHS University Library and Information Centre has the steady progress on Health Sciences Digital Library Initiative with the synchronizing development of GSDL.

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