

**USE OF DIGITAL LIBRARY DEVELOPED THROUGH
GREENSTONE DIGITAL LIBRARY SOFTWARE IN NEPAL**

**A Thesis Submitted to the
Central Department of Library and Information Science
in Partial Fulfillment of the Requirements for the
Master's Degree in Library and Information Science**

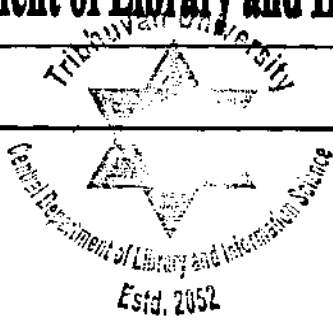
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LETTER OF RECOMMENDATION

The thesis submitted by Lunashree Upadhyaya entitled "USE OF DIGITAL LIBRARY DEVELOPED THROUGH GREENSTONE DIGITAL LIBRARY SOFTWARE IN NEPAL" is prepared under my supervision. I, hereby, recommend this thesis for evaluation and acceptance.

Date: 18 Sep. 2011

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Dr. Mohan Raj Pradhan
Thesis Supervisor

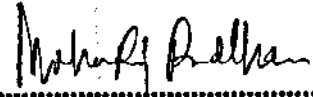


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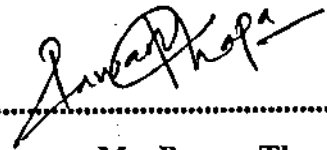

LETTER OF ACCEPTANCE

The thesis attached hereto entitled **“USE OF DIGITAL LIBRARY DEVELOPED THROUGH GREENSTONE DIGITAL LIBRARY SOFTWARE IN NEPAL”** prepared and submitted by Lunashree Upadhyaya in the partial fulfillment of the requirements for the Degree of Master of Library and Information Science is here by accepted and approved.

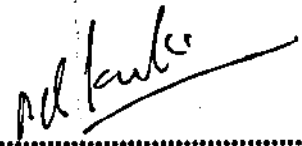
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ACKNOWLEDGEMENTS

First, I would like to express my sincerely gratitude to Dr. Mohan Raj Pradhan, who guided, supported and helped, despite his hectic schedule. My sincere gratitude also goes to all the respected teachers Dr. Madhusudan Karki, Head of the Department, Central Department of Library and Information Science, TU, Mr. Rudra Prasad Dulal, Mrs. Nirmala Shrestha, Mr. Bhim Dhoj Shrestha, Mr. Bishnu Aryal and Mr. Ramesh Parajuli, who always inspired me for my work.

My special thanks and appreciation to my external examiner Mr. Pawan Thapa of Madan Puraskar Pustakalaya. He is acknowledged for his continuous effort to bring this thesis in this shape.

Similarly, I am equally thankful to Mr. Chandra Kanta Jha, librarian of Institute of Medicine, Mrs. Gita Thapa, librarian of Maharajgunj Nursing Campus, Mr. Upendra Mainali, librarian of Nepal Institute of Medicine, Mr. Chandra Bhushan Yadav, librarian of Nepal Health Research Centre and Mrs. Sarita Khanal, librarian of Nepal College of Information technology for providing valuable information and supported me whenever I needed. I would also like to thank my beloved son Shashwot Sapkota, daughter Alisha Sapkota and husband who always helped and supported me whenever I needed during the time when I was preparing this thesis.

Finally, I would like to express my sincere gratitude once again, to my thesis supervisor Dr. Mohan Raj Pradhan and I am also equally thankful to my external examiner Mr. Pawan Thapa.

Thank you.

Lunashree Upadhyaya

ABSTRACT

The thesis entitled "Use of Digital Library developed through Greenstone Digital Library Software in Nepal" has been carried out to investigate the use of digital library developed through Greenstone digital library (GSDL) software in Nepalese libraries of Kathmandu Valley. Specific objectives of the study include knowing prerequisites for developing digital library, finding out criteria of selecting documents to process in digital library and knowing users' opinion regarding the use and usefulness of digital library. The study is limited to five libraries of Kathmandu valley, which are using GSDL software. The study is expected to help those libraries of Nepal which are planning to develop digital library and also to assist in carrying further research.

Different national and international literatures have been reviewed during the study. Most of them are the conceptual review about the digital library and GSDL software. There is not enough literature review regarding the use of digital library in Nepal due to non-availability of the literature. The focus of the study is on digital library, GSDL software and libraries applying GSDL software which includes five libraries namely; Nepal Health Research Council (NHRC) Library, Institute of Medicine (IOM) Library, Nepal Academy of Medical Science (NAMS) Library, Maharajgunj Nursing Campus Library and Nepal College of Information Technology (NCIT) Libraries.

The study has been conducted inside the Kathmandu valley within focused five libraries and the sample taken purposively from the users of those five libraries including the librarians of each library. The study is chiefly based on primary data using questionnaire with few secondary data. The collected data have been presented and analyzed using frequency distribution tables and pie-charts with their detail interpretation.

The major findings of the study show that all the libraries have chosen GSDL mainly because of its workability in both online and offline environment, its provision to process full text information, and the ease involved in operating it without requiring highly skilled manpower. Most of the libraries prioritize to process thesis and research reports over other information source such as books and documents. Out of the five

libraries, four are getting support services through email, telephone and training. Only one has been getting help through discussion group via internet. 15% of the overall users are found to have used digital Library site quite frequently whereas 10% of the other users do not rely on digital collection. 75% of the users access the site occasionally. Majority of the users (55%) visit the digital Library site for research purpose and only 18% of them visit for teaching and learning. The remaining 27% of the users visit it for enhancing their knowledge. Similarly, 83% of the users are not able to access the required information. Among them, 36% are unable to get access to the site due to technical difficulties whereas 64 % do not find the need information due to the slow digitization process.

From the findings of the study, it has been concluded that before developing digital library, it is necessary to have training to use the digital library software, proper planning before digitization for getting proper support services and providing services to the users. Selection of document to process in digital library should be on the basis of high demand. Most of the digital library users visit library occasionally and they prefer to access theses and research articles for research purpose. Similarly, majority of the users are not able to access the required information due to slow processing of information in digital library.

Based upon the findings and conclusions, it has been recommended that in the digital libraries of Nepal, there is a need of processing highly demanded documents as early as possible to provide information promptly to the users and make the digital collection more attractive and useful. Furthermore, due to its special feature, GSDL software is suitable digital library software in the context of Nepalese libraries. Hence, libraries of Nepal must consider using this software for developing their digital library collection.

Dedicated to my parents

PREFACE

The full form of GSDL software is Greenstone digital library software. This software was developed by the New Zealand digital library project at the University of Waikato in the early 2000. This research work on "Use of Digital Library developed through Greenstone Digital Library Software in Nepal" focuses on the use of Greenstone digital library (GSDL) software in Nepalese libraries. Invention of information technology (IT) makes revolutionary change in each and every sector of our life and library and information center is highly influenced by this technology. Libraries of developing countries are also moving toward the paperless library (digital Library) as developed countries. It is a new development for the country like Nepal.

As we know that most of the users in our country are out of reach from the valuable documents, so they are unable to get required information to empower their knowledge. But in this information society age, information should be cheaper which would occupy as minimum space as possible but could be communicated in greater speed ensuring its preservation. This is possible through digital library. This thesis has documented various important aspects of digital library.

This research study consists of six chapters. First chapter deals with the introduction of study. The second chapter deals with literature review. The third chapter includes different topics that are focused in the study. Research methodology used for the study including research design, population, sampling procedure, data collection procedure and data analysis procedure are discussed in the fourth chapter. Fifth chapter presents analyzed data, their presentation and interpretation. Sixth, the final, chapter deals with summary, conclusions and recommendations.

It is hoped that, this study will help the interested users to get information about the application of this software in Nepalese libraries and its uses.

Lunashree Upadhyaya

CATALOGUE OF THE THESIS

Main Entry

D
025.04095496

Uplu Upadhyaya, Lunashree

Use of digital library developed through Greenstone digital library software in Nepal / submitted by Lunashree Upadhyaya. – Kathmandu: Central Department of Library and Information Science, 2010.

xviii, 62 p. : ill. ; 30 cm.

Bibliography at the end of each chapter.

Thesis (M.A.)–Central Department of Library and Information Science, Tribhuvan University, 2011.

1. Digital Library Software–Nepal. 2. Greenstone Digital Library Software–Nepal. I. Title.



Shelf List Card

D
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Use of digital library developed through Greenstone digital library software in Nepal / submitted by Lunashree Upadhyaya. – Kathmandu : Central Department of Library and Information Science, 2011.

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1. Digital Library Software–Nepal. 2. Greenstone Digital Library Software–Nepal. I. Title.



Added Entry (subject)

D **DIGITAL LIBRARY SOFTWARE-NEPAL**
025.04095496
Uplu **Upadhyaya, Lunashree**
 Use of digital library developed through Greenstone digital
 library software in Nepal / submitted by Lunashree Upadhyaya. –
 Kathmandu : Central Department of Library and Information
 Science, 2010.
 xviii, 62 p. : ill. ; 30 cm.
 Bibliography at the end of each chapter.
 Thesis (M.A.)—Central Department of Library and Information
 Science, Tribhuvan University, 2011.

○

Added Entry (subject)

D **GREENSTONE DIGITAL LIBRARY SOFTWARE-**
025.04095496 **NEPAL**
Uplu **Upadhyaya, Lunashree**
 Use of digital library developed through Greenstone digital
 library software in Nepal / submitted by Lunashree Upadhyaya. –
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 xviii, 62 p. : ill. ; 30 cm.
 Bibliography at the end of each chapter.
 Thesis (M.A.)—Central Department of Library and Information
 Science, Tribhuvan University, 2011.

○

Added Entry (title)

D Use of Digital Library developed through Greenstone Digital
025.04095496 Library software

Up1u Upadhyaya, Lunashree

Use of digital library developed through Greenstone digital library software in Nepal / submitted by Lunashree Upadhyaya. – Kathmandu : Central Department of Library and Information Science, 2011.

xviii, 62 p. : ill. ; 30 cm.

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LIST OF ACRONYMS

AGLS	:	Australian Government Locator Service
ARL	:	Association of Research Libraries
ARPA	:	Advanced Research Project Agency
CAN	:	Computer Association Nepal
CAS	:	Current Awareness Service
CCF	:	Common Communication Format
CD-ROM	:	Compact Disk Read Only Memory
CQL	:	Common Query Language
DARPA	:	Defense Advanced Research Project Agency
DBMS	:	Database Management System
DC	:	Dublin Core
DL	:	Digital Library
DLF	:	Digital Library Federation
FEDORA	:	Flexible Extensible Digital Object and Repository Architecture
FTP	:	File Transfer Protocol
GIF	:	Graphics Interchange Format
GLI	:	Greenstone Librarian Interface
GSDL	:	Greenstone Digital Library Software
HP	:	Hewlett-Packard
HTML	:	Hypertext Markup Language
ICT	:	Information Communication Technology
IOM	:	Institute of Medicine
JPEG	:	Joint Photographic Experts Group
JRE	:	Java Runtime Environment
KWIC	:	Key Word in Context
MARC	:	Machine Readable Catalogue
METS	:	Metadata Encoding and Transmission Standard
MIT	:	Massachusetts Institute of Technology
MPEG	:	Moving Picture Experts Group
MSE	:	Metadata Sets Editor
NAMS	:	National Academy of Medical Science

NHRC	:	Nepal Health Research Council
NSF	:	National Science Foundation
NZGLS	:	New Zealand Government Locator Service
OAI	:	Open Achieve Initiative
OAI-PMH	:	Open Archives Initiative Protocol for Metadata Harvesting
OPAC	:	Online Public Access Catalogue
OSS	:	Open Source Software
PDF	:	Portable Document File
PPT	:	Power Point File format/extension
PHP	:	Hypertext Preprocessor
PWS/ISIS	:	Personal Web Server and Internet Information Services
RTF	:	Rich Text Format
SDI	:	Selective Dissemination of Information.
SRU/W	:	Search/Retrieve through URL or Web service
TIFF	:	Tagged Image File Format
UNESCO	:	United Nation Educational, Scientific and Cultural Organization
UNICODE	:	Universal Code
URL	:	Universal Resource Locator
XML	:	Extensible Markup Language

CHAPTER 1

INTRODUCTION

1.1 Background Information

Collection and access of all kind of information materials is out of reach for an individual with respect to organization and financial point of view. It is also true that no single library can supply everything and serve all kind of users. Library automation helps to manage diverse library resources and provides better and wider access to resources. A computer and telecommunication technology has helped to build up an information society, which has crossed the geographical limitations and has provided facilities to access into global information systems. In fact, 'automation' is an indispensable part of modern library's information systems development, organization, management and services. In the present 'age of information', automation has been making tremendous impact on different sectors of the library and information centers. With the development of information technology (IT) and information communication technology (ICT), numbers of sophisticated open source software (OSS) and proprietary software have been developed for library automation. Costs for proprietary software in developing countries are extraordinarily high. OSS developers make the source code freely available for anyone to distribute copy and modify. OSS is suitable to developing countries due to local adaptability, opportunities for developing knowledge and skills and cost saving.

The fundamental reason for building digital libraries is a belief that they will provide better delivery of information than was possible in the past. Traditional libraries are a fundamental part of society, but they are not perfect. Can we do better? Enthusiasts for digital libraries point out that computers and networks have already changed the ways in which people communicate with each other by which a scholar or user is better served by sitting at a personal computer connected to a communication network than by making a visit to a library. Here are some of the potential benefits of digital libraries (Ali, 2005).

The digital library (DL) helps users to access information remotely and without need of visiting library physically to access information 24 hours. New forms of

information become possible and digital library reduces cost. The doors of the digital library never close. A study at a British University found that about half the use of a library's digital collection was at hours when the library buildings were closed. Materials are never checked out to other readers, miss shelved, or stolen; they are never in an off-campus warehouse. The scope of the collections expands beyond the walls of the library. Private papers in an office or in a library on the other side of the world are as easy to use as materials in the local library.

There are a number of software packages for use in general digital libraries. Some of the popular open source digital library software are as follows:

- Greenstone
 - DSpace
 - EPrints
 - Fedora
-
- **Greenstone**

The GSDL Software was developed by the New Zealand digital library project at the University of Waikato in the early 2000, and provides a suite of open source software for building and distributing digital library collections. Greenstone is now well developed and distributed in co-operation with UNESCO and the Human Info, a non-governmental organisation. GSDL runs under Unix as well as in Windows. GSDL aims to provide ease of use as users can create files using varying formats, e.g. PDF, Postscript, MS-word or ftp.

GSDL is essentially suitable for managing the huge amount of information as information explosion is taking place. Its impact on library and information centres is profound. With the growing number of e-resources, it has become imperative for information professional to redefine their role in disseminating information to the users. Institutional Repository is a new concept for collecting, managing, disseminating and preserving scholarly works created in digital form by faculty and students in individual universities and colleges. Therefore for institutional repository GSDL is suitable.

Greenstone constructs full-text indexes from the document text, and from the document text and from metadata elements such as title and author. Indexes can be searched for particular words, Boolean combinations, or phrases and results are ranked by relevance or sorted by a metadata element. Greenstone 3 is a complete redesign and re-implementation of the original Greenstone digital library software and incorporates all the features of the existing system. GSDL is backward compatible, that is, it can build and run existing collections without modification. Written in Java, it is structured as a network of independent modules that communicate using XML (Witten, Bainbridge & Boddie, 2001).

A number of examples of libraries around the world that have implemented GSDL are provided on the website (www.greenstone.org). These include Human Rights in Argentina, Kyrgyz Republic National Library, Philippine Research Library, Education and Government Information Network and the Sudan Open Archive. (Krishnamurthy, 2008).

- **DSpace**

DSpace is a digital repository system, designed to capture, store, index, preserve and redistribute the intellectual output of an organization in digital formats developed jointly by Massachusetts Institute of Technology (MIT) Libraries and Hewlett-Packard (HP). DSpace is built in Java and can be customized and extended. It runs on any UNIX-type OS, such as Linux, HP/UX, or Solaris.

DSpace preserves and enables easy and open access to all types of digital content including text, images, moving images, mpegs and data sets. And with an ever-growing community of developers, committed to continuously expanding and improving the software, each DSpace installation benefits from the next.

- **EPrints**

EPrints were developed at the University of Southampton, U.K. with the first version of the software publicly released in late 2000. The objective behind the creation of EPrints was to facilitate open access to research and scholarly literature.

In other words, EPrint is a digital archive of the research output created by the scientists, faculty, research staff and students of an institution and accessible over the internet to end-users both within and outside the institution. As a facility, it consists of hardware, software and procedures to capture, organize, archive, disseminate and manage digital research resources of an institution. It also serves as an archive for other electronic documents such as images and audio.

E-prints are programmed on Perl and runs on any number of Linux distributions, and other UNIX-like systems including OS-X. It can also run on Windows Vista and XP.

- **Fedora**

The Fedora project was funded by the Andrew W. Mellon Foundation to build a digital object repository management system based on the research paper, Flexible Extensible Digital Object and Repository Architecture (FEDORA).

Fedora is developed jointly by the University of Virginia and Cornell University. Fedora supports digital asset management, institutional repositories, digital archives, content management systems, scholarly publishing enterprises and digital libraries. The system, designed to be a foundation upon which interoperable web-based digital libraries, institutional repositories and other information management systems can be built, demonstrates how distributed digital library architecture can be deployed using web-based technologies such as XML and Web Services. Fedora was released in May 2003. Fedora, designed in Java, can be configured using other databases such as Oracle. It runs on Linux operating system.

Given this background, the fact is that, it is new development for the country. We know very limited reading materials are available locally. To fulfill the teaching and learning activities of the college and university, books and journals and other reading materials are playing an important role in an academic life.

1.2 Statement of the Problem

Locally generated information is not easily available through commercial channels. But those are the information which actually charts the country's development and which is essential for planning process. Those are out of reach from most of the users. In this context one well equipped digital library (DL) is necessary to fulfill the academic and general information need of users for providing right information in the right time. The problem toward which, this research is directed is to investigate the use of digital library developed through GSDL software in Nepalese libraries of Kathmandu Valley. Thus, the study is mainly focused on the following research problems:

- What things need to be considered before developing digital library?
- How are the documents selected to process on digital library?
- What kind of information do users prefer to access from digital collection?

1.3 Objectives of the Study

The main objective of the study is to explore the use of digital library developed through Greenstone digital library software in Nepal. Specifically, the objectives of the study are as follows:

- To know prerequisites for developing digital library
- To find out the criteria of selecting documents to process in digital library.
- To know the users' opinion regarding the use and usefulness of digital library.
- To make necessary recommendations based upon the finding of the study.

1.4 Scope and Limitation of the Study

The scope of the study is limited to the use of digital library developed through Greenstone digital library (GSDL) software. The study has been conducted inside Kathmandu Valley with the focus on the five libraries which are using GSDL software. The study was conducted from May 2011 to August 2011.

The population of the study comprises only the five libraries as they were the only libraries using GSDL when internet search was done prior to conducting the study.

Since very few libraries are using GSDL software to which this study is focused, it is very difficult for broad generalization applicable to other libraries operating in Nepal.

1.5 Significance of the study

The concept of DL is growing day by day. Most of the library users prefer to work in a digital environment and love to have access digital content via web. This study will help the entire service provider, authority of parent body and the users to widen their knowledge about the concept of digital library. It also helps to make them understand to know the pre-requisites for develop DL, user's opinion about DL, and find out the criteria of selecting information to process in digital library. Thus, this study will beneficial to those libraries of Nepal, which are planning to develop digital library and also helps to do further research.

1.6 Definition of the Terms

- **Library Automation:** Library automation refers to the use of computers to automate the typical procedures of libraries such as cataloging and circulation.
- **Digital Library:** A digital library is a library in which collections are stored in digital formats (as opposed to print, microform, or other media) and accessible by computers. The digital content may be stored locally, or accessed remotely via computer networks. A digital library is a type of information retrieval system.
- **Greenstone Digital Library Software:** Greenstone is a suite of open-source software for building and distributing digital library collections.
- **Open-Source Software (OSS):** OSS is computer software that is available in source code form: the source code and certain other rights normally reserved for copyright holders are provided under a software license that permits users to study, change, improve and at times also to distribute the software
- **Metadata:** Metadata describes other data. It provides information about a certain item's content. For example, an image may include metadata that describes how large the picture is, the color depth, the image resolution, when the image was

created, and other data. A text document's metadata may contain information about how long the document is, who the author is, when the document was written, and a short summary of the document.

- **Proprietary Software:** Proprietary software is computer software licensed under exclusive legal right of the copyright holder. The licensee is given the right to use the software under certain conditions, but restricted from other uses, such as modification, further distribution, or reverse engineering
- **MARC:** MARC is an acronym, used in the field of library science, which stands for Machine-Readable Cataloging. The MARC standards consist of the MARC formats, which are standards for the representation and communication of bibliographic and related information in machine-readable form, and related documentation. It defines a bibliographic data format that was developed by Henrietta Abram at the Library of Congress beginning in the 1960s. It provides the protocol by which computers exchange, use, and interprets bibliographic information. Its data elements make up the foundation of most library catalogs used today.
- **Dublin Core Metadata:** The Dublin Core set of metadata elements provides a small and fundamental group of text elements through which most resources can be described and catalogued. Using only 15 base text fields, a Dublin Core metadata record can describe physical resources such as books, digital materials such as video, sound, image, or text files, and composite media like web pages. Metadata records based on Dublin Core are intended to be used for cross-domain information resource description and have become standard in the fields of library science and computer science
- **Virtual Library:** A Virtual Library also known as a Digital Library or an Electronic Library may be defined as the online facility provided by a conventional library to read books and access other facilities or it may mean a website which offers links to various sites with a large store of information in a catalogued or archived form. The term is more often used to refer in a collective manner to the entire number of online books and other literary material related to any subject available on the Internet.

- **Information Technology (IT):** Information technology is the acquisition, processing, storage and dissemination of vocal, pictorial, textual and numerical information by a microelectronics-based combination of computing and telecommunications. The term in its modern sense first appeared in a 1958 article published in the Harvard Business Review, in which authors Leavitt and Whisler commented that "the new technology does not yet have a single established name. We shall call it information technology (IT)."

1.7 Organization of the Study

The study has been organized in six different chapters. First chapter deals with the introduction of study, under which background of the study, statement of problem, objectives of the study, scope and limitation of the study, significance of the study, definitions of the terms and organization of the study are incorporated.

The second chapter deals with literature review. Different books, articles, journals and past researches relating to the subject matter of this study have been reviewed in this chapter.

The third chapter, focus of study, is mainly devoted for the understanding of the subject where the study is specifically and minutely presented on the aspects of digital library.

Research methodology, including research design, population, sampling procedure, data collection procedure and data analysis procedure are discussed in the fourth chapter.

Fifth chapter, presentation and analysis of data, presents analyzed data, their presentation and interpretation as per the pre-defined objectives of the study.

Sixth, the final, chapter deals with summary, conclusions and recommendations of the study.

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CHAPTER 2

REVIEW OF LITERATURE

During review of literature, different kinds of written documents namely books, periodicals, theses, reports, brochures, articles were consulted related to research.

The central mission of a library is to collect, organize, preserve, and provide access to knowledge and information. In fulfilling this mission, libraries preserve a valuable record of culture that can be passed down to succeeding generations. Thus, libraries are an essential link in this communication between the past, present, and future. (Jange & Sami, 2006).

With the development in information and communication technology (ICT), libraries begin using their services for different works. One major change it has brought in libraries and information centers is the accessibility of library resources. Internet, a wonderful advent of ICT, has made the libraries accessible and searchable from a remote location and also helped in sharing of information including the information about the development and availability of different computer software for library use. Internet is considered as a great information source to the academic and research community and also a great information tool to the library and information centers to supplement their information support to the user community (Jange & Sami, 2006).

Library automation refers to use of computers in library work including services (Sharma, 1990). Library automation can be of two types: stand-alone system and integrated system. Stand-alone system is basically meant to do only one specific function of the library such as cataloguing (i.e. creating the database of bibliographic records) whereas integrated system can be used in the automation of different functions of library such as acquisition, cataloguing, circulation, etc.

Computers were engaged for working in library service in USA in 1950s in a very modest way. Dr. H. P. Luhn had organized computerized indexes in 1950s. Computers entered and found some place in American libraries during this decade. However, their use and application was very limited and restricted due to the high cost of hardware and non-availability of application software packages. During 1960s, the cost of hardware was slashed down and appreciable attempts were made towards

development of library application packages. This led to increased use of computers in libraries and printing industries (Sharma, 1990).

The first use of the term digital library in print may have been in a 1988 report to the Corporation for National Research Initiatives. The term digital libraries were first popularized by the NSF/DARPA/NASA (National Science Foundation/Defense Advanced Research Projects Agency/National Aeronautics and Space Administration) Digital Libraries Initiative in 1994.

Phrases like "virtual library," "electronic library," "library without walls" and, most recently, "digital library," can all be used interchangeably.

The definition of digital libraries varies depending upon various factors and perspectives. From the infrastructural and technical perspective, digital library is defined as a library that "basically store materials in electronic format and manipulate large collections of those materials effectively. Research into digital libraries is research into network information systems, concentrating on how to develop the necessary infrastructure to effectively mass-manipulate the information on the Net" (National Science Foundation, 1999).

Seadle and Greifeneder (2007) refused to accept it as a total technological change that would replace the traditional library in the statement "Digital libraries are not replacements for traditional libraries. They are rather the future of traditional libraries, much as medieval manuscript libraries simply became a specialized and much revered part of the larger print-based that we have today". This definition asserts that traditional libraries with printed collection will remain the core of a library collection in future and digital collection will be a section of the total collection. Though prediction of the future of libraries may be laden with imperfection, in the light of the drastic technological changes and the enormity of information in digital form the idea of printed documents not being replaced by digital collection is hard to swallow. Seadle's statement also assumes that digital collection is a single entity that would be surrogates or replacements of printed document but "the digital library is not a single entity; the digital library requires technology to link the resources of many services that are transparent to the end users; Universal access to digital libraries and information services is a goal; Digital library collections are not limited to document surrogates; they extend to digital artifacts that cannot be represented or distributed in printed formats" (Association of Research Libraries, 1995).

Leiner (1998) deemed digital library as “the collection of services and the collection of information objects that support users in dealing with information objects available directly or indirectly via electronic/digital means. Similarly, Arms (1995) also felt that digital library is “a managed collection of information with associated services, where the information is stored in digital formats and accessible over a network”. Leiner and Arms definition emphasized on access to services and on content, which is sometimes called collections or documents or information or information objects. Casting the scope wider, Waters (1998) defined digital libraries as “organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence overtime of collections of digital works”.

The world is in transition today due to technological invasion. Majority of the libraries in metropolitan cities are involved in preparing themselves for 21st century. They are getting converted into digital libraries. But a natural question comes about what should be the criteria for selecting the documents for processing in digital library. Each libraries has its targeted users so their known, expressed and desired needs should always be given due priority. Since the digital library project involve high cost. According to The US task force on Archiving of Digital Information, established in 1996 by Commission on Preservation and Access and the Research Library Group, before processing information into digital collection one should consider.

- Institutional aims and objectives
- Quality, condition and uniqueness of materials
- Its current utility and future usefulness; and
- High demand of materials, and less used only when they are in unusable condition

(Shashi Prabha, 2008).

Modern information technology, i.e. digital library can help in managing conventional knowledge management. We should use our knowledge, technology, mechanism to move further in conventional content digitization and sharing through digital library system throughout the world (Dhungana, 2008). But still, there are various challenges and opportunities in knowledge management in digital library such as objective, advantages, and barriers in implanting digital library (Jain, 2008).

ICT i.e. digital environment help libraries in reducing costs, labour, time for acquisition, classification, and cataloguing, periodical management system, reference (CAS/SDI) service, resource sharing, storage, preservation, maintenance and open access publishing (Jawale, 2008).

Technologies with the ability to send information in a fast, efficient, and cheap fashion, such as the internet can provide dramatic improvement in access to information, advice and care. Internet was developed in Western countries and the information flow is from north to south. But for decision making within a country, information generated within a country is needed (Pradhan, 2006).

Digital library can contribute to society, socialization, and societal practices, services, and mechanism (Pokharel, 2008). Digital libraries (DL) and in particular, open source DL software, are helping developing countries to manage knowledge and to disseminate information needed for national development. The flexibility, robustness, ease of use, and free availability of the open source GSDL software suite make it a particularly useful resource for a wide range of digital library applications. The evolution of a Greenstone Support Network for South Asia has further helped to promote the development, adaptation and use of Greenstone in the implementation of digital libraries in the South Asia region. (Rose & Pradhan, 2010).

The Greenstone digital library (GSDL) software is an open-source system for the construction and presentation of information collections. Collections built with Greenstone offer effective full-text searching and metadata-based browsing facilities that are attractive and easy to use. Moreover, they are easily maintainable and can be augmented and rebuilt entirely automatically. The system is extensible: software "plugins" accommodate different document and metadata types. Greenstone incorporates an interface that makes it easy for people to create their own library collections. Collections may be built and served locally from the user's own Web server, or (given appropriate permissions) remotely on a shared digital library host. End users can easily build new collections styled after existing ones from material on the Web or from their local files (or both), and collections can be updated and new ones brought. (Witten, Bainbridge & Boddie, 2001).

The Greenstone digital library software is a comprehensive system for building and distributing digital library collections. It provides a way of organizing information

based on metadata and publishing it on the Internet or on removable media such as CD-ROM/DVD (Chidambaram & Yadav, 2008).

The internet was introduced in Nepal in 1994, and was quickly recognized as an exciting means of accessing information resources, appropriate for technologically advanced society. Donor agencies funding support and government policy was critical for the implementation of Nepal's digital libraries. Institutions with a strong background in advanced technology had an advantage when entering digital library field. Cooperative project also have significant impact. (Pradhan, 2004)

The concept of digital library is in initial stage in Nepal and the knowledge and qualification is not affluent enough to develop the concept. The limitations for digitization in Nepal have been enlisted as, technical architecture, building digital collection, copyright, preservation, government/authority, staff, and users (Aryal, 2008). In the digital libraries of Nepal, the digitized information is preserved and provided services to the users on request inside the library either by microfilm reader or by computer database. The information is not made accessible to the global users (Vaidya, 2008).

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CHAPTER 3

FOCUS OF THE STUDY

3.1 Digital Library

All conventional libraries' basic functions focus on collection, organization and dissemination of information resources. Traditionally a "library is a place in which books, manuscripts, musical scores, or other literary and artistic materials are kept for use but not for sale". It is an institution oriented towards collections and custody, where people may make use of the facilities. Whereas a digital library is an assemblage of digital computing, storage and communications machinery together with the content and software needed to reproduce, emulate and extend the services provided by conventional libraries. In other words, a digital library is a computer-based system for acquiring, storing, organizing, searching and distributing digital materials for end user access. It is not just a collection of material in electronic form; it includes a browser interface and perhaps a virtual space and society.

It requires less space and the data can be made available through communication networks to anyone anywhere, while facilitating searches with speed. The digital library is not a single entity and as such is linked to the resources of many such collections. The first use of the term *digital library* in print may have been in a 1988 report to the corporation for National Research Initiatives. The term *digital libraries* were first popularized by the NSF/DARPA/NASA (National Science Foundation/Defense Advanced Research Projects Agency/ National Aeronautics and Space Administration) Digital Libraries Initiative in 1994.

Traditional libraries are limited by storage space; digital libraries have the potential to store much more information, simply because digital information requires very little physical space to contain it. As such, the cost of maintaining a digital library is much lower than that of a traditional library. A traditional library must spend large sums of money paying for staff, book maintenance, rent, and additional books. Digital libraries do away with these fees.

- **No Physical Boundary:** The user of a digital library needs not to go to the library physically; people from all over the world can gain access to the same information, as long as an Internet connection is available.
- **Round the Clock Availability:** A major advantage of digital libraries is that people can gain access to the information at any time, night or day.
- **Multiple Accesses:** The same resources can be used at the same time by a number of users.
- **Structured Approach:** Digital libraries provide access to much richer content in a more structured manner, i.e. we can easily move from the catalog to the particular book then to a particular chapter and so on.
- **Information Retrieval:** The user is able to use any search term (word, phrase, title, name, and subject) to search the entire collection. Digital libraries can provide very user friendly interfaces, giving clickable access to its resources.
- **Preservation and Conservation:** Another important issue is preservation keeping digital information available in perpetuity. In the preservation of digital materials, the real issue is technical obsolescence. Technical obsolescence in the digital age is like the deterioration of paper in the paper age. Libraries in the pre-digital era had to worry about climate control and the de-acidification of books, but the preservation of digital information will mean constantly coming up with new technical solutions.
- **Space:** Whereas traditional libraries are limited by storage space, digital libraries have the potential to store much more information, simply because digital information requires very little physical space to contain them. When a library has no space for extension digitization is the only solution.
- **Networking:** A particular digital library can provide a link to any other resources of other digital libraries very easily; thus a seamlessly integrated resource sharing can be achieved.
- **Cost:** In theory, the cost of maintaining a digital library is lower than that of a traditional library. A traditional library must spend large sums of money paying

for staff, book maintenance, rent, and additional books. Although digital libraries do away with these fees, it has since been found that digital libraries can be no less expensive in their own way to operate. Digital libraries can and do incur large costs for the conversion of print materials into digital format, for the technical skills of staff to maintain them, and for the costs of maintaining online access (i.e. servers, bandwidth costs, etc.). Also, the information in a digital library must often be "migrated" every few years to the latest digital media. This process can incur very large costs in hardware and skilled personnel.

3.2 Greenstone Digital Library (GSDL) Software

The most popular open source digital library software in use today is GSDL, DSpace, Fedora and EPrints. Among them, it is found that GSDL is used in some libraries of Nepal. So, this study is basically focused on the GSDL software.

The GSDL Software was developed by the New Zealand digital library project at the University of Waikato in the early 2000, and provides a suite of open source software for building and distributing digital library collections. Greenstone is now well developed and distributed in co-operation with UNESCO and the Human Info, a non-governmental organization. GSDL runs under UNIX as well as in Windows. GSDL aims to provide ease of use as users can create files using varying formats, e.g. PDF, Postscript, MS-Word or ftp.

Greenstone constructs full-text indexes from the document text, and from the document text and from metadata elements such as title and author. Indexes can be searched for particular words, Boolean combinations, or phrases and results are ranked by relevance or sorted by a metadata element. Greenstone 3 is a complete redesign and re-implementation of the original Greenstone digital library software and incorporates all the features of the existing system. GSDL is backward compatible, that is, it can build and run existing collections without modification. Written in Java, it is structured as a network of independent modules that communicate using XML (Witten, Bainbridge & Boddie, 2001).

A number of examples of libraries around the world that have implemented GSDL are provided on the website (www.greenstone.org). These include Human Rights in Argentina, Kyrgyz Republic National Library, Philippine Research Library, Education and Government Information Network and the Sudan Open Archive (Krishnamurthy, 2008).

3.2.1 Overview of GSDL

GSDL is a suite of software for building, publishing and distributing digital library collections, either on the Internet or on CD-ROM. It is compatible with many library standards such as SRU/W feature, Z39.50 feature, MARC record import. These features of Greenstone make it a very good selection for integrating it with library automation package for full text indexing and searching. It is produced by the New Zealand Digital Library Project at the University of Waikato, and developed and distributed in cooperation with UNESCO and the Human Info NGO.

- **Full Text Search with SRU**

SRU/W (Search/Retrieve through URL or Web service) is a web services based protocol for querying the databases and returning to the search results. It uses the Common Query Language (CQL) as the format for submitting the queries. Although CQL is a formal language for representing queries to information retrieval systems, it has been designed to be human readable and writable. It allows both simple and very complex and powerful queries. Search results from SRU/W are in XML format.

- **Full Text Indexing**

The main objective of this module is to catalogue full text documents in Koha and index it in GSDL for carrying out full text search. In Koha cataloguing module, the URL of the full text document is specified under the tag 856, which is repeatable field, there by multiple URL for the same document can be given. After filling up the required cataloguing details, the record is saved. After saving the catalogue information, a unique document number is assigned by Koha for each catalogued document. This document number along with other required metadata details and full text document location is obtained through the catalogue form that

is passed on to GSDL for carrying out full text indexing. This is enabled by modifying add items 'tmpl' in Koha. A PHP script is invoked to carry out indexing in GSDL through command line collection building option.

- **Full Text Search Feature**

The main objective of this module is to enable the full text search in Koha and display the results of GSDL in Koha OPAC. For this purpose, four different perl scripts are written, viz., fulltextsearch.pl, fulltextsearch1.pl, full text search. 'tmpl', fulltextsearch1.tmpl. In fulltextsearch.pl query term is obtained from the user and passed to GSDL through SRU technique. The URL which is passed is split into 4 parts with question mark as the delimiter. The four parts in the GSDL are location in the system, collection name, required query and do option (ibid). In Nepal, GSDL software is being used to archive the Ph. D. thesis, dissertations, reports, proceedings, CD and image collection to store and full text retrieval and e-source, as well as CD management in different libraries since 2007. Various training and workshops were conducted by Healthnet Nepal and Tribhuvan University Central Library. Now, it is popular in Nepalese libraries for digital collection and management.

- **Required Software**

To create the digital collection(s) using GSDL some other associated software are required. The GSDL can be downloaded (free) from www.greenstone.org and www.sourceforge.net. Greenstone CD-ROMs have also been published by the United Nations and other humanitarian agencies for distribution in developing countries. Following are the associated software:

- Java Runtime Environment (JRE) version 1.4 or above (Free download from <http://Java.sun.com/j2se/downloads.html>)
- Image Magick Software (Free download from www.imagemagick.org)
- Web Browser Software (Internet Explorer, Netscape, etc.) (Download from www.msn.com; www.netscape.com).
- Web Server Software – Apache, PWS/IIS.

- **Platforms**

Both the source code and binaries of GSDL are available for Windows (95, 98, 2000, XP) and Linux (Red Hat and other Clones). It is also available for Mac and Sun Solaris, but here the source code has to be compiled.

- **Source Code**

Source code is available in GCC and Perl for Linux and VC++ and Perl for Windows.

- **GSDL Installation**

After downloading the above software from the respective websites, those have to be installed. Regarding installation of GSDL it is very essential to install the Java Runtime Environment (JRE) before installation of GSDL.

- **Local Library**

It is default setup. It has web server built-in and is suitable for building and viewing the Greenstone collections in a standalone system. It is available for Windows platform only.

- **Web Library**

It is recommended for those who wanting to serve Greenstone collections on the web. It requires a separate web server like Apache and Microsoft PWS/IIS.

- **Custom**

This setup allows installing any or all of the features provided by the above three setup types.

- **GSDL Interface**

GSDL has two separate interactive interfaces- User Interface and Librarian Interface. End users access the digital library collections through the User Interface, which operates within a web server. The Librarian Interface is a Java-based graphical User Interface that makes it easy to gather material for collection,

enrich it by adding metadata, design the searching and browsing facilities and build and serve the collection to the end users.

- **Metadata Formats**

GSDL has four predefined metadata sets, such as Dublin Core (DC), RFC 1807, New Zealand Government Locator Service (NZGLS), and Australian Government Locator Service (AGLS). New metadata sets can also be defined using Greenstone's Metadata Sets Editor (MSE).

- **Interoperability**

GSDL can harvest documents over OAI-PMH (Open Archives Protocol for metadata Harvesting) and include them in a collection. Any collection can be exported to METS and the Greenstone can ingest documents in METS form. Any collection can be exported to Dspace ready for Dspace's batch import program, and any Dspace collection can be imported into Greenstone.

- **Plug-Ins**

Relevant plug-ins has to use to ingest externally prepared metadata in different forms. In Greenstone built-in plug-ins exist for- XML, MARC, CDS/ISIS, ProCite, BibTex, Refer, OAI, Dspace, METS. Plug-ins is also used to ingest documents in different formats. For textual documents, the plug-ins are: PDF, Postscript, Word, RTF, HTML, Latex, ZIP, Excel, PPT, Email, TEXT, Index, Open Document, Book, etc. For multimedia, the plug-ins are – For Images - GIF, TIFF, JPG, JIF, PPT, W3Img, ; For Audio - Video - DAT, MP3 , AVI, WAVE, MPEG (1, 2, 3, 4).

3.2.2 Collection Building in GSDL

For building a digital collection the libraries professionals have do work with Greenstone Librarian Interface (GLI). The GLI is a Java based interface for building digital library collections and this provides very user-friendly approach. The librarian interface can be run in one of four modes: Librarian, Assistant Librarian, Library System Specialist and Expert users. Modes control the level of detail within the

interface, and can be changed through 'Preferences' in the 'File' menu. The GLI supports six basic activities, i.e. Download, Gather, Enrich, Design, Create and Build & Preview the collection, which may be considered as modules of GLI. Among these six activities the later five are indispensable for making Greenstone collection.

To build the digital collection, GLI should be selected from the program section of the start menu. The opening window of GSDL - GLI will appear (Figure 3.2.2-A). Here the option 'File' and then 'New' have to select, then a popup window will appear to give the name and the description of the content of the collection (Figure 3.2.2-B). Then one metadata element set has to select out of the built-in four metadata set. The activity 'Gather' is for gathering the source documents that will comprise the collection (Figure 3.2.2-C). For this the target files/folders have to drag from the workspace (Left side) and drop it in the Collection (Brightside). 'Enrich' is to enter the data of the source document(s) in the metadata fields to assign metadata for each source document (Figure 3.2.2-D). Metadata have to prepare for all the source documents in the collection.

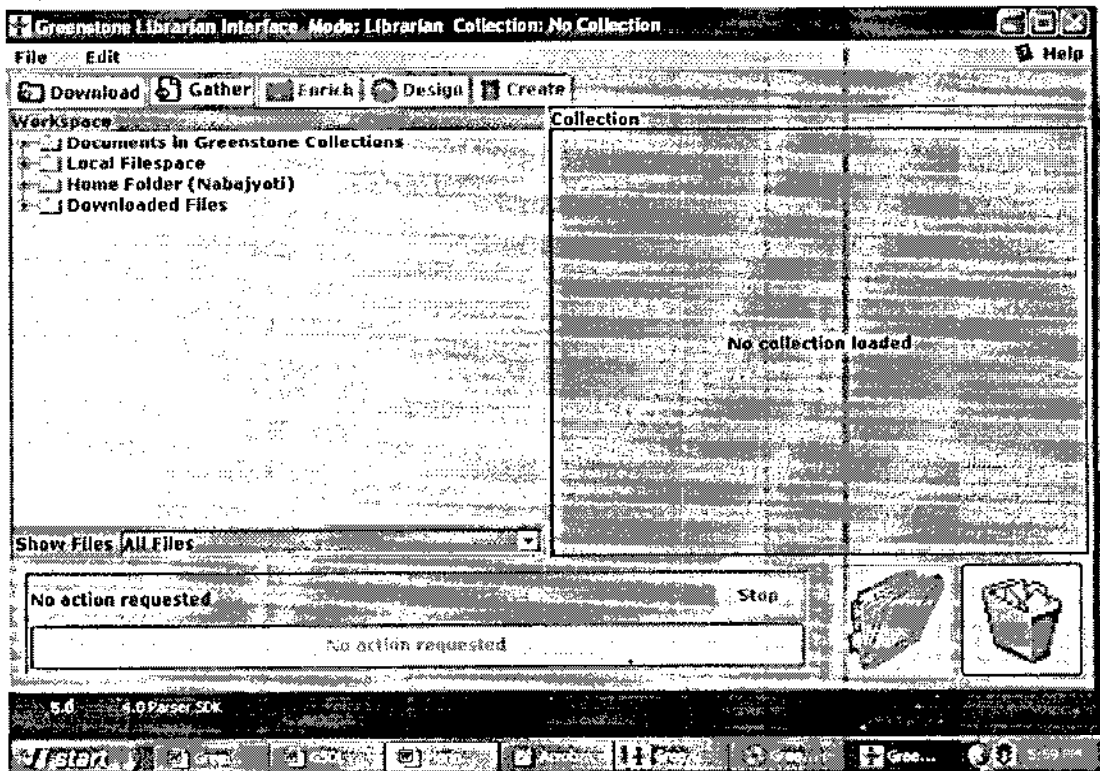


Figure 3.2.2-A: Starting Window of GLI

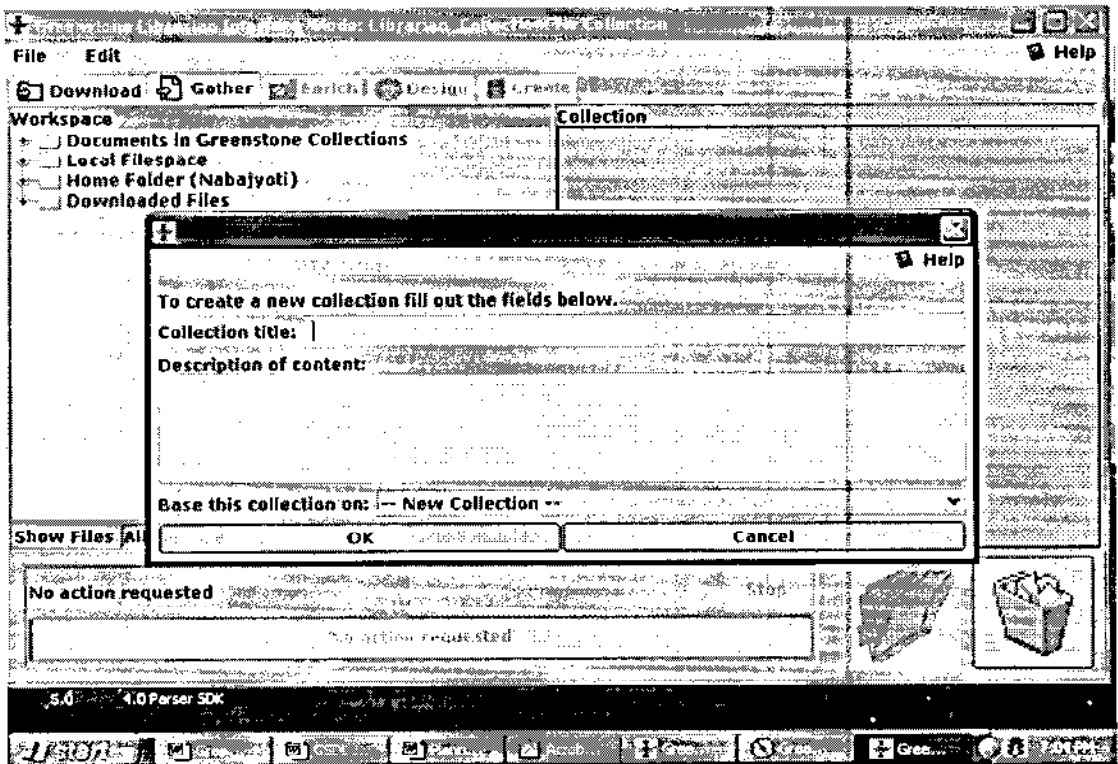


Figure 3.2.2-B: Name of the Content of Collection

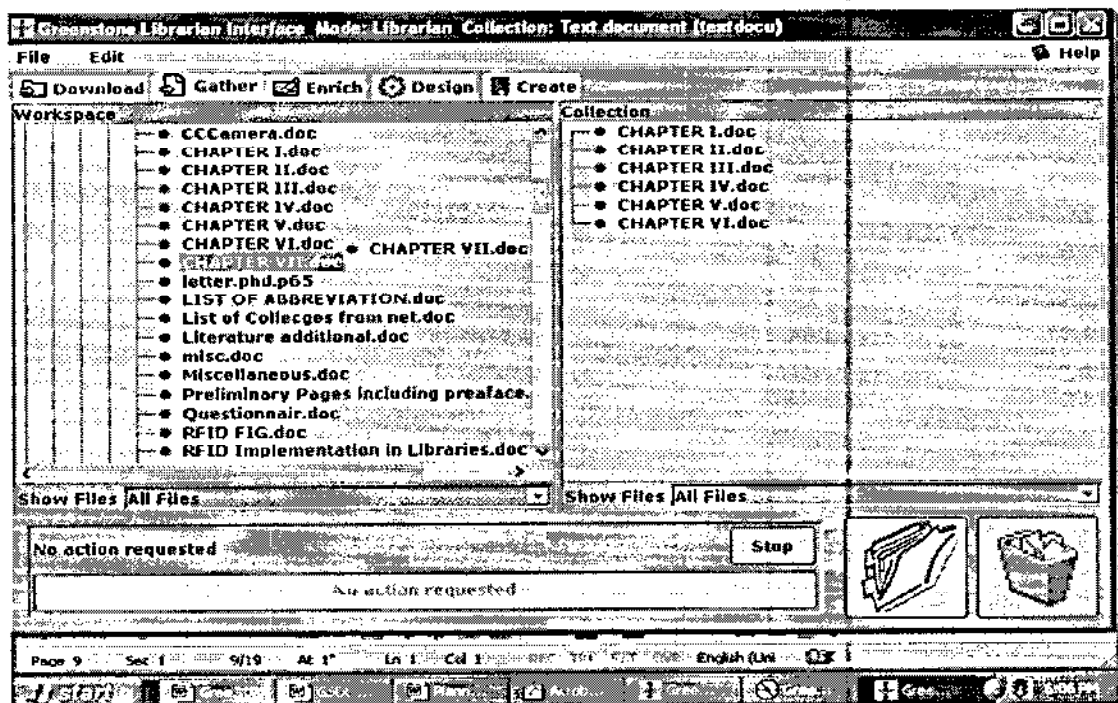


Figure 3.2.2-C: Gathering the Collection

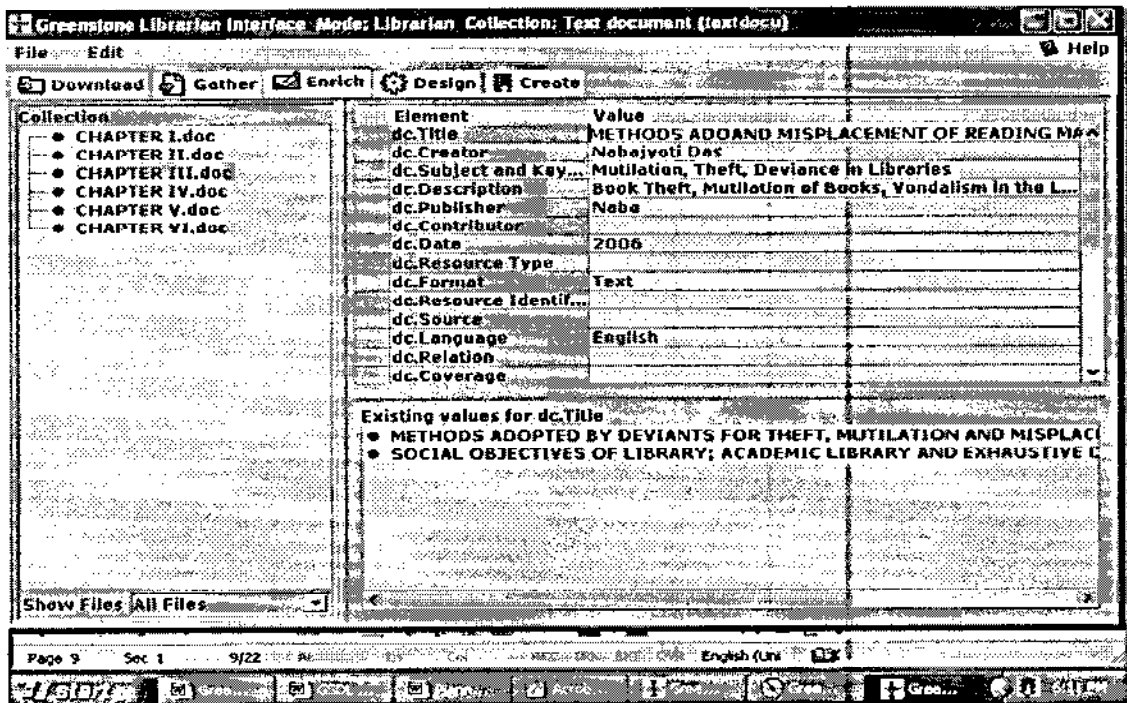


Figure 3.2.2-D: Window for Enriching the Collection

Design is for specifying collection configuration in terms of indexes, classifiers, display formats, document plug-in, etc. (Figure 3.2.2-E). Automatic extraction of simple metadata such as Title, Date etc. is possible. Explicit metadata has to be extracted via 'Classifiers' e.g. Subject, author, Organization, etc.

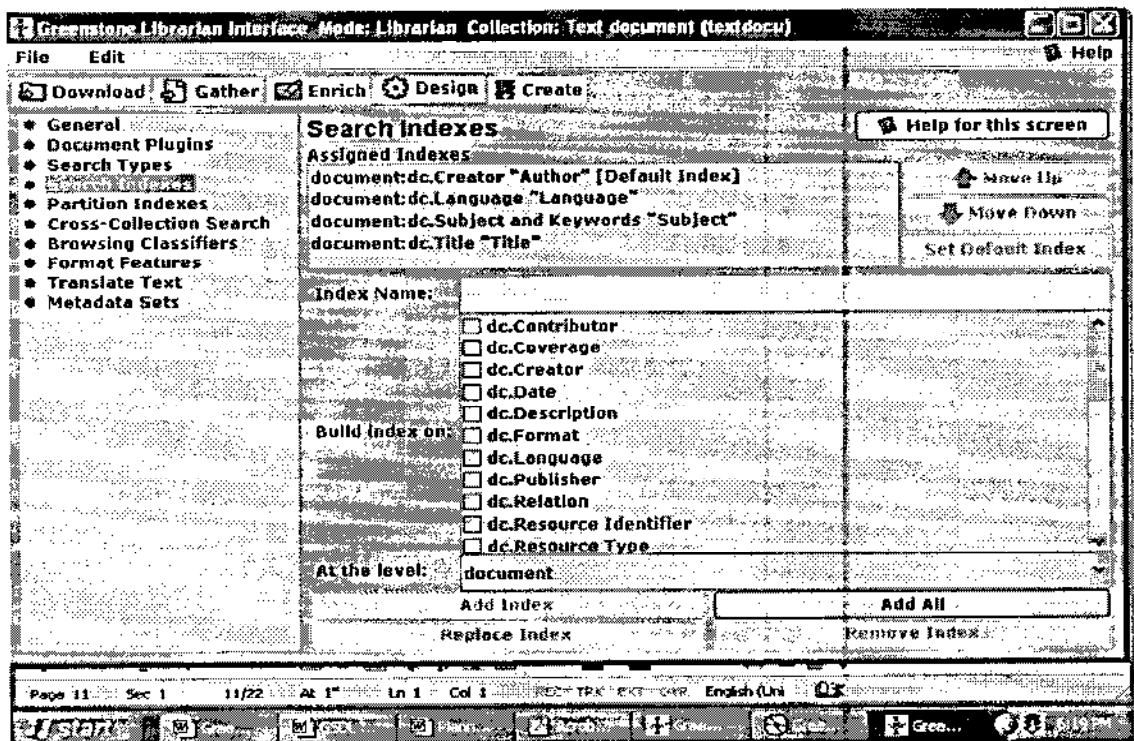


Figure 3.2.2-E: Indexing in the Design Panel

'Create' is for initiating the building process and 'Build Collection' is to build the collection in the GSDL system in compressed form of the source documents and coordinating all the activities done in the previous modules (Figure 3.2.2-F). 'Preview collection' is a link to the 'User Interface', by which one can view the current collection.' Download' is for downloading files and websites from the Internet.

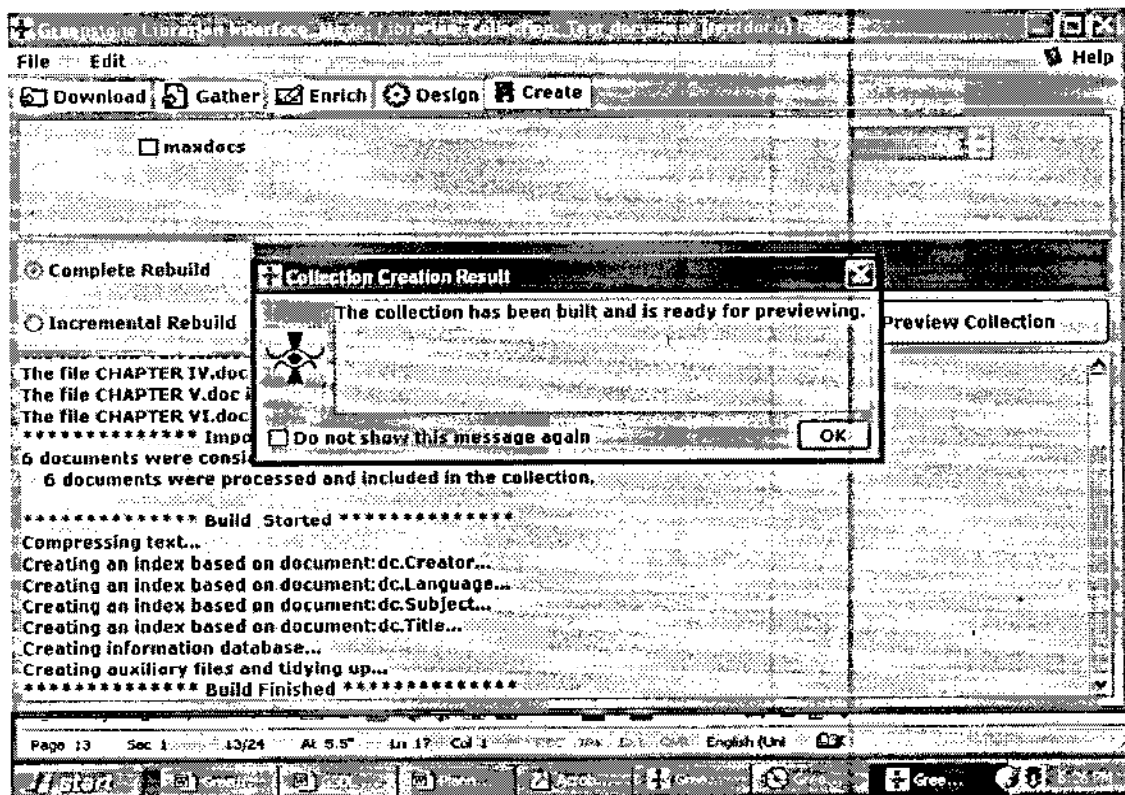


Figure 3.2.2-F: Create and Building Collection

Collection in GSDL can be searched and browse by using the 'User Interface' i.e Greenstone Digital Library. The library is browsed by web browser (e.g. Internet Explorer). Figure 3.2.2-G shows the Home page of the New Zealand Digital Library.

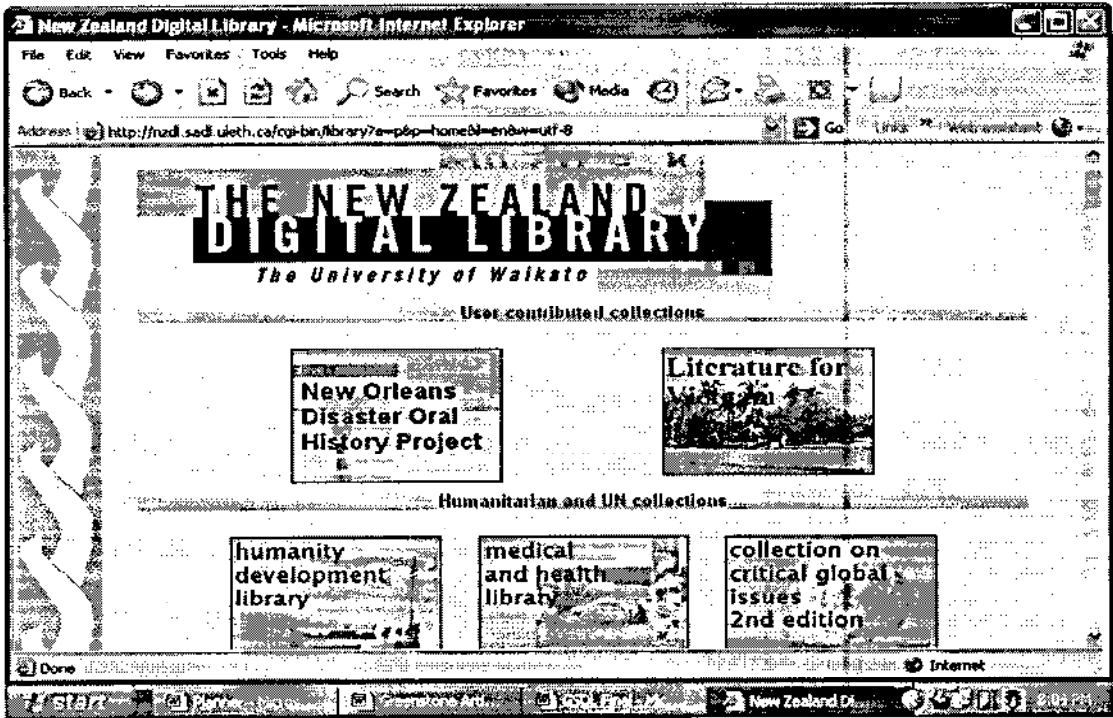


Figure 3.2.2-G: The New Zealand Digital Library

For searching 'Full Text Search, Metadata (Field) Search, Boolean Search' can be applied and full text/ full audio – video can be browse accordingly. In the following we have entered to the World Environmental Library of New Zealand Digital Library.

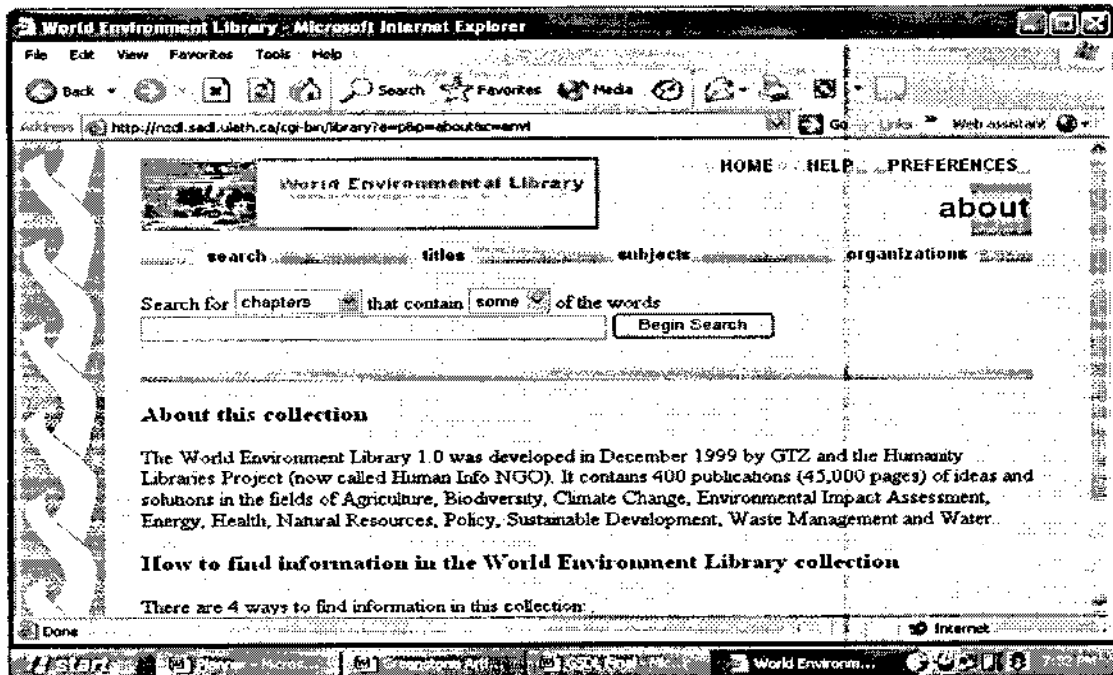


Figure 3.2.2-H: Searching the World Environmental Library (WEL) Collection

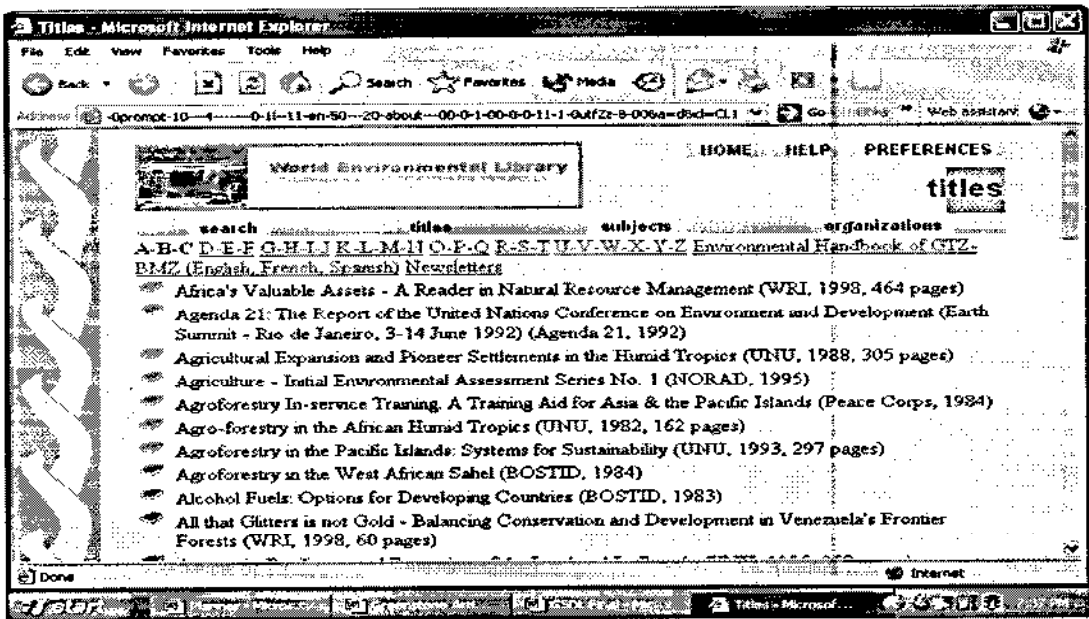


Figure 3.2.2-I: Browsing the WEL Collection by All Title

(Source: <http://nzdll.sadl.uleth.ca/cgi-bin/library?a=p&p=about&c=envl>)

The titles are arranged alphabetically. We may get the full text of the required title by clicking the title and then the respective steps such as content, chapter, etc. Similarly, we can search or browse documents by subject, organization or by advance search using the 'design search' option.

3.2.3 Features of GSDL

- **Content Management:** Greenstone does not have a built-in work flow process. Therefore users are unable to customize the work flow process to meet their unique workflow needs while building various collections. Greenstone envisages a "librarian" who is responsible for creating collections from existing resources and distributing them over the Web or on CD-ROMs.
- **User Interface:** Greenstone's user interface is specifically designed to be highly extensible and customizable. It allows users to gather together set of documents, enrich it by importing or assigning metadata, build them into Greenstone collection and serve it from their web site.
- **Extensible:** software "plug-ins" accommodates different documents and metadata types.

- **Software Plug-ins:** It processes different text format. Greenstone is multilingual in nature. It is fully documented in English, French, Spanish, and Russian and multiple Asian languages. As a result, Greenstone is popular in European and Asian countries.
- **User Administration:** Greenstone includes an “administrative” function whereby specified users can examined the composition of all collections; protect documents so that they can be accessed only by registered users on presentation of password. As an additional safe guard against misuse, the server administrator is automatically notified of each new collection. However, Greenstone was not rated well on authorization issues, as it only defines three kinds of users: general users, collection builders and administrators, which are not enough to meet the needs for the management of the content and the system.
- **Usage Pattern:** Greenstone places great emphasis on end-user functionality such as monitoring and reporting. e.g. usage reports and statistics help a library administrator to determine training of staff and identify popular file accessed.
- **System Administration:** Greenstone performs the functions of automated content acquisition, harvesting and automated metadata generation well which in turn makes DL maintenance much easier and can reduce labor cost.
- **Preservation:** With Greenstone, a file loses its original name after the submission process but keeps its other identities such as size and created date. This is a problem that Greenstone needs to fix in future releases. Moreover, Greenstone does not check data integrity via general checksum techniques, which may not guarantee that an imported digital object is the same as the original one. Regarding the strategy for long-term preservation, Greenstone has some features for long-term preservation as its multiple plugins automatically convert files in common formats (e.g. Word, PDF, PS) to their corresponding HTML documents and keep the files in the original formats at the same time. The use of non-standard persistent URL allows users to access a digital object, but is unable to resist an object's changes in location and state.

Greenstone is highly interoperable using protocols such as OAI-PMH. It is also Z39.50 compatible for accessing external servers and for presenting Greenstone collection to external client.

- **Standard Compliance:** For presentation of *structured document*, the most common format managed with Greenstone environment are: Extensible mark-up language (XML), Hyper Text mark-up language (HTML), PDF.

For images: GIF, TIFF, JPEG

For text format: UNICODE, RTF (Rich Text Format), PDF, Post Script, Word.

For audio & video: MPEG (Moving Pictures Experts Group), MP3.

- **Metadata:** Greenstone is very flexible in metadata support. It can support any metadata sets, if the desired schema for the metadata set is provided. The original package include Dublin Core Metadata schema.
- **System Support & Help:** Extensive *Documentation* for Greenstone is available. *Mailing lists* intended primarily for discussions is also available. To *report any bugs*, one can address it to greenstone@cs.waikato.ac.nz. It also provides *Manuals and Help Desk Support*.
- **Types of Contents:** Newspaper articles to technical documents, educational journals to history, visual arts to videos, pop music collection to ethnic folk songs.
- **Retrieval Feature:** Greenstone extensible search module supports Wildcard, Boolean and full-text searches and to some extent supports Proximity commands. Search results can be displayed by author, subject, title, dates, keywords, hierarchical classification and collection.

3.3 GSDL Applied Libraries

Study focuses on the libraries which are applying GSDL for developing DL. Those libraries are as follows:

3.3.1 National Health Research Council (NHRC) Library

NHRC library was established with the purpose of providing research based health information. It is being utilized by the all health and related professionals involved in research activities. It serves as a repository for health research related information and resources. It has started to digitize document to build digital library through the help of GSDL software. It process 2015 volumes of documents through the help of GSDL software, which includes research articles, theses, research report, CD, catalogue of books and power points.

Objectives of National Health Research Council (NHRC) Library

- To facilitate the teaching learning activities of different programs conducted by Institute of Medicine.
- To provide health related materials and create an appropriate environment for the users.
- To provide current health related information.

3.3.2 Maharajgunj Nursing Campus Library

IOM Nursing campus library was started since 1972 with a small room in the name of the library. In the beginning the collection was not technically organized due to lack of technical staff. The advancement in technology in the library started only since 1978. It also has been starting to digitize document by using GSDL software which contains only 15 documents.

Objectives of Maharajgunj Nursing Campus Library

To facilitate the teaching learning activities of different programs conducted by Institute of Medicine through the:

- Provision of books, journals, pamphlets, periodicals slides, cassettes, CDs

- Provision of photocopy and computer printing service.
- Provision of information using Medline HINARI/Internet.

3.3.3 Institute of Medicine (IOM) Library

Tribhuvan University Teaching Hospital (TUTH) Library, under Institute of Medicine was started since 1978, previously it was known as Central Campus Library, and IOM which was established from 1972. This Library is also the depository center of WHO publications. It contains 58 documents.

Objectives of Institute of Medicine (IOM) Library

- To facilitate the teaching learning activities of different programs conducted by Institute of Medicine.
- To provide health related materials and create an appropriate environment for the users.
- To provide current health information using online services of medicine, Healthnet and other health related websites.

3.3.4 National Academy of Medical Science (NAMS) Library

In Course of Development, Bir Hospital library became NAMS's library on Mangsir, 12 2059BS. It also has been starting to digitize document through GSDL software and it contains 468 documents.

Objectives of National Academy of Medical Science (NAMS) Library

- To facilitate the teaching learning activities of different programs conducted by Institute of Medicine.
- To provide health related materials and create an appropriate environment for the users.

3.3.5 Nepal College of Information Technology (NCIT) Library

Library of Nepal College of Information Technology was founded in 2001 with a commitment to provide high-end state of the art IT related education in the country.

NCIT library is dedicated and committed to fulfill the present need of our global dimension. It contains only 8 documents.

Objectives of Nepal College of Information Technology (NCIT) Library

- To facilitate the teaching learning activities of different programs conducted by NCIT.
- To provide current information.
- To promote research work.

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CHAPTER 4

RESEARCH METHODOLOGY

4.1 Research Design

The current study is an attempt to explore the use of digital library developed through GSDL in Nepal, hence, an exploratory research design has been used for the study using questionnaire as the main instrument for collecting data.

Study has been centered in five libraries from Kathmandu Valley, which are using GSDL software for developing digital library collection. The data collected from the questionnaire have been analyzed systematically so as to meet the predefined objectives of the study.

4.2 Population

This research study is focused on the libraries in Nepal using GSDL software for building their digital library collection. On internet search, it was found that only five libraries of Kathmandu Valley are using GSDL. Those libraries are Nepal Health Research Council (NHRC) Library, Institute of Medicine (IOM) Library, Nepal Academy of Medical Science (NAMS) Library, Maharajgunj Nursing Campus Library and Nepal College of Information Technology (NCIT) Libraries. Thus, the population of the study comprises those five libraries and their users.

4.3 Sampling Procedure

Sample was selected purposively from the users of those five libraries including the librarians of each library. Thus, a total of 12 users from each library along with the librarian are the respondents of the study.

4.4 Data Collection Procedure

The study is primarily based on the primary data. Few secondary data were also used for the study which mainly covers national and international literature and has been reviewed as a part of the study.

For the collection of primary data, questionnaire method was used. Two sets of questionnaire were used- one for the librarians and the other for users. A total of 60 questionnaires were distributed to the users with 12 questionnaires for users of each library. Similarly, a questionnaire was also distributed for each librarian of the focused five libraries. Several follow up requests were made for this purpose and all the questionnaires were duly filled and returned.

4.5 Data Analysis Procedure

The data from the questionnaires have been collected, edited, coded, tabulated and classified for analysis using frequency distribution and percentage. Frequency distribution tables and pie-charts have been used for their clear presentation. The data has been analyzed and interpreted in as systematic way, categorizing them in various headings and sub-headings for the fulfillment of research objectives.

CHAPTER 5

PRESENTATION AND ANALYSIS OF DATA

Adoption of the concept of digital library has not only saved the time of scholars, it also widened the access base of information sources. Digital library software packages being used in selected various institutional libraries in Nepal, especially located in Kathmandu valley have been taken for the study. Data have been collected from five institutional libraries. On the basis of questionnaires (*see Appendix A*) distributed to the librarian and users of those organization, the data has been collected. Those data was collected, edited, coded, tabulated and classified for analysis. All the data are further presented in various tables, charts, etc., and those are presented below:

5.1 Responses from Professional Librarians

Eight questions were asked to the five institutional libraries. Their responses are presented in the following sections:

5.1.1 Need of Developing Digital Library

A question was asked to the professional librarians about the need for making digital library. The five institutional libraries have given the following answers:

Table 5.1.1: Need of Developing Digital Library

SN	Name	To provide access to remote user	To reduce space problem	Provide access to locally generated information in digital format	All of them
1.	NAMS				Yes
2.	NHRC				Yes
3.	NCIT				Yes
4.	Nursing				Yes
5.	IOM				Yes

Source: Field Survey, 2011

In the answer of the question ‘reasons of making digital library’, the table above shows that all the five libraries seem to have realized the important benefits of digitization--easy to provide access to remote users, reduce space problems, and provide access to locally generated information in digital formats. Therefore, the above mentioned five organizational libraries have started initiating the idea of digital collection.

5.1.2 Reason of Choosing GSDL

A question was asked to the librarians about the main reasons of choosing GSDL software among others. The five libraries have given the following answers.

Table 5.1.2: Reason of Choosing GSDL

SN	Name	Free software	Works both on online and offline	No need of high technical manpower	Provision of process full text	All of them
1.	NAMS					Yes
2.	NHRC					Yes
3.	NCIF					Yes
4.	Nursing					Yes
5.	IOM					Yes

Source: Field Survey, 2011

According to the respondents’ opinions, it is noted that, the reason of choosing GSDL software among other software is because it comprises of features which are suitable for the context of Nepal. As mentioned above, it is free software. So the libraries using GSDL are at financial advantage. Likewise, one of its prominent features that is its workability both on online and offline environment, makes the processing and accessing of information easier in the sense that many remote areas of Nepal do not have internet access. Similarly, highly skilled manpower is not needed to operate GSDL thereby allowing people with average computer skills to use and handle it.

5.1.3 Getting Training

They were asked the question 'whether they get appropriate training to use GSDL software'. They have given the answer in following way:

Table 5.1.3: Getting Training

SN	Name	Yes	No
1.	NAMS	Yes	
2.	NHRC	Yes	
3.	NCIT	Yes	
4.	Nursing	Yes	
5.	IOM	Yes	

Source: Field Survey, 2011

The table above states that all the professional librarians of five institutions have been getting appropriate training to operate GSDL software.

5.1.4 Planning before Digitization

A question was asked to the librarians about whether or not they have been planning before developing DL. The responses are shown below:

Table 5.1.4: Planning before Digitization

S.N.	Name	Yes	No
1.	NAMS	Yes	
2.	NHRC	Yes	
3.	NCIT	Yes	
4.	Nursing	Yes	
5.	IOM	Yes	

Source: Field Survey, 2011

Above table shows that all the librarians of five institutions have been planning before processing information in a digital collection.

5.1.5 Preferred Document to Process

A question was asked to the librarians about the kinds of document they preferred to process on digital library. The answers are summarized below.

Table 5.1.5: Preferred Document to Process

S.N.	Name	Thesis	Text book/Reference book	Research report	All of three
1.	NAMS	Yes		Yes	
2.	NHRC				Yes
3.	NCIT	Yes		Yes	
4.	Nursing	Yes		Yes	
5.	IOM	Yes		Yes	

Source: Field Survey, 2011

Above table reflects the respondents' views on the answer of the question regarding the preferred document for digitization using GSDL software. According to the survey report, out of five, four respondent prioritize thesis and research report over other information source such as books, documents etc. But one of them prioritizes all types of materials to process on digital collection.

5.1.6 Selection Criteria of Document for Processing on DL

A question is asked to the five institutional libraries to know whether they have made any selection criteria in the selection of the document to process in digital libraries. The respondents' answers are summarized below:

Table 5.1.6: Selection Criteria of Document for Processing on DL

S.N.	Name	Expensive/Rare document	On the basis of high demand	On the basis of long term use	All of three
1.	NAMS		Yes		
2.	NHRC				Yes
3.	NCIT		Yes		
4.	Nursing			Yes	
5.	IOM		Yes		

Source: Field Survey, 2011

The above table noted the basic criteria of selecting document to process in digital libraries. As shown, three users chose document to process on digital collection on the basis of high demand. Only one of them chose long term use as the ultimate criteria whereas the remaining one considered all three above mentioned options as essential requirements during the selection of documents to be digitized.

5.1.7 Seeking Support Service

Librarians were asked how they seek support services. They have given the following answers:

Table 5.1.7: Seeking Support Service

S.N.	Name	Local service provider	Discussion groups	Manual	If other specify
1.	NAMS	Yes			
2.	NHRC		Yes		
3.	NCIT	Yes			
4.	Nursing	Yes			
5.	IOM	Yes			

Source: Field Survey, 2011

According to the survey's report, four respondents are seeking support service via local service provider whereas one of the respondents is being getting support service via discussion group, through the internet.

5.1.8 Providing Support Service to Users

Librarians were asked how they provide support services to their users. They have given the following answers:

Table 5.1.8: Providing Support Service to Users

S.N.	Name	Discussion group	Telephone	On site visit	Training
1.	NAMS		Yes	Yes	Yes
2.	NHRC	Yes			
3.	NCIT		Yes	Yes	Yes
4.	Nursing		Yes	Yes	Yes
5.	IOM		Yes	Yes	Yes

Source: Field Survey, 2011

The table shows that one of the respondents has been providing help through discussion group via internet and rests of the others have been providing help through email, telephone and trainings to their users.

5.2 Responses from Users

The responses from the digital library users are presented in the following sections:

5.2.1 Visiting Digital Library Collection

Users were asked how often they visited the digital library. The responses given by the library users are shown below:

Table 5.2.1: Visiting Digital Library Collection

S.N.	Name of Institution	Frequently	Occasionally	Never	Total
1	NAMS	2	9	1	
2	NHRC	2	10		
3	NCIT	2	8	2	
4	Nursing	2	8	2	
5	IOM	2	9	1	
Total Respondents		9	44	6	60
Percent		15%	75%	10%	100%

Source: Field Survey, 2011

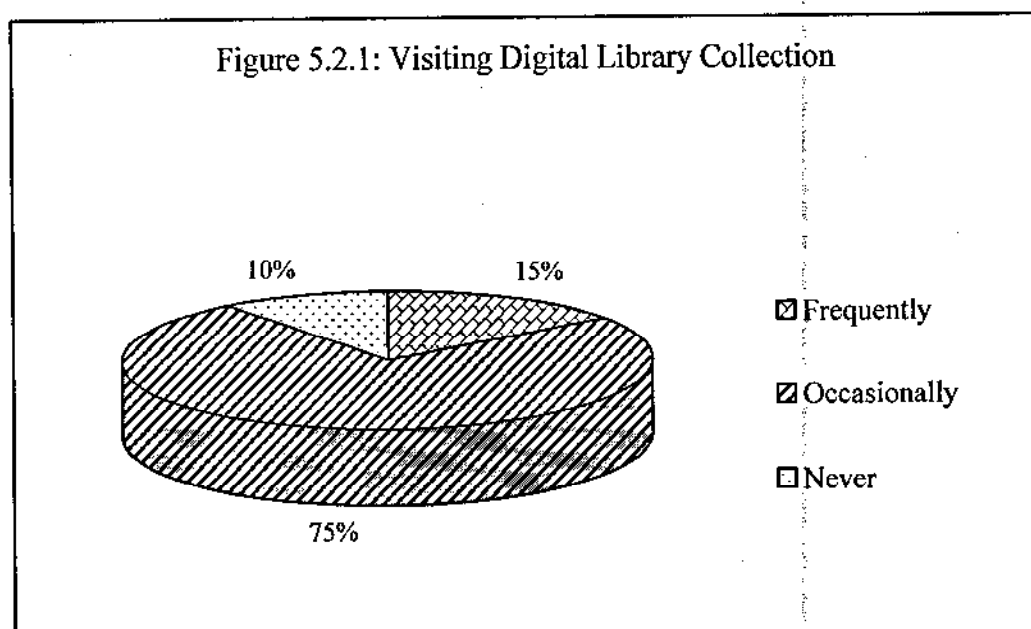


Table 10 reflects that 75% of the users visit digital library collection occasionally. 15% of the users visit DL collections frequently and 10% of the users were never

found to have visited the digital library collection. The data shows that majority of the respondent use DL occasionally.

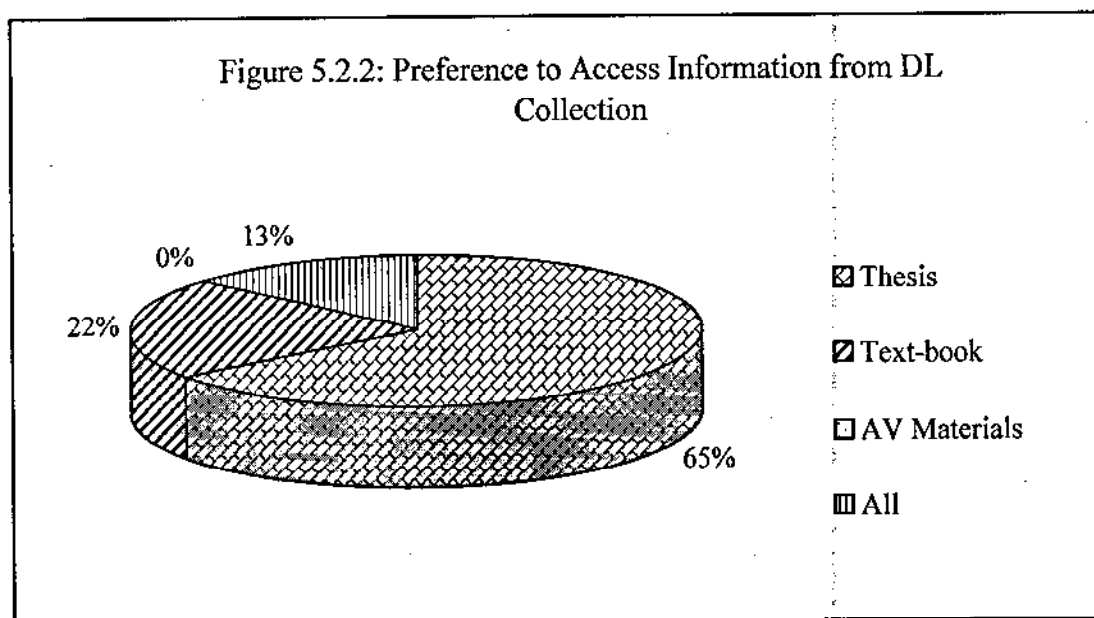
5.2.2 Preference to Access Information from DL Collection

The library users were asked a question to elicit information for their purpose of using the library and the responses are as follows:

Table 5.2.2: Preference to Access Information from DL Collection

S.N.	Name of Institution	Theses/ Research Article	Text-book	Audio/Visual Materials	All	Total
1	NAMS	7	3		2	
2	NHRC	10			2	
3	NCIT	6	4		2	
4	Nursing	6	4		2	
5	IOM	10	2			
Total Respondent		39	13		8	60
Percent		65%	22%		13%	100%

Source: Field Survey, 2011



The table above shows that 65% respondent prefer to access theses as well as research article from the locally generated digital collection. Only 22% users prefer to get text

book.13% users want to access all kinds of material- theses, research article as well as A/V materials.

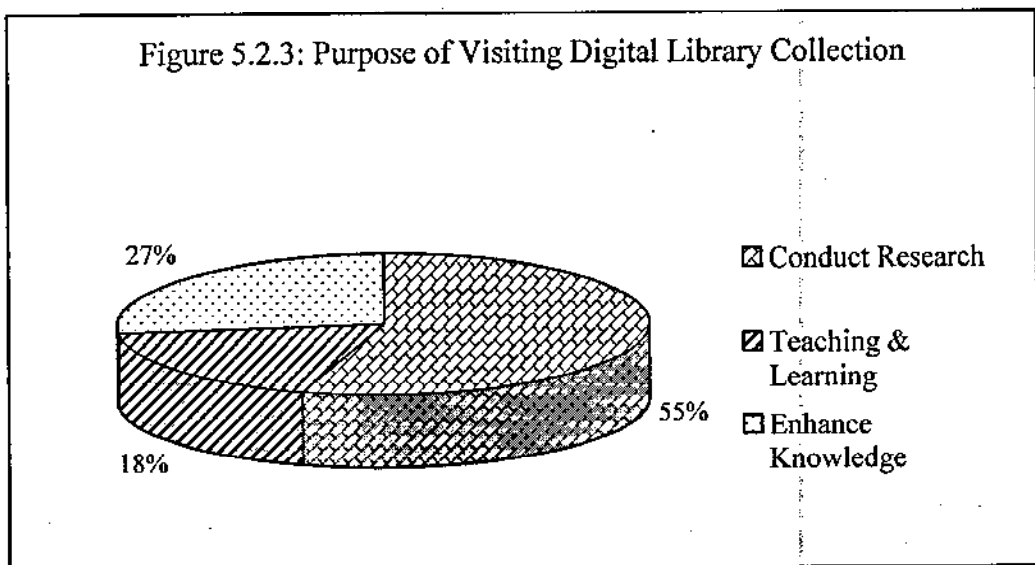
5.2.3 Purpose of Visiting Digital Library Collection

The library users were asked a question to elicit information for their purpose of using the library and the responses are as follows:

Table 5.2.3: Purpose of Visiting Digital Library Collection

S.N.	Name of Institution	Conduct Research	Teaching and Learning	Enhance Knowledge	Total
1	NAMS	8	3	1	
2	NHRC	9	1	2	
3	NCIT	9	2	1	
4	Nursing	4	3	5	
	IOM	3	2	7	
Total Respondent		33	11	16	60
Percent		55%	18%	27%	100%

Source: Field Survey, 2011



It is noted that 55% respondents use this site to conduct research. 18% percent of the respondents visit the site for the purpose of teaching and learning whereas 27% visit it to enhance their knowledge.

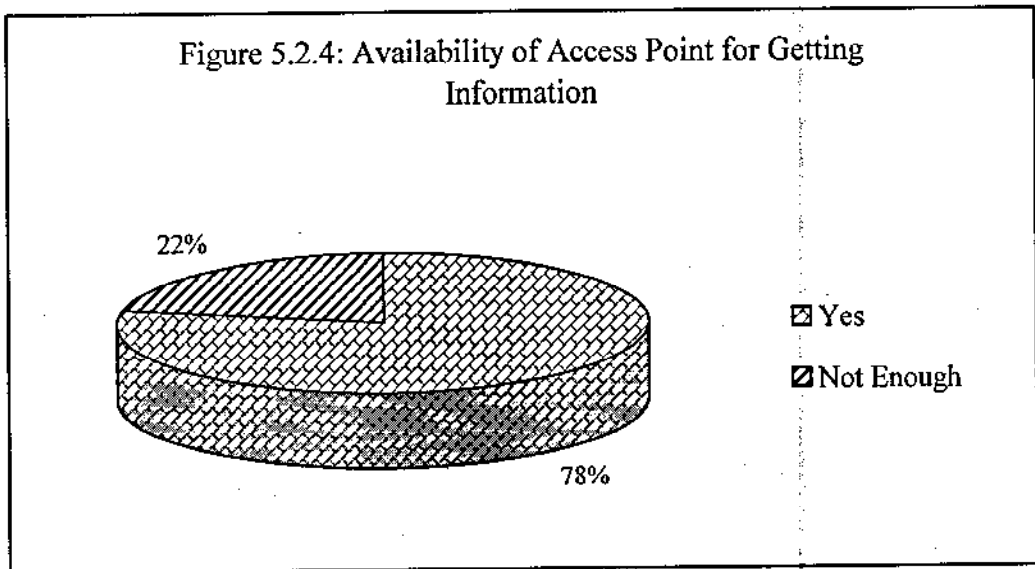
5.2.4 Availability of Access Point for Getting Information

Users were asked whether they are able to find access point for searching and getting information. The responses are as follows:

Table 5.12.4 Availability of Access Point for Getting Information

S.N.	Name of Institution	Yes	Not Enough	Total
1	NAMS	10	2	
2	NHRC	11	1	
3	NCIT	10	2	
4	Nursing	0		
5	IOM	12	5	
Total Respondent		47	13	60
Percent		78%	22%	100%

Source: Field Survey, 2011



The data of the above table shows that majority of respondents (78%) found enough access point to search full text information, but 22% have been meeting up with difficulties in doing so thereby making them unable to access full text.

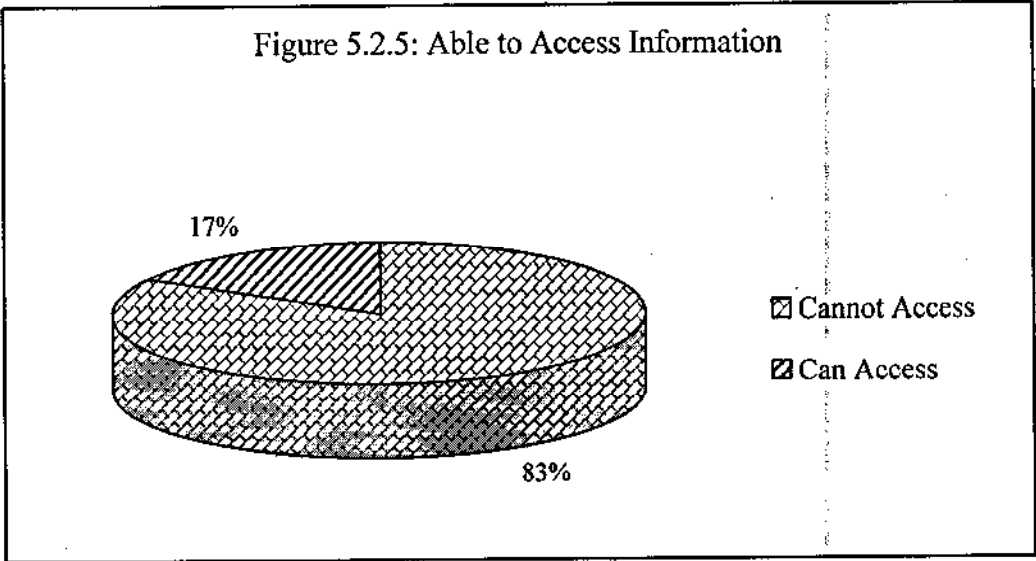
5.2.5 Able to Access Needed Information

Users were asked whether they are able to access information they needed to meet their need and purpose by visiting digital library. The responses given by the library users are shown below:

Table 5.2.5: Able to Access Information

S.N.	Name of Institution	Cannot Access	Can Access	Total
1	NAMS	9	3	
2	NHRC	9	3	
3	NCIT	10	2	
4	Nursing	10	2	
5	IOM	11	1	
Total Respondent		50	10	60
Percent		83%	17%	100%

Source: Field Survey, 2011



According to the respondent's reply, it is noted that, 83% of them are not able to access required information mostly from their digital collections, but 17% of the respondents have been able to access the needed information easily.

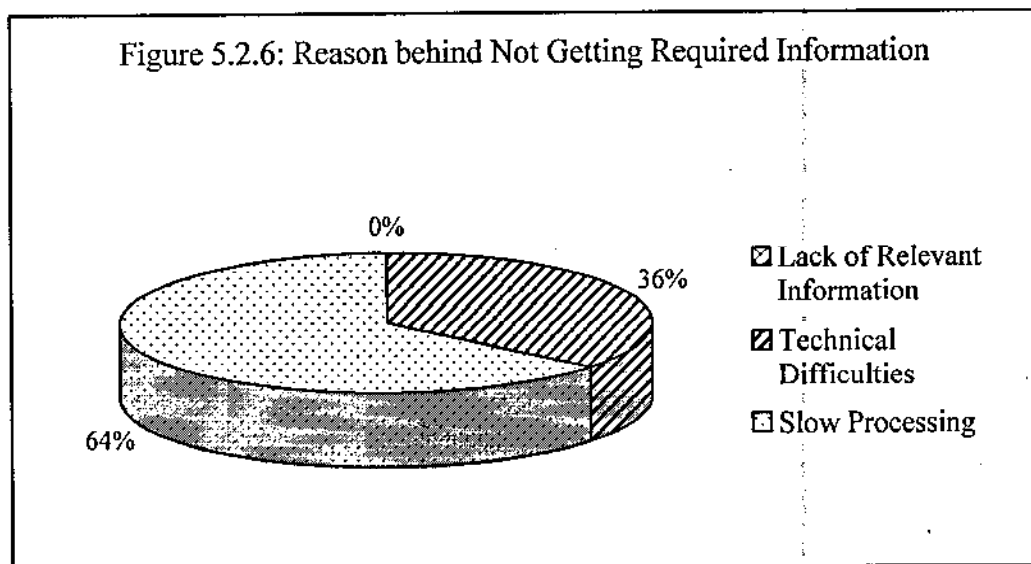
5.2.6 Reason behind Not Getting Required Information

A question is asked to know reasons behind not getting needed information from digital library. The responses given by the library users are shown below:

Table 5.2.6: Reason behind Not Getting Required Information

S.N.	Name of Institution	Lack of Relevant Information	Technical Difficulties	Slow Processing	Total Percent
1	NAMS		2	10	
2	NHRC		9	3	
3	NCIT		5	7	
4	Nursing		3	9	
5	IOM		4	8	
Total Respondent			23	37	60
Percent			36%	64%	100%

Source: Field Survey, 2011



To find out the reasons behind the difficulties met up while getting needed information from the digital collection, the above table has been presented. The data above shows that majority of the respondents (64%) point out the slow process of information on digital library as the main cause. 36% respondents considered technical problems as one of the prominent causes.

CHAPTER 6

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary

The main title of this thesis is 'Digital Library developed through the Greenstone digital library software in Nepal'. The objective of thesis is to know pre-requisites for developing digital library, the user's opinion regarding the digital library, find out the criteria of selecting information to process in digital library and to make necessary recommendations based upon the finding from the present study.

To make the research work robust and effective, a small study was conducted where a list of questions was put forth to the library professionals and the users. The questions were designed to meet the aim of the study. The study is focused on five institutional libraries namely Nepal Health Research Council (NHRC), Institute of Medicine (IOM), Nepal Academy of Medical Science (NAMS), Maharajgunj Nursing Campus (ION) and Nepal College of Information Technology (NCIT). A summary of the findings of the research is as follows:

- All of the five libraries seem to have realized the important benefits of digitization – easy to provide access to remote users, reduce space problems, and provide access to locally generated information in digital format.
- The five organizational libraries seem to have chosen GSDL because of its multiple benefits like free software, workability in both online and offline environment, its provision to process full text information, and the ease involved in operating it without requiring highly skilled manpower.
- The librarians of all the five libraries have been getting the appropriate training regarding the use of GSDL software. They were also found to have been planning before digitizing information.
- According to the survey report, most of the libraries prioritize to process the thesis and research reports on digital library collection over other information source such as books and documents.

- Out of the five libraries, four are getting support services through local service provider whereas only one has been getting help through discussion group via internet. Similarly, out of five, four libraries are providing support services to their users through telephone, on-site visit and training while one library is providing the support service through discussion group.
- 15% of the overall users are found to have used digital Library site quite frequently whereas 10% of the other users do not rely on digital collection. 75% of the users access the site occasionally.
- 65% of the users prefer to access theses or research articles whereas only 22% users prefer textbooks and 13% want all kinds of materials like theses or research articles, textbooks as well as A/V materials.
- As per the report, majority of the users (55%) visit the digital Library site for research purpose and only 18% of them visit for teaching and learning. The remaining 27% of the users visit it for enhancing their knowledge.
- Majority of users (78%) found enough access point to search information but 22% are still facing difficulties in finding access point for searching information.
- Similarly, 83% of the users are not able to access the required information. Among them, 36% are unable to get access to the site due to technical difficulties whereas 64% do not find the need information due to the slow digitization process.

6.2 Conclusion

Based on the findings, the conclusions drawn from the study are as follows:

- Before developing digital library, it is necessary to have training to use the digital library software, proper planning before digitization for getting proper support services and providing services to the users.

- Selection of document to process in digital library should be on the basis of high demand. Theses and research reports should be preferred to process for digitization.
- Most of the digital library users visit library occasionally and they prefer to access theses and research articles for research purpose. Similarly, majority of the users are not able to access the required information due to slow processing of information in digital library.

6.3 Recommendations

On the basis of findings and conclusion, the recommendations developed from the study are as follows:

- Before developing digital library, there are some important prerequisites like training on using digital library software, proper planning for seeking support and providing services to users, so the libraries in Nepal should consider fulfilling those prerequisites before developing any digital library.
- Libraries in Nepal should consider digitizing all the documents of high demand while they start developing the digital library so that the users who need them can get access to the document promptly and easily. Moreover, theses and research reports should be prioritized for digitization.
- Most of the digital library users in Nepal seek information for research purpose and want to access theses and research articles. We know information has time value and researcher always seek to access current information to conduct research. Thus, libraries must collect research report, scholarly journal and related materials of the latest date and process them in digital library promptly.
- Majority of the users visit digital library occasionally which shows they are not interested in using digital library collection. It may be because of the unavailability of required information at right time. Study also found that the reason behind not getting needed information is due to the slow processing of information on digital collection. So, the libraries must take appropriate action

to process information as early as possible so that the users of digital collection can fully rely on their digital collection.

- As we know that very limited reading materials are available locally and still those are out of reach from most of the users. In such a situation, GSDL software is suitable software for the country like Nepal. As the study shows all the five libraries select this software because of its special features like it is free/open source software, with no highly skilled man power needed. It can upload full text documents and run in the online as well as offline environments. So, the study found that GSDL software is one of the appropriate software for Nepalese libraries. Thus, the libraries of Nepal must consider using GSDL for developing their digital library collection.

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Appendix A: QUESTIONNAIRE

This questionnaire is a part of my study for preparing a thesis for the fulfillment of the 2nd year course of Master of Library and Information Science (MLISc). The topic of the thesis is "Use of Digital Library developed through the Greenstone Digital Library software." The purpose of the study is to explore the use of digital library developed through Greenstone Digital Library software in Nepal. For this reason, I would like to request you to give your valuable information to complete this research. The information received will be kept confidential and used only for research purpose.

For professional librarian

1. What are the main objectives of making digital library?
 - To provide access to remote user
 - To provide access locally generated information in digital format
 - To save time
 - All of above

2. Why are you choosing Greenstone Digital Library software to build digital library?
 - Free software
 - Workability in both the internet and intranet
 - No need of high technical manpower to operate
 - Provision of providing full text

3. Have you taken any training course to operate GSDL?
 - No
 - Yes

4. Do you plan before developing digital library?
 - Yes
 - No

5. Please list the types of document you prefer to digitize on the basis of priority?

- Theses/research article
- Text book/Reference books
- Research article
- All

6. How have you been selecting documents which are to be digitized?

- Expensive/Rare document
- On the basis of high demand
- On the basis of long term use
- All of above

7. How are you planning to seek support service?

- Local service provider
- Discussion groups
- Manual
- If other specify.....

8. How are customers being supported?

- Discussions group
- Telephone
- On site visit
- Training

For users

9. How often do you visit locally generated digital library collection?

- Frequently
- Occasionally
- Never use

10. What kinds of document do you prefer to access from your digital collection?

- Theses/Research article
- Text book
- Audio/Visual materials
- All of above

11. What are the main purposes of visiting digital library collection?

- Conduct research
- Teaching and learning
- Enhance knowledge
- If any please specify.....

12. Do you get enough access point?

- Yes
- Not enough

13. Are you able to find required information through digital collection?

- Cannot access information
- Can access information

14. What are the reasons behind not getting needed information?

- Lack of relevant information
- Technical difficulties
- Slow processing

15. If you have any suggestion to improve the Digital library, please mention.....

Thanks for your kind cooperation

Appendix B:
BIO-DATA

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