Web-Based Library Services in Academic Perspective: Knowledge Management with Special Reference to Institutional Repositories

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Abstract

Nowadays the information is being used as leading phase for development. Information is generating from almost every sector of our society but, every society are not that much of developed. Some societies are very well developed, some developing and some are lagging in comparison to others. The secret behind the well-developed societies is information. They are the much producers, seekers, managers and users of information. This journey started from the very beginning concept data. After processing the data it became information. Now we are in the age of knowledge. The societal development is also changing from agrarian to information society and now knowledge society. In the role of the development of any society, library performs the pro-vital role. Various types of libraries are serving various types of users. The 21st-century technologies proceed libraries to the sky level of providing tremendous services to the end users.

This paper deals with the modern technologies used for proving services to the modern users. Modern users very need bases. They want much-pinpointed resources rather than a full document. So libraries are also becoming modern information centres. The internet made this job very easy for the professionals for providing the on campus as well as from outside for accessing the resources. Various tools are using for these purposes. DSpace is considered one of the KM tools.

Keywords-Web-Based Services, Academic Library Services, Knowledge Management Tools, Institutional Repositories, DSpace.

1. Introduction

The developments of Data-Information-Knowledge-Wisdom bring humans to the endless process. Human society also changes to the knowledge society from agrarian society. These see changes affected on the whole humankind. The present society deals with the knowledge by a locus in the knowledge society. The term knowledge stands for knowing something or aware about some concept, and management stands for managing something. So, Knowledge Management (KM) is a skill to manage whatever one has. This may be theoretical or practical. This may be fact, lesson, instruction, message, news, materials or any other thing from where one can gain or learn something. The term first coined by Nicholas N. Henry in 1974[1]. Now KM has spread vastly and both the types of knowledge i.e. tacit and explicit stands with own importance. Resources have also changed to electronic forms in various formats.

To face these problems library professionals also acquiring various way-outs to serve the society better. Many tools are developing for managing these huge amounts of information producing every day. These e-resources or digital resources are taking place of the traditional resources. So libraries are also hiring digital mechanism for managing digital resources. Separate libraries are forming for these types of materials. In academic libraries, separate sections are creating to handle these. To manage these types of resources, digital library software are using. Through the help of these tools, acquiring,

managing and disseminating of information becoming very easy and first job for the professionals.
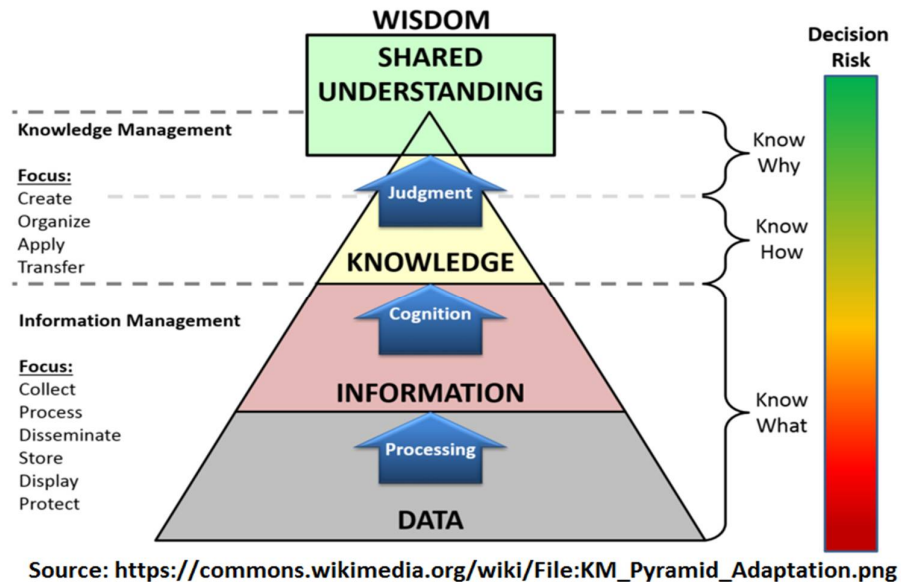

Source: https://commons.wikimedia.org/wiki/File:KM_Pyramid_Adaptation.png

Figure 1: Knowledge Management Cognitive Pyramid

The knowledge society generally means a society where people are able to use the available knowledge for the development of them as well as for the society and transform to reuse of it for future. The academic area is the only place where both types of knowledge are found. Explicit knowledge as in the form of tangible objects and archived in repositories and tacit knowledge in as faculty, scholar, administrators etc.[2] DSpace is performing one of the popular tools for archive/ repository.

1.1 Objective of the Study

The followings are the main objectives of this study to aware of

- ➢ Aware of data, information, knowledge.
- ➢ To know the various kinds of the library.
- ➢ Aware of modern library management tools.
- ➢ To know the various web-based services in academic libraries.
- ➢ Aware of institutional repositories and its various issues.
- ➢ Being known overall about DSpace.

1.2 Coverage of the Study

Due to the shortage of time and maintain the lengthiness, the present study deals with the various web-based library services provided to its users. This study also deals with various knowledge management tools for managing library resources. Lastly, it shows an overview on institutional repositories and DSpace, performing as one of the important resource managing tools.

2. Literature Review

Lots of studies are done on web-based library services in academics, institutional repositories in academic libraries and DSpace. Some of them are- Mole and others elaborated the development of a web-based Information Literacy service, at the Library of the Alexander Technological Educational Institute of Thessaloniki[3]. Gbaje and Kotso describe to assess the content of academic library websites in Nigeria with a view to

identifying the extent to which they effectively facilitate access to electronic resources[4]. Siddike, Munshi and Mahamud explain the current status of public and private academic library websites in Bangladesh[5]. Kaur and Singh state to explore the nature of customer service in the academic library setting in the electronic environment[6]. Singh focuses on the impact of the internet on various library processes, services and products[7]. Gerolimos states to document the integration of Web 2.0 services into the working framework of some of the most advanced academic libraries in the world[8]. Klimczyk and Probst incorporate several methodologies to assess outcomes, user satisfaction, and performance to identify an unmet need for Web-based services[9]. Kiran and Diljit state the key determinants of Web-based library service quality, with an emphasis on how library customers perceive service quality, has much to offer[10].

Sinha discusses Knowledge Management theory and its application for library management[11]. Maponya states the way to provide value added services by engaging with knowledge management in the academic librarians of the University of Natal, Pietermaritzburg Libraries[12]. Raja, Ahmad and Sinha explores how information technology and related automated systems can support librarians' endeavour towards better implementation of knowledge management[13]. Asogwa examines the contributions of librarians in knowledge management and the implications for academic librarians[14].

Vishala and Bhandi provide an overview of Institutional repositories its benefits to the institutions and also describes the role of the library in building an Institutional repository[15]. Cullen and Chawner explore the development of institutional repositories as a global phenomenon, comparing their objectives with the core principles of scholarly communication[16]. Jantz and Wilson identify the diverse navigational paths to IR sites from library Web site homepages[17]. Yakel states the part of a larger research project Making Institutional Repositories a Collaborative Learning Environment[18]. Kamila explains the concept of Institutional Repository, its relevance, merits, and software requirements[19]. Pathak discussed library community to be actively involved, perpetrate orientation programmes to users and prevent the loss of proprietary web services by supporting the development and use of standard web services[20]. Bhardwaj thinking web-based environment, the role of library and information professionals to teach the students how to use the existing resources, frequently organising workshops, book talks, debates, develop web based contents and provide web-based service to its client[21].

3. Methodology

As the present study deals with the conceptual matters of library services, knowledge management, tools for managing knowledge, institutional repositories and DSpace; descriptive methods of research is followed here. Starting with the concept of data, information, knowledge it described various types of libraries. Then it shows various types of modern services both on campus and off campus. Then it describes the importance of institutional repositories in this technological era and its various aspects. Finally, it shows an overview of DSpace and its issues.

4. Different Types of Libraries

Library basically means a place where, various kinds of materials are collected, stored, maintained and distributed to the needy users and from where users can gain some concept/ information/ knowledge about anything. A library may run by various organisations. It may be formal educational sectors, may govt. or private sectors, an association or NGOs or as an individual public sector. Whatever the type is, the main purpose of the library is to serve the people relating or associated to the organisation. In early life, people stored and used knowledge in clay tablets and palm leaves[22]. In keeping with the times, library resources are changed from print to electronic. The library has also changed from storehouse to information centre. Now every sector of the society maintains their own library for their needs. So, it is very difficult to define the types of the library[23].

American Library Association (ALA) has categorised library into four types[24] i.e. Public, Academic, School and Special library. While school is a part of an academic sector, it is assumed that the rest three are the main category of libraries. Below a small description is given for each library.

Libraries Types	Public	Academic	Special
Description	Library for the public, by the public, of the public.	Library associated with an institution.	Library associated and build with special objectives and people.
Objectives	To serve the public irrespective of race, religion and caste.	Serves mainly to people associated with the particular institution.	Serves mainly to a specific group of people or people related to a special object or subject.
Example	National library, state central library, district library, town library, rural library etc.	Libraries of school/ college/ university/ institute etc.	Space library, physics library, association library, parliament library, museum library etc.

Table 1: Types of Library

5. Modern Services in Academic Libraries

This study is associated with Academic Libraries only. Again, the expansion of academic libraries is also spared. So as it is said in the objectives of this paper, library services are a main dealing part here especially computer-based services. Modern library services are very different as a comparison to early days. Modern users are also very very specific. After visiting some well-developed library sites it is shown that today's library services are divided into two methods i.e. traditional services and modern technology based services. Academic libraries are providing the so-called traditional services i.e. catalogue, journal, cassette, floppies, borrowing, CAS, SDI, reference, reprography, newspaper clipping, reading room, request a purchase etc. Side by side now technology and internet deliver various types of web based services by which library services reached a high-level satisfaction to the users.

5.1 Web-Based Library Services

As it is said above about various types of modern services, it is neither possible nor required to provide all the services mentioned theirs. Different libraries acquired different services. Sometimes it is one of the above, sometimes they implement a new and different service particularly implemented for that library or user category.

Web-based library services are the service where interaction between users and library professionals were made through electronic means. It can be categorised into two part, one is browser based and another one is application based. Some services can provide both through browser and application. Again these can be delivered in two ways, one is on campus i.e. information can accessed from inside the campus only and the other one is off campus i.e. information is accessible from anywhere. Some web based modern service examples are given below[25][26][27][4][8][20][28][21]

Type	Services	Descriptions
B R O W	Information KIOSK	It is an automated search service, ex- OPAC.
	Discovery Services	Various software is using for easy retrieval of materials from the internal or external database.
	Reserve	The user can hold any material if it is unavailable or very

S E R B A S E D		demanded.
	How to Service	Library provided this services to guide how to use library techniques and technologies then-and-then to reach any material.
	Resource Sharing/ Inter-Library Loan	Due to high pricing and avoiding duplicity, a group of libraries hiring one copy of any material and share among others.
	Scholarly Publishing	To provide resources and expertise surrounding the scholarly publication cycle.
	CD/DVD Database	Accompanying materials are provided as a different material.
	Audio-Video Materials	Study lectures are providing here for using internal/ external users.
	New Arrival	Cover image of the newly arrived materials showed here.
	Institute Publications	Providing institute publication to aware ongoing trends and future work.
	E-Newsletter	Updated library news was provided through this service like- new services, new arrival, trial access, library programmes, any changes etc.
	CAS/ SDI	Computer-based CAS/ SDI service provided here.
	Previous Year Question Paper	Digital copy of question papers is providing for internal/ external users.
	Lab	Computer lab facility provided here for accessing the internet.
	Downloads	Various forms related to the library like- requisition, leave form, duty exchange etc.
	Library Blogs	Details latest news were published here. An extension to the e-newsletter.
	IR Services	Archiving resources of institute outputs/ acquired by the library.
	User Education	New admitted users are showing how to use and access library resources.
	Liason Programmes	This service is given to a particular group/ dept. for guiding towards resources of their interest when required.
	Useful Links	Some useful library/ materials/ news links were given.
	FAQ	Frequently Asked Question gives the predefined answer of the common question by users.
	E-mail Server	It maintains the e-mail communication for the particular institute members only with a fixed domain name for everyone.
	Bookmark	It saved the retrieved item for later use.
	Database	It provides information on packaged information acquired by the institute.
	Gateway	It is a collection of web resources suggested by subject specialists.
	Bulletin Board	It shares/ exchange the information over the network.
	Union Catalogue	A collection of resource gateway for more that one library.
Ap pli cat ion	Android App	Application for using library services through android/ smartphones.
	RSS	Web feed for providing updating news automatically after subscribing.
B O	Integrated Library Services	Various software is using for providing automated library resource services.

T H	Self Issue-Return	The user can Issue-Return materials by self through FRID system.
	Research Support Service	Various research supportive materials/ tools are providing for scholarly outputs.
	Ask a Librarian	It is an extension of reference service where users can communicate/ chat with the library professionals for any help/ requirement.
	Social Network	Information can also provide through this and social interactions also been made.

Table 2: Web-Based Library Services

Apart from these many other services can also be provided as and when required by the users of that institute.

6. Knowledge Management Tools

The concept of KM is first coming out during the last decade of the 20th century by the business world to gain competitive advantages. Later it speared into other organisations and development areas including Library and Information Science (LIS) field. Basically, KM in libraries is a process of creating knowledge to distributing (Figure 2)[29] to the mass. After the 1950s, when management principles are applied to the LIS field full framed, the main objective of the academic libraries is based on the collection development and organise the resources according to the institute objectives. But later it focused on the retrieval and use of the resources and for that, the service to the user changed to used based services (Figure 3) [30].
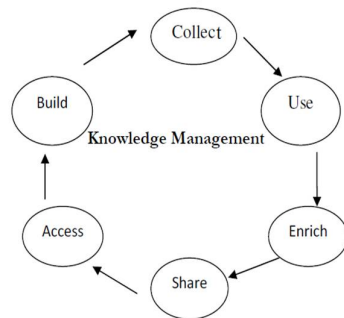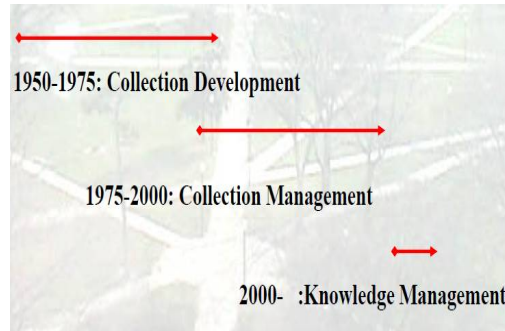

Figure 2: KM Cycle

Figure 3: Towards KM

Modern digital resources are quite diverse in nature. They are also scattered widely. So various modern tools/ software are required for acquiring, managing and disseminating this e-resource as well as traditional resources. Libraries are using both commercial and open source tools for mapping of its resources. This article talked about the open source tools mainly. Here some open source knowledge mapping tools are given with their activities in libraries-

Software	Activities
Library Integrated Software	Manage library in-house operations like; accessioning, cataloguing, circulation etc. (Koha, Evergreen etc.)
Digital Library Software	Manage institutional repositories/ archive (DSpace, EPrints).
E-Resources Management Software	Manage e-resource operations mainly. (Coral, Helibtech).
Reference Management Software	Manage for mapping scholarly/ technical outputs. (BibDesk, Zotero).
Guide To Research	Mapping and guide resources according to subject/ dept. wise.

Software	(Subjects Plus)
Discovery Software	Manage of searching-retrieving of resources. (Vufind, Open-Audit).
Blogs	Mainly using for providing current news but, it can also be used for other services. (Wordpress, Joomla).

Table 3: Open Source Resource Management Tools

Apart from that, many other tools are there for mapping and managing resources. Some tools are available with paid version with different types of features.

6.1 Institutional Repositories as a KM Tool

The web technology has opened the new trends of sharing resources and the internet has added the accessibility to any resource from anywhere and anytime. Nowadays archive/ repository is becoming a lead communication cycle among the scholar community. While an archive raises the key upholds the institute's intellectual outputs, side by side it meets the crisis of scholarly output. An institutional repository is a storage space consists of various single or multiple types of intellectual products in digital formats. There are many software available for building institutional repositories[8]. Some are open source and some are proprietary. UNESCO has compared categorically of some well known IR software to provide a guideline for the library professionals for choosing an IR for their institute.[31]

6.2 Benefits and Barriers of IR

IR represents the digital collection of any institution. The contents may available full-text or request based. Having an IR of an institution is very benefited to the students, scholars, faculties of that institution. The following are some key benefits of IR-

- ➢ Provides the whole institutes' scholarly outputs in a single interface.
- ➢ Provides an overview of current trends in research of that institute.
- ➢ Digitally teaching methods and materials are provided to the large community.
- ➢ A literature search is gone easier and faster.
- ➢ Long term preservation.
- ➢ Disseminate and acquire of scholarly writings are gone faster.
- ➢ Accessing information is not limited to time, space and quantity.
- ➢ Collaborative and multidisciplinary works are possible.

Though it's very lesser issue but, some barriers are also there of an IR. The following are the barriers-

- ➢ Copyright to contents sometimes create conflicts between the institute and publishers.
- ➢ Lack of technical as well as budgeting support at the back end.
- ➢ Lack of technical person for maintenance.
- ➢ Offline repositories are not accessible from outside and sometimes contents may not found important for other institutes.

6.3 Key Benefited through IR

Through the IR system, many can be benefited directly or indirectly. A tree has given below of the key benefited (Figure 4)[32]-
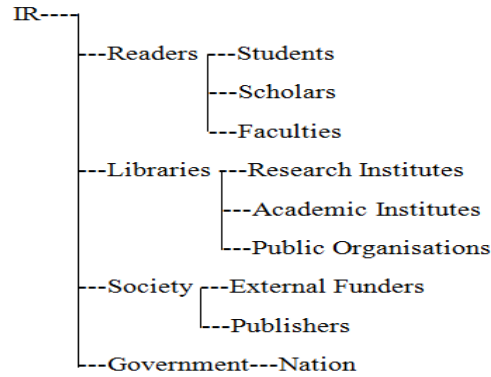
```
IR----
        ┌---Readers ┌--Students
        │           │--Scholars
        │           └--Faculties
        │
        ├---Libraries ┌--Research Institutes
        │             │--Academic Institutes
        │             └--Public Organisations
        │
        ├---Society ┌--External Funders
        │           └--Publishers
        │
        └---Government---Nation
```

Figure 4: Key Benefited Tree

6.4 Types of Contents for IR

Different types of materials can be stored in an IR. It depends upon the institute, what type of material they want to archive. Here some types of materials are given below, institute can deposit in their archive-

- ➢ Thesis/ Dissertations of scholars.
- ➢ Faculty publication.
- ➢ Video/ Audio lectures.
- ➢ Previous year question papers.
- ➢ Institutes purchased the software.
- ➢ Grey literature.
- ➢ Reports/ Meetings/ Committee papers.
- ➢ Pre-prints.
- ➢ Newsletters.
- ➢ News clippings.
- ➢ Conference/ Seminar publications.
- ➢ Event photographs.

Institute can archive many other things except these according to their policy and need.

6.5 Policy Frameworks for Building IR

While building an IR, institutes/ libraries must prepare some policy/ guidelines through which it can archive materials as the contents are the outputs of individuals. Without a proper policy, the institute may face some copyright and IPR issues. An IR policy generally indicates that the institute/ library has taken a prior permission from the author to archive it in their repository and giving access to other users. An institute/ library may prepare different categories of policies like; collection policies, submission policies, preservation policies, usage policies etc. Below some points are given which institutes may remember while building an IR-

- ➢ Types of content and formats to be an archive in IR.
- ➢ From whom materials can be taken.
- ➢ The library's/ institute's rights and responsibilities
- ➢ Distribution license and privacy policy for access to other users (on campus/ off campus and full text/ abstract).
- ➢ Free services or fee-based.
- ➢ Rights to withdraw or affix embargo policies.
- ➢ Submission fields required.
- ➢ Supported metadata standards.
- ➢ The authentication process for verifying submission etc.[34][35]

7. DSpace- A Tool for IR

DSpace is open source software for building IR. It is the most popular open source software in the present scenario. It can archive any type of digital material in any format like- word, pdf, image, video, datasets, software and much more. It was developed by MIT Libraries Cambridge and HP Labs California and first introduced in 2002. At present DuraSpace is maintaining the software and user community. The following link is very helpful for aware about technical details of DSpace (http://www.dspace.org/techspecs).

7.1 Features of DSpace

The mainstream features of DSpace are-

- ➢ Simple to install and operate.
- ➢ It's free.
- ➢ Due to open source, it is fully customisable.
- ➢ Large user community for support.
- ➢ Up-to-dateness.
- ➢ Any institution can set it up.
- ➢ It supports any file format.
- ➢ Unicode facility etc.

7.2 Key Requirements for DSpace

Several packages are required for building a repositories using DSpace. These are-

- ➢ Storage space (server/ local storage).
- ➢ Operating System (UNIX-like/ Windows).
- ➢ Java JDK 5 or later.
- ➢ Apache Maven 2.0.8 or later.
- ➢ Apache Ant 1.6.2 or later.
- ➢ RDBMS (PostgreSQL 7.3 or later/ Oracle 9 or later).
- ➢ Tomcat 4 or later.

It also supports JSPUI and XMLUI interface with Open Archive Initiative Protocol for Metadata Harvesting (OAI-PMH) with Metadata Encoding and Transmission Standard (METS) packages for interoperable access[33].

7.3 Installation and Customisation of DSpace

DSpace is very user-friendly both while installing and customising. DSpace can be installed both on Windows and Linux but, due to security reason, developers recommend to install DSpace in Linux. Installing DSpace in Linux can be done through executing some commands.However many well-reputed professionals have made ISO image file where everything is already made through running some commands for easy installing, just change it according to the institute requirements after installing.

There are many ISO files are available on the internet. One of them are given below-

- ➢ By D. P. Tripathi (http://www.dptripathi.in/download/dspacelive.iso).

There are many sites through which anyone can install DSpace by executing the command step by step. Some well-known sites are given below-

- ➢ By Vimal Kumar (http://dspacegeek.blogspot.in/2016/03/installing-dspace-5x-on-ubuntu-1404-lts.html)
- ➢ By D. P. Tripathi (http://www.dptripathi.in/open-source/dspace-repository-software/)

- ➢ By V. K. Mishra (http://mishravk.com/dspace/)
- ➢ Installation Video (https://www.youtube.com/watch?v=6fWRStQz_X0)

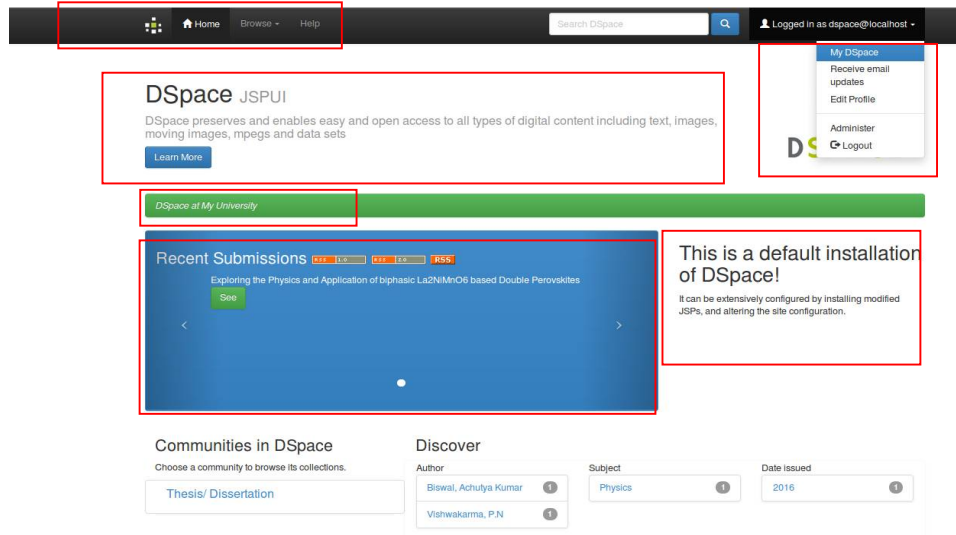DSpace can also be installed in windows. The following link will guide to install DSpace step by step-

- ➢ http://dptripathi.in/manual/dspacewindows.pdf

Figure 5: DSpace Interface with Main Customisable Area [26]

The customisation is quite typical. It is a never-ending process and one of the most important features of DSpace. One can build and represent anyhow they want. In Figure 4, the main customisable area is shown. Except those, many other things were there to adjust from administration tools according to the need. The administrator should aware of the file structure and some markup/ Javascript/ PHP and commands. Some links are given below for dealing various issues of customisation-

- ➢ New User Training (http://www.dspace.org/new-user-training)
- ➢ Community (http://www.dspace.org/community)
- ➢ Blogs (http://www.dspace.org/jira)
- ➢ Other Resources (http://www.dspace.org/resources)
- ➢ Google Group (https://groups.google.com/forum/#!forum/dspace-tech)
- ➢ Vimal Kumar's Blog (http://dspacegeek.blogspot.in/)

Except these many other online community/ groups/ individuals are there for support.

7.4 In-House Operations of DSpace

The in-house workflow is also very user-friendly. After completing the basic customisation the DSpace interface will be ready for submitting the content. Below some step by step content submitting process is given-

- ➢ Login to the DSpace account with the id-password.
- ➢ Create community and sub-community according to the need and institute/ document type.
- ➢ Go to my DSpace from login bar and start a new submission.
- ➢ Choose the collection type.
- ➢ Fill the metadata of that content.

- ➢ Fill the description of that content (keywords, abstract etc.).
- ➢ Upload the actual file into Dspace.
- ➢ Verify the submitted item details.
- ➢ Accept the distribution license, and

The submission is complete. The following links can help for submitting any content-

- ➢ From PDF file (https://nsrc.org/workshops/2012/nsrc-library-senegal/raw-attachment/wiki/References/Submit_DSpace.pdf)
- ➢ From video (https://www.youtube.com/watch?v=ewVSYaMItJo)

8. Conclusion

Providing service to its users is the most important activities of any library. Academic libraries are one of the types of the library where a variety of services are provided. Sometimes readymade services and sometimes user based or demand based. Modern technologies are extended these services beyond the library wall. WWW is the most revolutionary invent of today's age. Libraries are also acting as one of the benefited organisations of WWW. Various web-based library services are the true example of this. IR and DSpace as a tool for IM is one of the recent initiatives institutes/ libraries are taking for upholding their resources not only to their users but it represents the nation's intellectual output to the global community. It avoids both acquiring of duplicate resources and resolves the low budgeting problem in this inflation situation especially in developing country like India. Resource sharing, inter library loan these are some concept through it alternate resources can acquire by the library. IR is playing as the resource sharing concept, though it is not a collaborative action or package subscription materials.
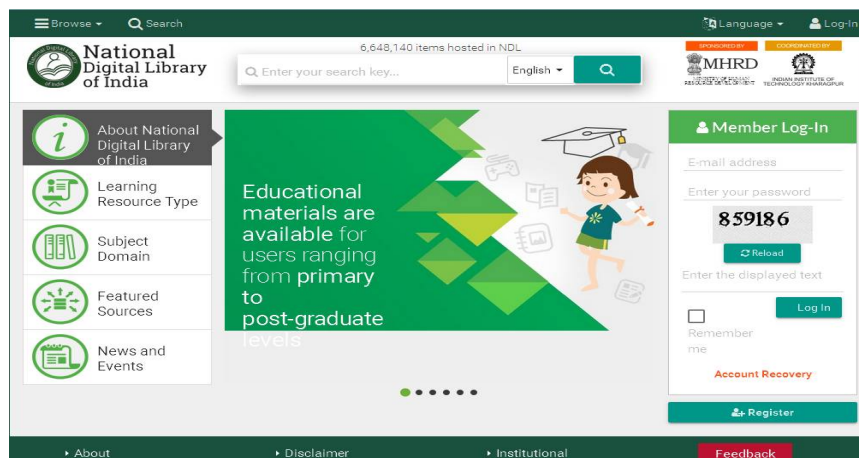

Figure 6: NDL Interface (https://ndl.iitkgp.ac.in/)

Recently Ministry of Human Resource Development (MHRD), Govt. of India taking many Digital India initiatives for serving the nation digitally. National Digital Library (NDL) is one of the tremendous examples of the nation's repository. It is a pilot project of MHRD to prepare and represent a national archive in a single interface hosted by IIT Kharagpur. They encourage all the institutes/ organisations/ universities to build an IR. They also providing support, hands-on training, and materials for building IR. After successfully building an IR they harvest the metadata and create links to their NDL site through which they redirecting any seeker of information to the particular institute IR. NDL providing study materials from primary level to higher education.

Through these various services, libraries are expressing and indicating their status globally that libraries are not that traditional places where it limited to issue-return of

books and librarians are acting as a protector. Now libraries are one of the valuable service sectors of the society and librarians are performing as a service provider.

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