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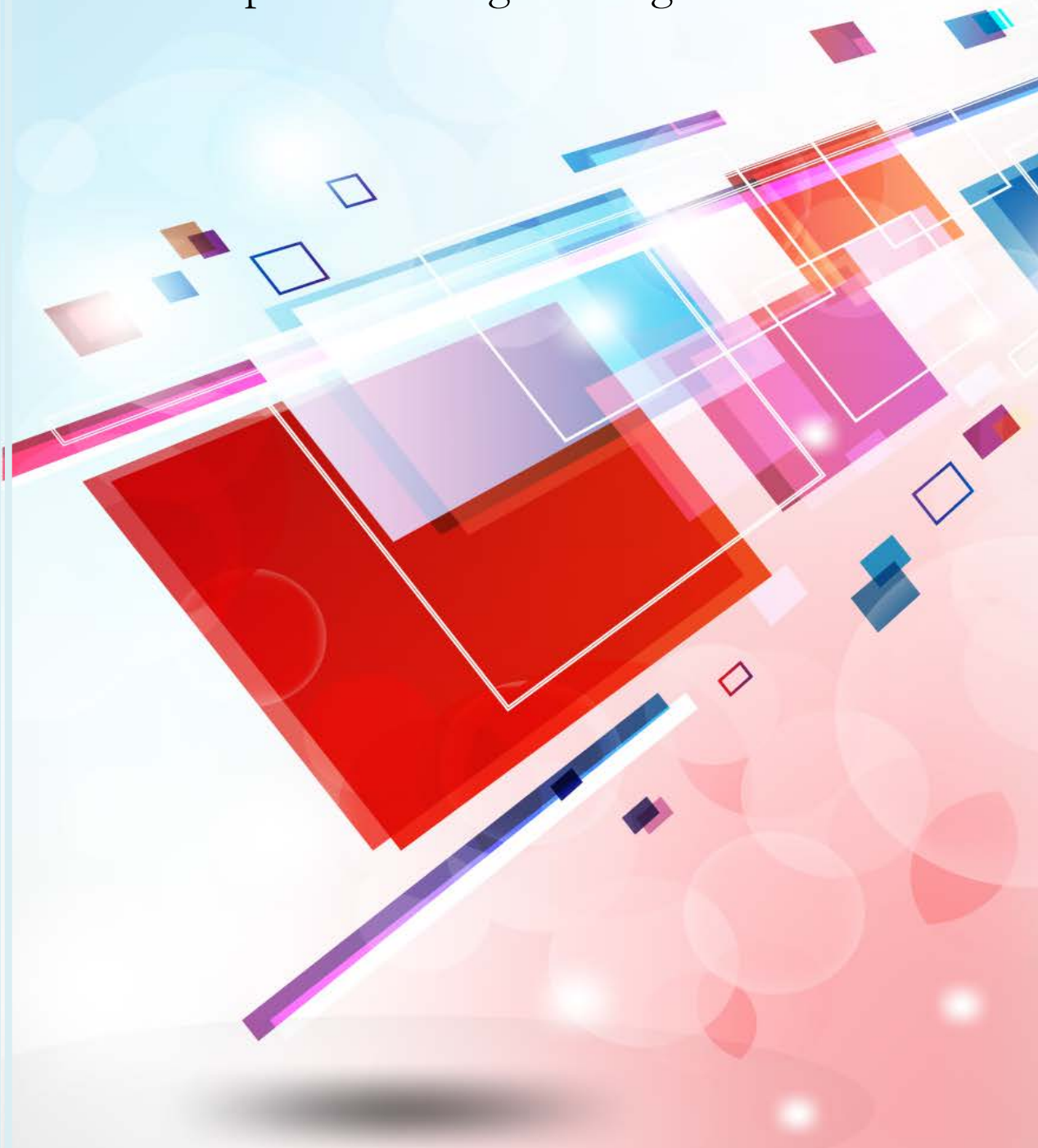
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Information Communication Technology Use in the Library of Independent University, Bangladesh: Past, present and future plan

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Abstract: This article aims to explore the adoption of Information Communication and Technology (ICT) and reason behind embracing Open Source (OS) solution at the Library, Independent University, Bangladesh (IUBL) finally. This study tries to share the extent of the OS implementation process in brief for the relevant digital service in light of the drawback of previous software execution. IUBL has been involved in applying ICT-based solutions for the management with a range of library functions and services since its inception. As user-centric service provider, for last few years IUBL has engaged in finding solution for changing the traditional ICT-based system. In this process the library staffs have identified the satisfactory direction for better library service. A number of popular OS Integrated Library System (ILS), Institutional Repository (IR) and Discovery Tools have been reviewed and examined to adopt the suitable tools. Among various tools Koha, DSpace and VuFind are preferred as ILS, IR and discovery tool respectively. This paper also illustrated implementation of ABCD software for journal indexing. This write-up demonstrated a successful way out from the library professionals and university library perspective. This study would close the gap and provides guidelines for practicing librarians, policy makers, and management.

1. Introduction

Academic libraries, specially university libraries are established for a common operation to fulfill the mission and objectives of their parent institutions which is related to support teaching and learning, research and development (Husain and Nazim, 2015). Research and Developments in Information Communication Technology (ICT) have affected all areas of knowledge and information (Babu et al., 2007). ICT is an umbrella term, to include all rapidly emerging and developing technologies altogether i.e. computer, software, networking, programming and information systems. Globally ICT changed the library services in a spectacular manner. (futalib, 2013). With the recent development of ICT, academic and research libraries are anticipated more user centric desired services to meet the need of both the users and the library mangers (Woodward, 2009). Globally, ICT has contributed massively to the performance of librarians with the services and functions of the library which includes but is not limited to the collection development, references services, document delivery, access to organized collections, circulation management, serials control, security etc which help in the maximum way to get the benefit for the users (Whatisict, 2015).

In Bangladesh, in the year 1960, the first computer was installed by the Adamjee Jute mill and Agrani Bank Ltd. installed a computer on the same year later. Atomic Energy Centre, in the year 1964 installed a mainframe computer (Islam & Panda, 2009). However, In the early 1980's libraries in Bangladesh started to use computers (Islam & Islam, 2007) by developing and providing bibliographic database services. The International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) Library and the Agricultural Information Centre (AIC) are considered pioneers in introducing automation activities in Bangladesh (Khan, 1989). Chowdhury et al. (2011) reported that recent rapid developments in ICT have changed the scenario in Bangladesh which have a great impact on the socioeconomic condition, education, office management, even in the environment of library and information management.

2. Independent University, Bangladesh Library

The library of the Independent University, Bangladesh (IUB), was established in 1993 is the major contributor to achieve the university's aim of developing independent learners. The library's mission is to provide user-focused services through the provision for accessing to the recorded knowledge in an environment that foster individual teaching, learning, research and promote exchange of ideas by providing materials, resources and facilities to support students, faculty members, researchers and the general information need of IUB community (IUB Library, 2015). Currently, the library serves about 7,000 users; among them graduate and under graduate students, faculty members, and staffs. Additionally, trust and donor members as well as the alumni also get services to some scales. Most of the collections of IUBL are closely related to the university's courses of six schools, i.e. School of Business (SB), School of Engineering and Computer Science (SECS), School of Liberal Arts and Social Sciences (SLASS), School of Environmental Science and Management (SESM), School of Life Science (SLS) and School of Public Health (SPH) (IUB, 2015). The IUB Library holds more than 26,000 printed books, about 4,000 CD/DVDs, a large quantity of audio/video cassettes. The library has access to approximately 21,000 titles of e-resources, subscribed through two local consortia and independently. At present the library has subscription to a good number of local and international printed journals and periodicals.

3. Status of ICT at IUB

Independent University, Bangladesh has been giving significance on the use ICT to ensure state-of-the art facilities and services. In IUB, a unit named Central Information and Technology Services (CITS) is responsible for providing the development, promotion, and maintenance of software, hardware, and network infrastructure as well as the operational tasks related to IT. A very up-to-date IT infrastructure with high speed broadband connections (uplink 50 mbps and downlink 80 mbps), Wi-Fi connections with adequate number of access point, fiber optic facilities as a network backbone with a local area network (LAN), a number of high configured brand servers (about 35) like Domain Name System Server, Dynamic Host Configuration Protocol Server, Mail Server, Web Server, Authentication Server, Database Server, Proxy Server, etc. and more than 1,000 workstations and 200 laptops with the latest versions of software and tools. All the schools specially SECS and SB have a great arrangement of IT facilities. All other schools, different departments, institutes, and the library also have excellent facilities for using ICT with modern digital communication and technology.

4. E-resources of IUB Library

ICT is a vital component for information management which is required for use and manage E-resource effectively. Beside the in-house resources, the library has subscription to quite a large number of titles of e-resources. IUB Digital repository http://dir.iub.edu.bd:8180 hosted a good number of digital institutional resources. Being a member of Bangladesh-INASP-PERI consortium, IUBL has access to American Chemical Society, Wiley Online, EBSCOHost, SpringerLink, Astronomical Journal, American Physical Society, Institute of Physics Publishing, American Society of Civil Engineers, Mary Ann Liebert, Inc. Publishing, Annual Reviews, Beech Tree Publishing, Cambridge University Press, Oxford University Press and so on. The library also subscribed Emerald full-text and JSTOR through UGC Digital library. Additionally, the library subscribed ABI Global of ProQuest independently. Besides, the library has registered all four HINARI, OARE, AGORA and ARDI resources of Research for Life which ensures free access to huge electronic resources. The library also has access to e-databases of World Bank WDI, GDF, ADI, GEM and so on. Moreover, library has access to E-books of DeGruyter LIS books collection and ProjectMUSE books 2013 complete collection.

Earlier, IUB library purchased licensed version of EndNote X7 in July 2014 to support the researchers of IUB to manage citations, bibliographies and references electronically.

IUB library maintains an individual webpage http://www.lib.iub.edu.bd which has necessary links to the subscribed e-resources. Initially, the IUB Library Webpage was designed with Dreamweaver and HTML and launched in 2003. In March 2012, the library launched a new interface of its website using Drupal. The new website serves as a platform for browsing OPAC http://opac.iub.edu.bd, managing and accessing electronic journals, databases, electronic books and selected online resources http://lib.iub.edu.bd/?q=node/22. The interface of the library website has been designed with an objective to make the collection more accessible to its users.

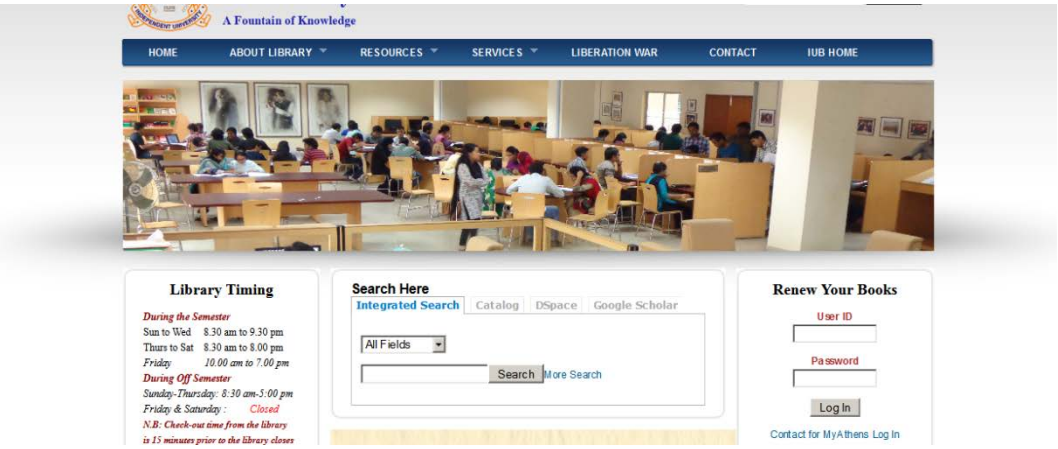


Figure 1: IUB Library web site with integrated search option

In the library website the Drupal Quick Tabs module has been used to create blocks of tabbed content, specifically views, blocks, nodes and other quick tabs using jQuery for integrated and individual search.

The library has about 70 internet connected computers which are mainly dedicated for using electronic resources. As subscriptions are IP-based, so all students, faculty members, researchers and administrative staffs can access full-text databases from any of thousands of computers at IUB campus. To ease remote access to e-resources, IUB library subscribes MyAthens.

5. Objective of the Study

Though the scope of the ICT is wide but this paper shared the software adoption issues for providing effective library services. In Bangladesh, open source software specially ILS, OPAC and IR adoption are very recent phenomenon. The need for the availability and accessibility of scholarly materials, along-with the resources, bibliographic descriptions of the resources in both offline and online mode of libraries of their own is immense. While detailed technical discussion is beyond the scope of this paper, however, it is based on practical knowledge of implementation and technical assistant provided by the library professionals of IUB for open source ILS, IR and Discovery tool adoption along-with the experience and evaluation of previous systems. This write-up will help to examine the challenges and prospects to the implementation phase which is relevant to strategic decisions too.

6. Previous ILS Shortcomings

In most of the cases the term library automation is synonymous with the term computerization. The automation of library tasks were mainly related to the completion of tasks and services with the assistance of computer. Though nowadays more other smarter ICT-based solutions are in use in the library. Use of ICT, i.e. computerization in IUB library has been started since its inception. The IUB library had been using CDS/ISIS to manage library databases locally since 1993. For online search, GenISIS Web was being used during 2005-2009. A customized ILS for local use was being used which was developed by using MS Access in the year 1998. It was basically used for circulation, acquisition purpose and serial management. Yet this ILS is in use for acquisition and serial management. In the year 2001, Librarium, a customized ILS, developed by IUB Computer Science students by using Oracle, Visual Basic and Crystal Report. As ISISs were used for searching library catalog, on the other hand Librarium was for circulation only. There were huge limitations of all the programs functionally. Librarium was used for circulation mainly though searching was possible there and ISISs was for searching library resources. There was no way to know the present status or availability of resources. Though Oracle has its own Report facility but it was absent in the Librarium. MS Access and Crystal Report was being used for report module. Also, the report module, an important tool for libraries, was not available in Librarium. IUB Library was fulfilling the report function by using Microsoft Access and connecting with Oracle, the main library database. Additionally, there was no bibliographical standard and no harvesting procedure of data. It was very laborious and time consuming to operate different modules as all were sub-standard, discrete and incomplete as ILS. Moreover, lack of OPAC module, lacking in patron management, lack of fine management, non-standard Cataloguing module, lack of data interoperability, lack of features connected to Bar-code and Patron ID card generations, moreover lack of a true next generation integrated library system. So, a true ILS which is efficiently “integrated”, including acquisition, cataloguing, circulation, and other technical and administrative activities, was much for functioning the library effectively.

7. Previous IR Shortcomings

As both are a type of information retrieval system, the terms digital library and digital repository are synonymous. Earlier, SECS used to host a digital repository in the year 2005, basically for thesis and reports. It was named "SECS Digital Library," which did not fulfill the proper purpose of a digital library or digital repository to the users due to some major limitations, i.e. lack of user-friendly searching and browsing options, metadata handling, self-archiving, multifaceted formats, Open Archives, metadata harvesting, data migration, interoperability, user handling, access management, etc. After developing a standard repository, the researchers, teachers, students, stakeholders of the university or other users will be able to access digital resources provided by this repository; moreover, the repository can make an impact to the researchers, teachers, and students as it disseminates the publications, increasing the visibility of research output and consequently the department and the institution.

8. Previous Journal Indexing Shortcomings

IUB library has been receiving a good number of titles of international and national printed journals/periodicals every year. To maximize the visibility and usability of printed journal/periodicals, IUB library had indexing articles of journals and newspapers using CDS/ISIS since 1996 named DStor. But for the lack of suitable platform those data were preserved and maintained as in-house database locally. Though an attempt was taken to make it available through GenISIS Web, but there was some limitations specially searching, browsing, and metadata handling. In this age of software revolution, ISIS appeared as obsolete and back-dated tool for handling data as more user-friendly web-based tool of need. So, requirement for a suitable software for indexing journal and periodicals was the demand of the librarians and users. A software which can be served as an ILS and repository simultaneously was the priority. Now, journal/periodical index is maintained through ABCD.

9. Necessity for Discovery Tool

Though there was no discovery earlier, but there was always a requirement at IUBL. Multi-faceted complex resources are a concern for the library mangers. Resource discovery has a mechanism of identifying and accessing required and relevant information for the user. Irrespective of the location, storage and authority, a variety of resources are represented as per user's requirement through web service and content integration through discovery system. Like most other university libraries, IUB library also has a growing number of local and online collections. They are mainly traditional print, electronic journals and databases, digital repository and web pages for scholarly resources. All those have growing number of delivery systems with their own interfaces. OPAC, institutional repository, multiple databases and e-resources sites and extensive web sites. This multiplicity of interfaces make difficult for the users to utilize fully what is available to them. So, the library staffs investigated the solution to overcome this setback and decided to adopt VuFind. So, as a pioneer of utilizing ICT at library it is very justified to do such task for better access to resources in an effective and novel manner.

10. Methodology of Choosing Suitable Software

To choose the acceptable OS ILS, IR and Discovery Tool of IUBL needs, evaluation was made considering software licensing, software category, community, functionality, operational and technical complexity, maturity, sustainability, reliability, and interoperability (Müller, 2011). There are a number of OS ILS, IR software packages and Discovery Tools available. For ILS, Koha, Evergreen, ABCD and NewGenLib; for IR, EPrints, DSpace, Greenstone and Fedora; and for discovery, VuFind and Blacklight are mentionable. After reviewing the literature and observing the comparison of the different functionalities, architectural and feasibility analysis, and direct technical hands-on examination suitable software package were adopted. All the authors of this paper tested the above mentioned software packages in local servers to analyse the functionality. Finally, all the library professionals have given their consent for Koha, DSpace, ABCD and VuFind for adoption at IUBL.

11. Reason for Migration to New Software

Recently, the structure of library resources has changed with the development of information and communication technologies. Traditional resources are replaced by the in-house and external digital resources. Software that used even in ten years ago are nowadays become obsolete due to the changes of technology, accessibility, variety of resources, and library manager and patrons need. All the ILSs do not perform the required tasks what librarians are looking for. It has been mentioned earlier that IUB ILS and IR also had short

of functionalities which were common for any library. In case of ILS, globally as many of those are lack of actual flavor of a true and effective integrated which should be conformed with the different basic modules of ILS i.e. acquisitions (ordering, receiving, and invoicing materials); cataloguing (classifying and indexing materials); circulation (borrowing and return back); serials (managing and tracking journal, magazine, newspaper etc.); the OPAC (access to catalogue by end users) and web 2.0 facilities (Sulaj, 2015). So it is the demand for the users as their information seeking patterns have been changed for last few years. Their demand match with the new approach and user-oriented environment to access the library resources. "Next Generation Catalog" is an approach where few librarians adopted any new ILS with keeping side by side a discovery tool. Though discovery tool integrates all the formats, types and carriers but few ILS also act as the access point too. Beside the main functions, interactive functionalities are also expected to be present in modern ILS, like suggestion, self-checking, renewal, hold, reviewing and annotating a resource, provide active user input in other ILS modules. The service quality and user satisfaction is influenced by a good interactive ILS. Both proprietary and open source ILSs are available in the market. Though all ILS have a lot of common features but they are certainly different in their functionalities and maturity. Flexibility is required for any software so that any technological updates and important issues can be adopted, thus change may be done in the ILS. As Proprietary ILS are typically costly and have restrictions, Open Source ILS are more effective solution when the libraries are running under budget-cut environment. It is mentionable that, IUB library had explored several world leading ILSs with the demo and pricing from the vendor in 2005; among them Liberty and Voyager are notable. So, like ILS, top ranked OS IR and discovery software are also getting priority for their features and functions. More about the advantages of OSS may be described elsewhere.

So, in case of IUB library, the migration from previous ILS and IR to new OS is basically for -

i. Not fulfilling the criteria or requirement by the old system, i.e. CDS/ISIS and Librarium
ii. Backdated and obsolete software and hardware of old system
iii. Lack of flexibility, lack of support and no upgradation of old system (Macan et al., 2013).
iv. Absent of standards for bibliographic data
v. Poor functionalities, laborious maintenance of old system and financial restrictions
vi. Updated features, functionalities for new software
vii. Better change requirement and of further modification for new OSS
viii. Openness to customization and to support from user community for new OSS
ix. Better usage and distribution option for new OSS than proprietary software

As ICT plays a vital role for the development of library, so in this financial restriction and availability of technology with mature products, OSS is suitable both developing and developed countries. There is always a freedom of choice, usage and distribute of the required software by the librarians to provide better and innovative services to meet users needs.

12. Functionalities of Adopted Software

12.1 Integrated Library Software (Koha)

Implementation of Koha ILS is a major achievement for IUBL. IUB Library users and staffs are experiencing much functionality after implementing Koha, Dspace, VuFind and ABCD. Regarding Koha ILS, though IUB library doesn't use all the module due to lack of few administrative and technical procedure, but the modules those are in use, running very effectively.

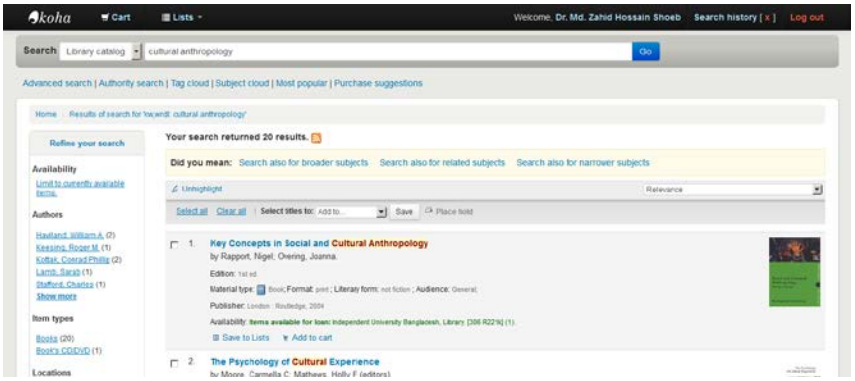


Figure 2: IUB Library OPAC

It may be mentioned that, IUB library explored a lot with acquisition and serial management modules, those are assumed as incomplete and inappropriate got for this library. However, the most functional module is the circulation module of Koha made it possible to send circulation confirmation messages, place hold messages and overdue notices to users. Text/SMS messages to patrons are also possible. From the OPAC users library staffs receive different messages, i.e. 'purchase suggestion' and 'place hold' messages. Thus, library staff became more conscious of and informed about their services. Z39.50 makes the cataloguing easier as importing bibliographic information through this service saves time and labour, this is not only for book, but also for serials or other resources. Printing barcodes and call number labels through Koha saves the time of the library staffs. Report module gives a variety of statistics in different format. Any sort of customized report on any module can be generated. OPAC functionalities also give the user the real time status of library items. Users can search in both basic and advance option by using different Boolean search operator. Additionally, users are able to make lists and carts in the OPAC which they can print, e-mail and download. Place hold, tagging, purchase suggestion, message customization, renew items, reading history can also be done in the OPAC. These features are much helpful to the users (Ahammad, 2014).

12.2 Institutional Repository (DSpace)

Adopting IR is another milestone of success for the IUBL. As DSpace offers a concrete and sustainable infrastructure for the library, it is a huge task yet to take the task of archiving intellectual output and administrative documents for the benefits of IUB community.

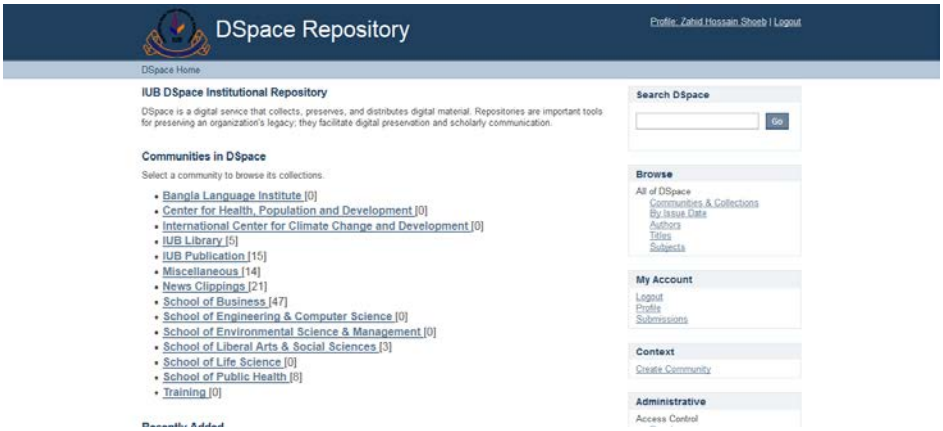


Figure 3: IUB Library IR

Additionally, it is needed to explore the total functionality as well to make the marketing of this service. The tangible and intangible benefit of IUB will be immense after making the IR full functional by collecting and curating digital output. This IR undoubtedly opens up the university to the global intellectual and academic audience which will maximize the visibility of the university. IUB research and academic activities can be also be assessed by utilizing IUB IR (Shoeb, 2010).

12.3 Journal/Periodical Indexing (ABCD)

Perhaps ABCD accomplishment and data migration from ISIS to ABCD is the first time in Bangladesh by IUB library. Though ABCD is being used as test basis. But it is quite possible to use as ILS and digital library by the same software.

ABCD is compatible with MARC21, Dublin Core, METS and other current standards. For ABCD acquisition module where libraries can set up budgets and create vendors database. Though it is needed to explore whether it can be cope with the local policy. The Serials Control (SeCs) module provides a tool for managing journals where all kinds of publishing patterns can be managed. The loan module, report and statistics , administrative tasks, security also make a strong player in the field of ILS.

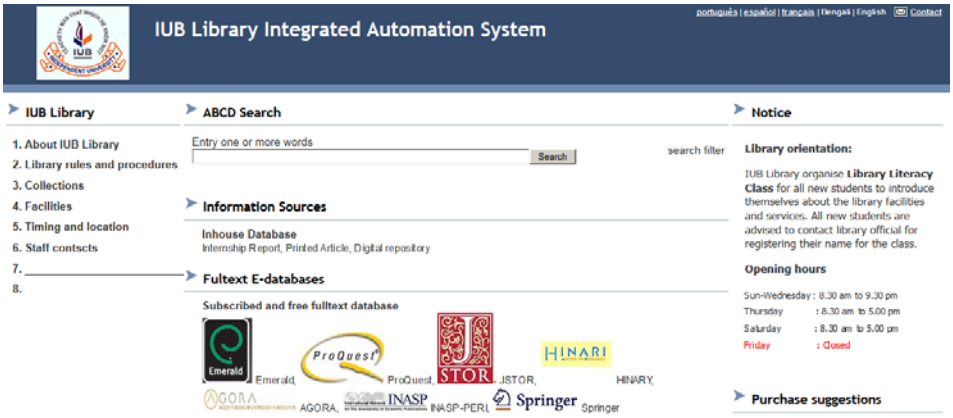


Figure 4: IUB Library journal indexing ILS

12.4 Discovery tool (VuFind)

VuFind interface offered many improvements over classic OPAC. IUB library User can search all the integrated resources through one search.

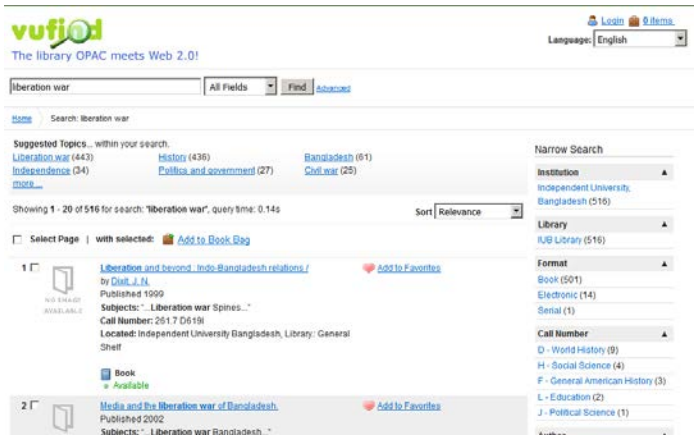


Figure 5: IUB library discovery tool

Faceted search results allow users to narrow down items by the keywords. User can see the live records status and location very fast for the functionality of AJAX. When viewing a record, the user will be offered and suggested similar records. Bookmarking, tagging, Open Search, OAI, Solr providing VuFind more user friendly and user centric search facilities are available in the discovery tool (Rahman, 2012).

13. Future Planning of IUB Library

IUBL always tries to implement the latest ICT-based services comparing to other developed country library to provide better services to meet up the ever changing demand of the users. In pursuing so, the library is trying to train up its professional through international training and collaboration. This trend will also be given preference in near future. Regarding ILS, as Koha Acquisition and Serial module is not fully functional yet due to the mismatch of institutional acquisition policy, so it is considered to make it usable after eliminating the barriers. In case of IR, the library intended to enhance strategy of marketing to engage faculty members and researchers of IUB community further to contribute to the repository collections. In addition, the library is supposed to classify its resources namely institutional repository and institutional memory. In VuFind, the users are able to search and browse resources as per their requirement. But in case of electronic journal, user can access up-to journal level index but no article level. The library is eager to have a discovery system to get access to full-text articles. Concerning IUBL website, the design and functionality will be emphasized on more access to resources, research support, navigation, better interface and more informative. For indexing, ABCD will be hosted on Linux live server to make it public and more usable along-with full-text access. For ensuring resource security, the library is supposed to implement RFID technology in its premises. The library is discussing with the university management regarding the matter. Possibly this will be implemented through the university's central initiative.

14. Conclusion

So, for providing better and user-centric library service the most acceptable resolution is to adopt reliable and functional library software. Though this is difficult task to accomplish and many challenges are to face in rapidly changing ICT environment but nothing is unworkable. Whether it is a small library or large academic or research library from the beginning it should be considered to adopt standard, customizable, flexible, sustainable and functional ICT solution. The software being used by IUB library rarely required money. But with these tools a resourceful and service oriented library may be developed and enriched. The technology that has been using by IUBL is constantly being updated and customized to meet the need of the library. So, now, it is time to give up the old, traditional products for computation or automation for library services and to play with the current and emerging trends of easily available OS resources. The library staffs of IUB have the expertise and skill to play with the resources, to embrace the tools.

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