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Open source digital library on open educational resources

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Abstract

Purpose – This paper aims to explain the implementation procedure of DSpace at the Library of Independent University, Bangladesh. This paper shows how DSpace is promoting open educational resources (OER) movement and demonstrates the ease of implementing DSpace in an institution. Moreover, the purpose of this paper is to encourage library professionals to participate in the OER movement by implementing DSpace in their libraries.

Design/methodology/approach – The requirements for implementing DSpace have been shown in this paper. It also describes the system model of an academic repository (DSpace)/digital library (DL). In addition, the paper describes the legal issues for submitting an item in DSpace and self-submission process of an item as well as shows impact of DSpace on OER.

Findings – Open source software and Open Access Institutional Repository software has a fundamental role in promoting OER. DSpace is perfect for building a DL or an institutional repository in libraries, especially for developing country libraries because this demands low cost and it is easy to implement in libraries as well as is user-friendly.

Originality/value – This paper will help to understand the role of the library community and librarians about OER. It will also show the impact of DL on OER. In addition, this paper encourages librarians to participate in OER movement.

Keywords Digital libraries, Open educational resources, Institutional repositories, Digital archives, Digital storage, Collection management, Content management, Developing countries

Paper type Case study

Introduction

From almost the beginning of human civilization, libraries have been considered as essential institutions for preserving and disseminating human cultures. In extension, digital libraries (DLs) and institutional repositories (IRs) help to preserve and disseminate human cultures. In this context, both DLs and IRs are doing the same job. Before the innovation of the computer, libraries kept their resources in various forms. But, after the innovation of the computer, libraries are using day-by-day more and more digital contents and resources. Nowadays, open source DLs and IRs play a vital role in the field of open access (OA) and the open educational resources (OER) movement for scholarly publications. Open access (OA) DLs and IRs have a deep relationship with OERs. Many institutions are using DSpace for collecting and disseminating their publications around the globe. It becomes especially important for developing countries because educational institutions in these areas lack the necessary financial ability to purchase software for DLs and IRs. DSpace is an OA repository software. It is also easy to implement in educational institutions, so many educational institutions select DSpace for their DLs and OER dissemination purposes.



Background

Digital library and institutional repository overview

DLs and IRs are used for the same purpose in a library, according to definitions and contexts. In the field of information and library science, phrases, such as *digital library*, *electronic library*, *library portal*, *virtual library*, *web library*, *online library* and *e-library*, are used interchangeably (Masrek and Gaskin, 2016). A *digital library* is defined as a collection of objects, including text, video and audio, along with methods for access and retrieval, and for selection, organization and maintenance of the collection (Witten and Bainbridge, 2003). DLs are organizations that provide selected and structured digital resources for intellectual access and employ specialized personnel to provide assisted access. This assisted access interprets, distributes and preserves the integrity and ensures the persistence over time of collections of digital works, so they are readily and economically available for use by a defined community or group of communities [Digital Library Federation (DLF), 1998]. DLs are an organized collection of information; they are collections of all kinds of digital materials that are useful in the field of education and research. Not only this, DLs also have the ability to distribute and disseminate their collections. In addition, in the context of a library, DLs must have some basic entities, such as metadata schemes, standard metadata interchange protocols, indexing/search engines and the ability to grow with future needs. An *institutional repository* is a set of services and technologies that provides the means to collect, manage, provide access to, disseminate and preserve digital materials produced at an institution. While most IRs are based at colleges and universities, they also exist in governmental agencies, museums, corporations and other organizations. Within colleges and universities, most IRs are managed by the library (Markey *et al.*, 2007). DLs/IRs store and disseminate pre-print and post-print articles, theses, dissertations, internship reports, working papers, books, book chapters, teaching materials, conference proceedings, audio and video recordings and many other things which are related to education.

Regarding open education resources

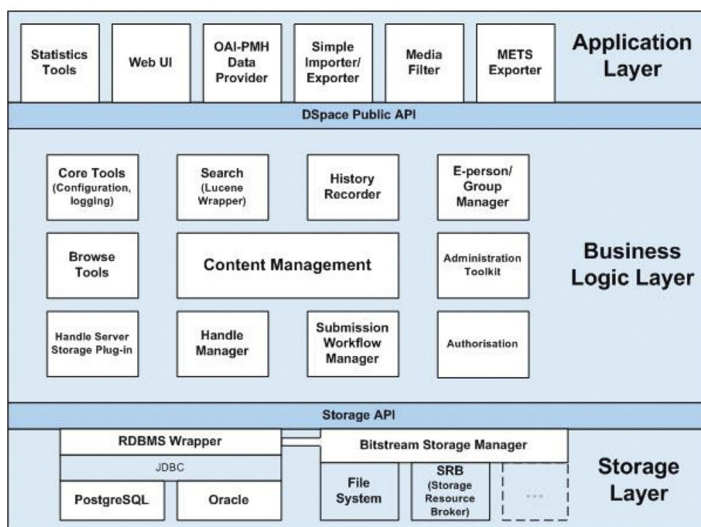
OERs are educational resources which are openly and freely accessible for everybody. It means, without payment, users of educational resources can use their scholarly materials over the internet or in information centers. It is not limited to the internet. These resources can also be freely accessible in libraries and information centers without consideration of users' color, race or location. Bell (2018) said that OERs are educational materials and resources that are publicly accessible, meaning that they are openly available for anyone to use and under some licenses to re-mix, improve and redistribute. OER is also a movement in education that seeks to counter costly, commercially-produced learning content – typically textbooks – with publicly accessible material that is licensed so that it can be freely distributed and shared (Bell, 2018). OERs should be created with the collaboration of educators, learners and scholars. OERs can be accessed freely by everyone. OERs include openly licensed course materials, lesson plans, textbooks, games, software and other materials that support teaching and learning. However, an OER is not limited to just the resources themselves. It also draws upon open technologies that facilitate collaborative, flexible learning and the open sharing of teaching practices that empower educators to benefit from the best ideas of their colleagues. It may also grow to include new approaches to assessment, accreditation and collaborative learning. Understanding and embracing innovations like this is critical to the long-term vision of this movement (Cape Town Open Education Declaration, 2007). The Budapest Open Access Initiative (BOAI) specified that *open access* means it is available on the public internet without any cost, access is granted to every user to read, download, copy, distribute, print, search or link to the full texts of these

articles, crawl them for indexing or use them for any other legal purpose, without financial, legal or technical barriers other than those inseparable from gaining access to the internet itself. The only condition for reproducing and distributing OA items is that the author owns the copyright over their work, as well as the right to be appropriately acknowledged and cited (BOAI, 2002). Although the author sees similarities between OERs and OA, some scholars say there are differences between them. [Eaton \(2017\)](#) addresses the dissimilarities as the fundamental distinction between them and they are the reasons behind their creation. The line between OER and OA can be fuzzy. There are some institutional textbooks considered as OA, even though their primary purpose is of teaching and learning. It also seems that some OER can be treated as OA. However, not all OA resources are considered as an OER. OA tends to be a wider and more inclusive term, but OER has achieved recognition in recent years because of major support by the US President Obama for open education initiatives and resources. The factor is not on the categorization of them as OER or OA, but the centre of attention for both is on being freely and openly accessible ([Eaton, 2017](#)). By definition, all OERs are OA, but not all OA materials qualify as OERs. Sometimes the distinction may not matter. You may want to link a video or exercise in your course and an item may allow that without allowing all five IRs of a valid OER. Always pay attention to the licensing of the specific material you want to use to determine whether your desired use is permitted ([Owens, 2018](#)). Accordingly, OER opens the door to universal education, referring to education for all and not limited to only some groups of people. It reduces educational discrimination. Learners can use their necessary scholarly resources without making any payment because of OER, paving the way for education for all. The author thinks OERs and OA are complementary to each other because OA also works on open education. Therefore, open education cannot become successful ultimately without OERs.

About DSpace

DSpace was developed by the Massachusetts Institute of Technology (MIT) in collaboration with the Hewlett-Packard Corporation (www.duraspace.org). MIT released this software under an open source arrangement. DSpace is not only an IR but it also plays the roles of a DL in our current digital library world.

The DSpace system has three layers (storage, business logic and application), each of which has several elements. The storage layer works as the physical storage of metadata and content. The business logic layer is responsible for managing the content of the archive, users of the archive (e-people), authorizations and workflows. The application layer is formed from components that communicate with the world outside of the particular DSpace installation. DSpace system architecture is shown in [Figure 1 \(Duraspace.org, 2018a\)](#). The storage layer has two sections; the relational database management system (RDBMS) and the bitstream store. The business logic layer has 11 sections – core classes, content management API, workflow system, administration toolkit, e-person/group manager, authorization, handle manager/handle plug-in, search, browse API, history recorder, and checksum checker. The application layer has five sections – statistical tools, Web UI (user interface), Open Archive Initiative Protocol for Metadata Harvesting (OAI-PMH) data provider, simple importer/exporter, media filter and metadata encoding and transmission standard (METS) exporter. The search section of the business logic layer uses a Solr Lucene search engine which provides a variety of searches. It provides exact term search, fielded search, wildcards search, fuzzy search, proximity search, range search, boosting a term search and Boolean search. However, DSpace uses the Dublin Core metadata standard. Dublin Core has 15 metadata elements comprising title, creator, subject, description,



Source: <https://wiki.duraspace.org/display/DSDOC6x/Architecture>
(accessed 14 March 2018)

Figure 1.
The DSpace system
architecture

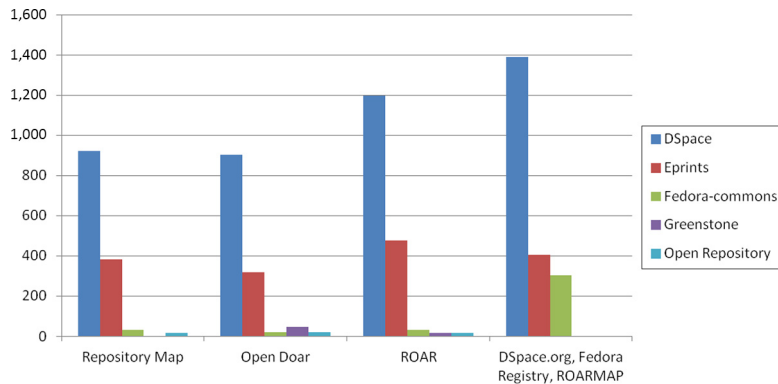
publisher, contributor, date, type, format, identifier, source, language, relation, coverage and rights. In Dublin Core, there is no mandatory element and all elements may be repeatable.

Reasons behind DSpace. There are several DL/IR software, such as DSpace, EPrints, Fedora-Commons and others. Among them, the Independent University Bangladesh (IUB) Library selected DSpace to fulfill its DL and academic repository needs. DSpace has the ability to satisfy both requirements. DSpace is also free and open source. Anyone can use DSpace free of cost. It is possible to change its source code according to the individual institutional requirements. Duraspace.org describes the top four reasons for using DSpace as:

- (1) focus on the institutional repository use case;
- (2) be lean, agile and flexible;
- (3) be easy and simple to install and operate; and
- (4) include a core set of functionality that can be extended to or integrated with complementary services and tools in the larger scholarly ecosystem (Duraspace.org, 2015).

Not only these, DSpace has other good reasons to be used. Various lists show different numbers of users of the various systems. According to different repository lists, Figure 2 shows different repositories' users. At present, 2,477 organizations are using DSpace to achieve their repository and DL needs; on the other hand, 363 organizations are using Fedora Commons (Duraspace.org, 2018b) and Registry of Open Access Repository Mandates and Policies (ROARMAP) listed 889 EPrints users (ROARMAP, 2018). The numbers differ slightly according to Repository 66, which shows there are 922 organizations using DSpace, 384 organizations using EPrints and 32 organizations using Fedora Commons (Maps.repository66.org, 2014). Han (2004) mentioned that DSpace received the highest score in his

Figure 2.
Different repository
users according to
various sources



feasibility analysis when matched against his requirements, although it is not a mature product. Among the three systems, DSpace has the most extensive documentation, ranging from the system architecture to developer resources (Han, 2004).

Consider a case where an institution or university needs a digital repository for research papers and dissertations produced by students and staff. The most appropriate DL system is DSpace, as it, by default, represents communities (e.g. university departments) and collections (e.g. papers and dissertations), while workflow management support is essential for item submission by individuals (Pyrounakis and Nikolaidou, 2011). The IUB Library's primary purpose for implementing DSpace is to store its research papers, dissertations, thesis, articles, internship reports and other research outputs and also disseminate these to others. However, DSpace has some major differences from other software. The major differences are as given below:

- DSpace is an open source software (OSS). All well-known IRs are not open source. There are some open source IRs in the market. Among them, DSpace is the best OSS for building an academic repository/digital library/institutional repository.
- DSpace uses the persistent identifier (handles and DOIs, digital object identifiers) system, but Greenstone DL and many others do not have permanent resource identifier systems.
- DSpace uses the open archives initiative protocol for metadata harvesting (OAI-PMH) system. OAI-PMH is a mechanism for harvesting metadata from repositories. Greenstone DL has no OAI-PMH for metadata harvesting. One useful feature of the Greenstone DL is Z39.50 protocol for metadata searching and retrieving. Z39.50 is a communication protocol for searching and retrieving data from databases over a TCP/IP network.
- Greenstone does not have any standard database system, such as MySQL, PostgreSQL, MariaDB, SQL or Oracle. On the other hand, DSpace uses the PostgreSQL database.

However, the basic reason for implementing DSpace is the open source factor. DSpace is an open source IR software and that is why it saves IUB Library's money. If the IUB Library had implemented proprietary DL or IR software, it would have had to spend a lot of money. DSpace only needs technical staff to maintain it. The IUB Library has sufficient professional staff to keep and maintain it in a sustainable manner.

There are some basic differences between open source and proprietary software. The primary differences between open source and proprietary software are as given below:

- *Programming source code*: OSS's programming codes are open for everyone but proprietary software's programming codes are not visible or open.
- *Cost*: OSS is entirely free of cost. On the other hand, proprietary software is costly. It has a variety of charges, such as software purchase cost, per user or per node cost, licensing fees and yearly subscription costs.
- *Freedom of use*: Anyone can use OSS all around the world, whereas proprietary software cannot be used by everyone because of its licensing and payment methods and prices. Some proprietary software is not even distributing the same version for everyone.
- *Further enhancement*: In OSS, further enhancement is very easy. Anyone can make further enhancement in OSS. It is completely open for all. Likewise, anyone can make any change in OSS because it has not any restriction on improvement and modification. On the other hand, further enhancement and changing are not possible for everyone in proprietary software. Because it is not open for all and it has a restriction on new improvements and change.
- *Availability of documentation*: OSS has very good documentation. Its users are always trying to create documentation. Furthermore, its users share their documentation freely on the internet. As a result, new users easily get helpful documentation for learning OSS by searching on the internet. But proprietary software users completely depend on the concerned software company for their documentation. They also sometimes pay for getting documentation from their software company.
- *Bug issues*: OSS has fewer bugs than closed source software because millions of eyes see the source code of OSS code. Therefore, fixes for bugs are faster than proprietary software.
- *Business risk*: Proprietary software has more business risk than OSS. Proprietary software depends on one particular company for its maintenance and development. If the concerned company closes business, software clients fall into business risk for their software maintenance and development. On the other hand, this type of consequence does not happen to OSS clients because OSS does not depend on a particular software company.

Open source overview

Currently, OSS is playing a significant role in everyday life. Many organizations are using OSS to satisfy their daily needs. OSS is freely distributable, its source codes are open for all, modifiable, redistributable, with no user discrimination and release under OSS license. Sometimes, open source and free software create confusion because somebody lumps together open source and free software. All OSS packages are free but all free software packages are not open source. A lot of free software is available in .EXE (executable) form but source codes are not open. Chudnov (2002) said that the open source movement is a phenomenon that affects the software industry in fundamental ways and that it is a paradigm shift in how software is developed, marketed and used. It means OSS is breaking the monopoly market of proprietary software and it is also bringing liberty to the digital

world. However, DSpace is also promoting the open source movement (Deek and Mchugh, 2008). A worldwide attempt to promote an open style of software development is more aligned with the accepted intellectual style of science rather than the proprietary modes of the invention that have been characteristic of modern business. The idea – or vision – is to keep the scientific advances created by software development openly available for everyone to expand and improve upon. The term *open source* refers to the programming code being open, free, accessible and changeable by anyone who has knowledge of programming languages. The main feature of open source is that it is under a general public license which ensures OSS criteria. In terms of library automation, OSS is playing a vital role in modern libraries. As the library is the backbone of an educational institution, it is important to offer modern services (Ahammad, 2014).

Impact of open access repositories on open educational resources

We can participate in OER movement by using DSpace. It promotes OA in the field of scholarly publications. Its default setting is an open repository setting. Therefore, everyone can access DSpace for collecting scholarly needs (Rogers-Urbaneck, 2008). IRs have been aggressively promoted as a part of the OA movement. McGovern and McKay (2009) said that IR advocates have parlayed their passion for OA into real influence. IRs have become the infrastructure of universities for the OA movement, and universities are confident about IRs long-term sustainability. IRs have branding for many years. IR and OA have similarities in terms of purpose, functions, features and services (Rieh et al., 2008). OER and the OA movement are multidisciplinary and encompass all academic disciplines. They are also multi-industrial which is drawing on libraries and universities and such varied economic sectors beyond the academy as publishing, telecommunications, software engineering, philanthropy and government. Besides these, it is also multi-national and works for individuals and organizations all over the world (Suber, 2008). Figure 3 shows the type of contents in OA repositories all around the world. This figure clearly shows OA repositories contain a huge number of OERs according to its definition. Therefore, it proves that OA repositories have a fundamental impact on OERs globally. Figure 4 shows, day-by-day, how OA repositories are growing rapidly. As a result, open source repositories play a central role in the OER movement.

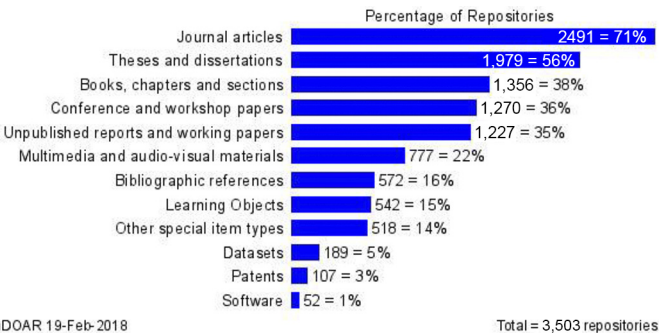
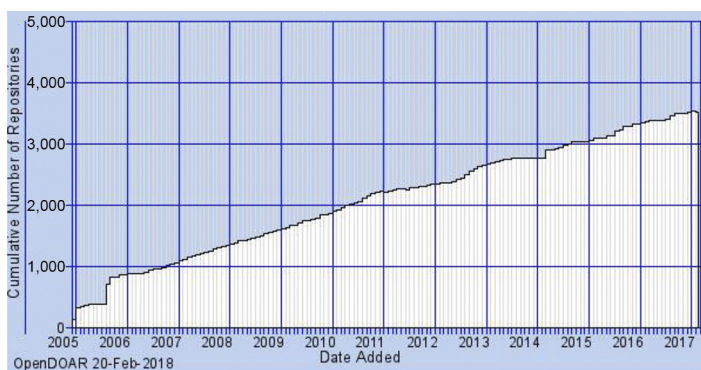


Figure 3.
Content types in
OpenDOAR
repositories
worldwide

Source: Available at www.opendor.org (accessed 19 February 2019)



Source: Available at: www.opendoar.org/onechart.php? (accessed 20 March 2018)

Figure 4.
The growth of
OpenDOAR
databases worldwide

Figure 3 demonstrates that almost all types of OERs are distributed by OpenDOAR repositories for educators, learners and scholars. There are now 3,503 repositories which are registered with OpenDOAR. Of their total collections, 71 per cent of repositories have journal articles, and 56 per cent have theses and dissertations. In addition, 36 per cent of repositories have conference/workshop papers, and 35 per cent have unpublished reports/working papers. OpenDOAR repositories also list 22 per cent have multimedia, 16 per cent bibliographic references, 15 per cent learning objects, 5 per cent data sets and 3 per cent patents.

Figure 4 shows there were about 500 repositories in 2005 all around the world. The number of repositories has been continuously growing for the past 12 years, and it had approximately 3,600 repositories worldwide in 2017, making nearly 3,100 repositories established within 12 years. That is the most significant improvement in terms of OERs. However, most of the IRs are providing their resources openly without doing any discrimination among scholars, learners and educators. Thus, DLs/IRs have become part and parcel of the OER movement.

Implementation procedures

DSpace is developed by using Java. By using Sun Java, some complexity at the time of the DSpace installation can be avoided. DSpace can be installed on any popular operating system. It may be Windows, Linux or Mac. DSpace has proper documentation at its community site (<https://wiki.duraspace.org/display/DSDOC/All+Documentation>).

Hardware and software selection for the IUB Library DSpace: Software and hardware requirements are important for implementing DSpace in an institution. Some hardware and software are mandatory for DSpace. The software requirements for DSpace are specific, but the hardware requirements partially depend upon the amounts of items stored in DSpace and the number of simultaneous user accesses wanted for DSpace.

Software used: The following software was used for carrying out the implementation of DSpace at the IUB Library:

- Ubuntu server (version 16.4);
- Default-JDK;
- Tomcat7 for back-end web-server;
- Maven3;

- Postgresql-9.4;
- DSpace 6.2;
- Apache2 for front-end web-server;
- Open-Office or LibreOffice Writer for converting Word files to PDF (not mandatory because Word files can be directly uploaded to DSpace without converting into PDF);
- IrfanView (freeware/shareware) for resizing and converting images in a variety of formats;
- Screen Capture Elite (Firefox add-on) for capturing live web images (specifically for news clippings); and
- Tesseract 4.0 optical character recognition (OCR) for converting images to text

Hardware used: The following hardware was used for carrying out the implementation of DSpace at the IUB Library:

- HP brand server with Xeon processor and 32GB RAM;
- HP brand semi-automated scanner;
- One desktop for remote backup;
- One external 2 TB hard disk for storing permanent backup; and
- 4 hard disks (2 TB) with raid-5.

DSpace installation: DSpace was installed in Debian Squeeze in December 2011 when the project started. Figure 5 shows newly installed DSpace by author at IUB. At present, it is running in Ubuntu Server 16.4 version. At the beginning, the author installed all pre-requisites of DSpace and then installed it on the command line. The IUB Library uses the Mirage theme and enables DSpace Discovery. Mirage theme enhances browser capability and performance of DSpace. DSpace Discovery provides author, subject and date issued discovery list (sidebar facet). Not only this, it provides a search filter.



Figure 5.
Newly installed
DSpace

Overall community and collection structure of the IUB IR: 13 communities, 23 sub-communities and 45 collections were created in the IUB Library's digital institutional repository, as shown in Figure 6. It will expand according to future need.

IUB DIR policies: All IUB faculty, staff, researchers and students can submit their publications and research outputs to the IUB Digital IR. For this purpose, the IUB DIR policy was determined. This policy includes both the IUB DIR community policy and IUB DIR self-submission policy. We are also using Sherpa and Romeo for self-archiving.

News clippings: From the beginning, the IUB Library has been working on news clippings. After implementing DSpace, news clippings began to be preserved in DSpace. The IUB Library staff scan the news not available on the internet. The sources of newspapers are acknowledged to avoid copyright issues. After implementing DSpace at IUB, it became easier for staff to do news clippings, and the new method saves the time of IUB Library staff for this task. Now they



Figure 6.
Organization of the
communities and
collections of IUB's
DSpace

do not physically cut the news items from the newspapers; they make a copy or take a screenshot image of the news item and then submit it to DSpace.

Adding resources to the IUB IR: After creating communities, sub-communities and collections, digital resources started to be added to DSpace. Thesis papers, internship reports, articles, news clippings and other IUB publications are being added. The subject keyword with the help of the Library of Congress subject headings are added. The IUB Library's metadata creator applies the technique of technical reading to find the subject (s). After finding the subjects, their selected subjects are matched against the Library of Congress's online subject headings. The IUB Library allows self-submission in the DSpace repository for IUB faculties and staff. For self-submission, users have to register with their IUB extension e-mail address.

Invitation for submitting articles: The IUB Library issued an internal memo to the authority by asking for all IUB publications. Several internal memos were also issued to some departments of the IUB to ask for their faculty's publications. IUB faculties are motivated to submit their pre-print and post-print papers to DSpace. Likewise, the library arranged a workshop for introducing DSpace's facilities and author participants were shown the self-submission procedure. Initially, the IUB Library invited IUB faculties to this workshop. In Figures 7-9, the author shows the self-submission process of DSpace, along with the following steps:

- At first, a user has to register to submit an article in DSpace. Only IUB family members can register in IUB DSpace with their @iub.edu.bd address.
- IUB Library users have to enter their IUB e-mail address for registering with DSpace. After submitting the e-mail address, they will get an e-mail for finishing their registration. Then they have to complete the form and submit. After that, they can login to DSpace and submit materials to the system.
- IUB users can select a collection where they would like to submit their papers. Then they need to enter the necessary bibliographical information of their papers. After that, they can upload their papers by granting a license.

 **Digital Institutional Repository**
Independent University, Bangladesh

[DSpace Home](#) → [New user registration](#)

New user registration

[Verify Email](#) → [Create Profile](#) → [Finished](#)

Register an account to subscribe to collections for email updates, and submit new items to DSpace.

Email Address:
This address will be verified and used as your login name.

[Register](#)

[Login](#)

Search DSpace

[Go](#)

[Advanced Search](#)

Browse

All of DSpace
[Communities & Collections](#)
[By issue Date](#)
[Authors](#)
[Titles](#)
[Subjects](#)

My Account

[Login](#)
[Register](#)

[Library Home](#) copyright © 2011-2012

Figure 7.

How a user enters the new user registration process

Figure 8.
New user registration

DSpace Home → New user registration

Create Profile

Verify Email → Create Profile → Finished

Identify
Email Address:
asfa@iub.edu.bd

First Name:

Last Name:

Contact Telephone:

Language:
English

Security
Please enter a password in the box below, and confirm it by typing it again into the second box. It should be at least six characters long.

Password:

Retype to confirm:

Complete Registration

Search DSpace
 Go
[Advanced Search](#)

Browse
All of DSpace
[Communities & Collections](#)
[By Issue Date](#)
[Authors](#)
[Titles](#)
[Subjects](#)

My Account
[Login](#)
[Register](#)

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Figure 9.
The self-submission
process

DSpace Home → Item submission

Item submission

Select a collection

Collection:
Select the collection you wish to submit an item to.
Article

Next

Search DSpace
 Go
[Advanced Search](#)

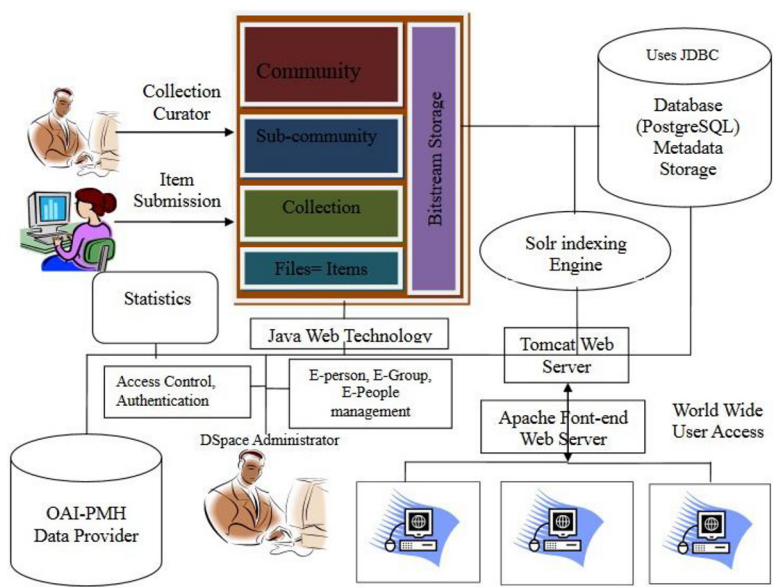
Browse
All of DSpace
[Communities & Collections](#)
[By Issue Date](#)
[Authors](#)
[Titles](#)
[Subjects](#)

My Account
[Logout](#)
[Profile](#)
[Submissions](#)

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Batch importing into DSpace: The batch importing method of DSpace is a basic and simple method for importing items into DSpace, and is a time-saving tool for library staff. By using this tool, multiple items can be imported into DSpace within a short span of time. With this tool, library staff can avoid one-by-one item submissions.

Figure 10.
IUB Library's
institutional
repository



IUB without digital library

Before implementing the DL at the IUB Library, a showcase for presenting IUB's OERs on the internet did not exist. Some departmental websites tried to display their publications, but this did not satisfy user needs. The individual school's websites only contained a list of thesis/internship report titles and faculty publications, but they were not searchable. At that time, users had to come to the library to find previous internship reports, thesis papers, research papers/reports, dissertations and any other OER materials. It was very difficult to find the required sample research papers in the library. Therefore, it was hard to determine the limitation and the future development on a specific field of research. They could not learn how much research had been conducted on their topic nor how much future development needed to be done. In addition, the IUB did not have any digital news archives where they could do news clippings before implementing DSpace.

Findings

Libraries and librarians are playing a pivotal role in promoting OERs by implementing OA and DL software. DSpace is one of the major OSS which is playing a vital role in distributing OERs all around the world. The DL OSS works as the life blood for the OER movement. In a final word, librarians are the godfather of this movement, as they are running most of the repositories all around the world. However, [Table I](#) shows the number of views of several items on IUB Library's DSpace. [Table II](#) gives more details – 4,248 archived items and, among them, 254 are preprint; 1,548 are theses and dissertations; 785 are research papers; 529 are internship reports; 579 are working papers; and 549 are other items. It also shows the total number of item views of IUB Library's DSpace. The IUB Library has achieved a great accomplishment with 19,159,135 bitstream views.

[Table III](#) demonstrates the total number of views of a DSpace item with the monthly number of views. The mentioned item has 2,019 total views. It had the highest views of 180 in September 2018 and the lowest views in February 2018. Worldwide users downloaded the

mentioned item 1,879 times. It is remarkable and encouraging news for the OER movement. Table IV shows the access statistics of an item on DSpace by country and city. In the top country views list, Bangladesh viewed the item 757 times. Next highest is the USA with 57 views. The least viewed countries are the UK and Malaysia. On the other hand, Dhaka is the most viewed city in the top city views list and Ashburn is the least viewed city. It proves that the DL/IR has a great impact on OERs worldwide.

However, there are some limitations to the project. First, the staff of the Central Information Technology Section of the IUB are not willing to learn about the technical issues and troubleshooting for DSpace. This is a major problem for making DSpace sustainable at the IUB. Second, most of the faculty members are not self-motivated to submit their papers to the DSpace repository. Third, many users do not like to read their reading materials on digital devices. They ask to print their downloaded file so that they can read more comfortably. Finally, metadata quality control is one of the biggest challenges for the IUB Library. Faculties, staff and research students of the IUB are submitting their publications to DSpace, but they are not familiar with DL metadata standards. They are not also familiar with library science subject headings. As a result, they do not create proper metadata when

Table I.
Total visits for
several items in IUB
Library's DSpace

Total Visit of some items of DSpace	Views
Proceedings of 4th International Conference on Advances in Electrical Engineering	120587
Proceedings of International Conference on Learning and Teaching	110548
Proceedings of 8th BELTA International Conference	104187
Evolution of Climate Change Adaptation Policy and Negotiation	95987
A Simple Guide to the Warsaw International Mechanism on Loss and Damage.	95879
A brief overview of Community-Based Adaptation	87964
Mainstreaming climate change adaptation into development in Bangladesh	86746
An Investigation on Cell Phone Subscribers of Dhaka City, Bangladesh- Are they Happy and Loyal?	85945
The Effects of Financial Ratios on Bankruptcy	84579
Protecting Existing and Prospective Investors and the Role of Internal Auditors	83577

Table II.
A general overview
and the archive
information of IUB
Library's DSpace

<i>General overview</i>	
Items Archived	4,248
Bitstream Views	19159,135
Item Views	1491,883
Collection Views	24,481
Community Views	18,532
User Logins	4630
Searches Performed	879684,445
Licence Rejections	146
OAI Requests	7845986
<i>Archive Information</i>	
Content Type	No. of items
All Items	4,248
Preprint	254
Thesis \\\ Dissertation	1548
Research Paper	789
Internship report	529
Working paper	579
Others	549

EL
37,6

Statistics
Total visit

The insurance Act 2010 for non-life insurance; problem, prospect and future of Bangladeshi insurance company

Views

2019

1036

Total visits per month

Jan 2018	Feb 2018	Mar 2018	April 2018	May 2018	June 2018	July 2018	Aug. 2018	Sep. 2018	Nov. 2018	Dec. 2018
45	32	105	68	74	97	83	92	180	108	138

The insurance Act 2010 for non-life insurance; problem, prospect and future of Bangladeshi insurance company

Table III.

The access statistics
of an item on DSpace

File visits

08104057.pdf

Views
1879

Views

Top country views

Bangladesh	757
United States	57
AP	27
India	16
Japan	11
Australia	4
China	4
South Korea	3
United Kingdom	2
Malaysia	2

Top cities views

Dhaka	168
San Mateo	23
Pasadena	16
Chittagong	15
Ochelata	5
Melbourne	3
New Delhi	3
Tejgaon	3
Agrabad	2
Ashburn	2

Table IV.

Top country and top
city visits of a
DSpace item

Ashburn

they submit their publication to DSpace. Fortunately, the IUB Library has a future development plan for DSpace. They are trying to establish a strong system library department with several skilled system librarians. The head of the IUB Library and IUB's vice-chancellor are very concerned and interested in sustaining a strong repository system at IUB. It is a very good side of the future of the digital library system. The IUB Library is also trying to integrate the Tesseract open source OCR software within DSpace. Therefore,

DSpace can extract texts from pictures/images, causing the repository to be even more useful.

Conclusion

The IUB Library is getting many advantages from implementing the DSpace DL. It helps library staff to archive any digital contents with a minimum of effort. Adding items to it is very easy and saves time. Now, IUB educators, learners and scholars can submit their research works by using the self-submission feature which is a user-friendly module of DSpace. This feature is so trouble free that anyone with primary computer literacy can use it. By using this module, they are participating in OER. However, it is not only saving time and reducing the efforts of library staff but also saving time and reducing the effort of library users and scholars. At present, they are getting their needed papers in DSpace online and are not required to physically come into the library. All of the above-discussed advantages of the IUB DL are enhancing quality education and research of the IUB and promoting the OER movement too. In addition, the IUB Library users easily find their required materials by searching in DSpace. With DSpace, now they are displaying their student's thesis papers, internship reports, and other scholarly works to the world. It has enriched IUB's Web presence and visibility of its scholarly works as well.

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About the author

Nur Ahammad completed B.S.S honour and M.S.S in Information Science and Library Management with Post Graduate Diploma in Information and Communication Technology. He implemented Openbiblio open source library software in Bhuiyan Academy. He has achieved a lot of practical knowledge on how to implement library software in a library when he worked in Bhuiyan Academy. His main duty and responsibility were to maintain Koha ILS in BRAC University Library. He installed and configured Koha ILS on BRAC University library server and is able to implement Koha ILS in any library. After that, he joined Independent University and worked there for seven years and four months. He implemented Koha ILS in IUB, Library. His own implemented Koha's OPAC address is <http://opac.iub.edu.bd>. He migrated all data from CDS/ISIS database to MARC 21 format and then imported into Koha. He is able to implement the Institutional Repository. Not only these, but he also implemented DSpace Institutional Repository in the Independent University Library. He hosted this Institutional Repository on <http://dir.iub.edu.bd:8180>. He also has good knowledge of MARC 21 and Dublin core Meta-data and can make MARC 21 records in IUB library. In addition, he also implemented Koha ILS at Chittagong Independent University (CIU) and Martin Luther College. CIU OPAC address is <http://library.ciu.edu.bd>. He also implemented Koha at Chittagong Veterinary and Animal Science University. Its OPAC address is <http://opac.cvasu.ac.bd>. In addition, he has

developed a library website by using Drupal CMS which is hosted at <http://lib.iub.edu.bd>. Author has tow publication in his professional file:

Open source
digital library

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