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Library Philosophy and Practice (e-journal)

Libraries at University of Nebraska-Lincoln

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2021

## Features and Implementation of Digital Library Software (DLS) among Public and Private Sector University Libraries Located in Punjab, Pakistan

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Tariq, Wahab, "Features and Implementation of Digital Library Software (DLS) among Public and Private Sector University Libraries Located in Punjab, Pakistan" (2021). *Library Philosophy and Practice (e-journal)*. 7046.

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## **Features and Implementation of Digital Library Software (DLS) among Public and Private Sector University Libraries Located in Punjab, Pakistan**

### **Abstract**

Purpose – The purpose of this present paper is to evaluate the features and implementation of the digital library software in university libraries located in Punjab, Pakistan.

The present study aimed to examine the usability of digital Library Software among university libraries in Punjab, Pakistan. The objective of the study was to find out the digital library systems in terms of software implemented and their useful features that would be helpful for library users to select the right software. In order to accomplish the research objectives, a self-reported questionnaire was constructed after reviewing the literature and with the help of experts.

Design/methodology/approach - This study was descriptive research carried out by using the survey design in 2020-2021. The purposive sampling method was adopted to select the participants. Data were collected from digital librarians by using the online Google Form. In this study, HEC recognized universities were selected in which 38 public sectors and 24 private sectors.

Findings – This research revealed interesting results about the implementation and features of the DLS. Male professionals perform better at digital software as compared to female professionals. Finding also depicted that D-space and E-print are heavily used worldwide to build digital storehouses instead of fedora.

Originality/value – This is the first comparative study about features and implementation of DLS in HEC recognized universities in Punjab, Pakistan. This study will allow institutions, universities, and organizational libraries to move from traditional library systems to modern digital library systems due to the useful features reported by the participants. It will help to select a better software system to implement in their libraries.

Keywords - Digital Library Software, Features of digital library software, D-space, e-prints, Greenstone, Fedora.

## **Introduction**

Digitization is the process of conversion of information resources from print to e-format or digitized format to provide access and distribution of information resources. Digital library software packages are necessary for librarians to manage information contained in digital format and to provide better services to their users. During the last decades, it has been noticed that the formats of information have been transformed. Rapidly, information shifted into digital formats for print, including text, pdf, doc, multimedia, PPT, and audio-video forms. Information is being increasingly converted into digital formats. Today, data is organized in digital forms, and several digital library software options are available, like D-space, Greenstone, Fedora, E-print, Calibri, etc. which are used to manage digital content available in libraries. Simultaneously, preservation of data is necessary to ensure sustainability, accessibility, and retrieval across extended periods of time (Madalli, Barve & Amin, 2012).

In the early 1990s, libraries started to convert print material into digitized material. Historically, the open-source software packages started with the initial phases of computer and software development, when computer operators and designers frequently shared their software freely. Richard Stallman designed the GNU project in 1983. Creation of Free Software Foundation in 1985. Development of Linux kernel by Linus Torvalds in 1991. Open Source Initiative (OSI) was designed by Eric Raymond in 1998 (Kumar, 2008). The software has gained popularity in the library and information management profession since 1999. It is gaining popularity among the LIS community. a study showed that DL software like open-source software (OSS) provides economic and innovative technological solutions to libraries (Rafiq, 2009) and its features are user friendly. The features of the DL software are the well-publicized resource of downloading the source code, without cost, normally via the Internet.

Generally, small and medium-size libraries did not automate their housekeeping functions due to the expensive Library Management Systems (LSM). The features of the open-source software provide an effective way to automate library operations and create digital library operations without paying the cost of the management system (Lee, 2009). The digital library software is a complete system, which comprises different tools designed to gather, store, process, and

communicate information. Digital library Software maybe the combination of the procedures that facilitate the librarians for generation, searching, retrieval, and use this information for problem solving through electronic devices (Chen & Zhang, 2014). The development of digital Libraries has changed the current environment to facilitate global interconnectivity. Today, libraries are technological information hubs where librarians can use information and communication technologies to provide better products and services to the users of libraries and information seekers. Therefore, the librarians must recognize the current scenario and become digital software literate in the emerging knowledge-driven society and continuously changing environment.

In the Pakistani scenario, the implementation of DL software at its emerging phase. Only fewer universities have been using the DL library management systems in their libraries. Digitalization provides many facilities to the libraries, which plays a major role in technology adoption. DL software provides cost-effective substitutes to costly proprietary library management systems. The open-source model gives a chance to librarians to improve their skills and automate library operations. In the Pakistani context, the major issues in the implementation of the DL system are many like social (cultural) differences, digital divide, insufficient technological developments, lack of funds, and unskilled staff. It is anticipated that software implementation projects in Pakistani libraries will get success by careful planning and by devising a mechanism to address the identified issues (Rafiq & Ameen, 2008). Before implementation, it is important to investigate software features for the proper management of digital content in libraries. There is a need to investigate the inspired features, their usability, and implementation of digital library software in university libraries. The available literature shows that the earlier investigators conducted their research studies to find out the relationship of digital library software packages with each other but there is limited literature available on implementation, usability, and features of digital library software. The present study aimed to investigate the implementation and useful features of the digital library software that is being used in public and private universities of Pakistan.

### **Significance**

The use of digital library software is necessary to manage digital content available in libraries. The main purpose of this study was to investigate the digital library software in terms of its implementation, usability, special features, and characteristics. The results of this study will be helpful for librarians to select appropriate digital library software in order to implement and

manage digital content. The present study will add in literature practically and theoretically. Furthermore, it would be helpful for information sciences and library management students to understand the usability of the DL software. Hence, the study is important to facilitate library professionals to select the proper library software for digitalization and develop automated libraries system effectively.

## **Objectives**

This study was designed to serve the following objectives:

1. To investigate the type of DL software implemented among universities located in Punjab.
2. To examine the implementation of DL software in public and private universities.
3. To find out the mean differences among study variables across demographic including gender, designation, professional experiences.

## **Hypotheses**

1. There would be a significant difference in types of DL software implemented among universities located in Punjab.
2. Private universities will be more satisfied with DL software features and their implementation as compared to public sector universities.
3. Male DL software users will be likely to exhibit higher scores as compared to female DL software users.

## **Method**

### **Participants**

The population of the present study was digital librarians working in HEC recognized university libraries of Punjab. A list of universities was prepared from the HEC website. Total 62 HEC recognized university libraries existed in Punjab.

### **Data Collection for the Study**

The data was collected through Online Google Form from university librarians. Only digital librarians were taken as the study participants who are working in University libraries located in Punjab Province. The Google form included the informed consent, which all the necessary details about the study. The participants were required by email to read and respond to email. In addition, it was instructed them to take a part in this study if they are agreed. The questionnaire was distributed via email among the digital librarians and requested them to submit it after completion.

### **Research instrument**

The draft questionnaire was sent to the relevant experts for evaluation. For ensuring content validity some senior well-known LIS professionals, like Ata-ur-Rehman and Bushra Jaswal of national-level recognition were requested to review the draft of the questionnaire. Their selection was based on their relevant experience and adequate knowledge about digital library software and its application in different libraries. In the light of the experts' opinions, necessary amendments and modifications were made in the draft.

## Result

### *Psychometric Properties of Study Variables (N = 62)*

Variables	<i>M</i>	<i>SD</i>	$\alpha$	Range		Skewness	Kurtosis
				Potential	Actual		
Features of DLS	46.70	17.39	.97	24-120	24-109	1.00	1.98

Table shows the psychometric properties of variables. The reliability analysis revealed that the alpha coefficient of Features of Digital Library Software was .87, which indicated high internal consistency. The reliability analysis indicates that the scale is reliable to use in the present for making inferences. The values of skewness for scale ranged 1.00 ( $< +1 / -1$ ) which indicated that data is symmetrical and not skewed. Similarly, the values of kurtosis for scale ranged 1.98 ( $< +2 / -2$ ) which indicated that data is not kurtic. Thus, it is confirmed that data is normally distributed on scales, which is an essential requirement of the analysis administered for hypotheses testing in the present study.

### *Mean, Standard Deviation, and F-Values for the type of the software implemented in university libraries (N = 62)*

Variable	Greenstone ( <i>n</i> = 05)		D-space ( <i>n</i> = 26)		Fedora Commons ( <i>n</i> = 7)		e-prints ( <i>n</i> = 13)		Any other ( <i>n</i> = 11)		<i>F</i>	<i>p</i>	$\eta^2$
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Type of DLS	57.00	30.29	42.19	15.71	51.42	16.60	52.61	15.20	42.72	15.29	1.58	.19	.01

Table shows mean differences for Librarian professionals belonging to five levels of software using on features of DLS. The findings indicated non-significant mean differences on features of DLS with  $F(2, 60) = 1.58, p > .05$ . The value of  $\eta^2$  was .01, which indicated a small effect size.

*Mean, Standard Deviation and t-Values for Type of University on Features of DLS among Library Professionals (N = 62)*

Variables	Public Sector		Private Sector		<i>t</i> (60)	<i>p</i>	95%CI		Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>LL</i>	<i>UL</i>	
Features of DLS	43.0	14.56	52.4	20.11	-2.12	.03	-	-.55	.02
	7		5				18.19		

The table shows the mean differences in the type of university among study variables. Findings revealed that significant type of university differences on Features of DLS with  $t(60) = -2.12$ ,  $p > .05$ . The value of Cohen's  $d$  was .02, which indicated a small effect size. Results show that private sectors were higher as compared to the public sectors.

*Mean, Standard Deviation and t-Values for Gender on Features of DLS among Library Professionals (N = 62)*

Variables	Male		Female		<i>t</i> (60)	<i>p</i>	95%CI		Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>LL</i>	<i>UL</i>	
Features of DLS	47.25	18.33	45.38	15.26	.38	.70	-7.94	11.66	.02

The table shows the mean differences in gender among study variables. Findings revealed non-significant gender differences on Features of DLS with  $t(298) = 1.08$ ,  $p > .05$ . The value of Cohen's  $d$  was .02, which indicated a small effect size. Results show that men's professionals were higher as compared to women's professionals.



## **Discussion**

The present study aimed to examine the usability of digital Library Software among university libraries in Punjab, Pakistan. The study focused on the features involved in making a DL system more impactful for DL software users of university libraries. The objective of the study was to find out the digital library systems in terms of features that would be helpful for library users to select the right software. In order to accomplish the research objectives, a self-reported questionnaire was constructed after reviewing the literature and with the help of experts. This study was descriptive research based on the survey research design and purposive sampling techniques used. Data was collected from the 62 universities including 38 public sectors and 24 private sectors using digital library software in university libraries. Respondents were the employees of university libraries dealing with DL software. After data collection, the results of the present study were computed by using the SPSS 25 version.

It was anticipated that there is a difference among types of DL software implemented in university libraries. The present study supports that the majority of the university libraries have implemented the D-space software. D-Space is the software that is useful for non-profit, academic, and commercial organizations that are intended to build open digital storehouses. It has free access and easy installation “out of the box” and is excessively suitable for the customizable needs of a particular organization. All kinds of digital content such as text, visualization, moving images, and data sets are easily accessible and preserved via D-space. With the advanced technology and ever-growing developers’ community, working to expand and improve the software services, a now D-Space updated installation benefits from previously installed versions (Biswas, & Paul, 2010). It allows its members to easily access the sources. At present, it does not have the Metadata Encoding and Transmission Standard (METS) that made it additionally influential. It is the most popular open-source software among digital library software like e-print and also it is used widely. However, many organizations have executed digital libraries, but not available online. Open access to information resources is possible only if these storehouses of knowledge have been made online (Biswas, and Paul, 2010). Past research showed that greenstone has better functioning as compared to the other library software (Tramboo, Humma, &Shafi, 2012)

The present study highlighted the second widely used software in university libraries is e-prints and fedora. The e-print is a free and open-source software package for developing openly accessible fountains. It supports theses, dissertations, and research papers also. E-Prints is using traditional technologies and running on Open Source systems. It is using Apache database, MySQL, and web server (Tramboo, et al., 2012). Fedora is a principles-based flexible system of service-centered architecture. It can store, manage, and provide access to digital content. Fedora is a modular, robust, open0source storehouse system that are capable enough to manage and disseminate digital content effectively. It is highly suited for digital archives and libraries, both for accessibility and preservation. Additionally, it provides specialized access to the large to keep complex collections including cultural and historic materials as well as scientific data in digital format. Most importantly, fedora has worldwide-installed user-bases, which is full of academic and national libraries, cultural heritage organizations, research institutions, government agencies, and university libraries (Biswas, & Paul, 2010). Greenstone is a flexible instrument for effectively managing and building digital collections. Literature demonstrated that the usability of greenstone software has a greater proportion of responding to questions and completion of responsibilities is very high (Dalkıran, et al., 2014). Greenstone is a widely used software in libraries because it allows users to spend less time finding an article or an author. Greenstone organizes information and publishes it on the internet in the form of a metadata-driven, fully searchable, and digital resource. Greenstone can also be run in removable media such as a USB Flash Drive and DVD.

An independent sample t-test was applied to analyze the research question. The results exposed the significant mean difference based on the type of university (public and private sector). The findings of the present study confirmed that private sectors universities were satisfactory about using DL software in university libraries as compared to the public sector. The features of DL software have improved the information system and management of library staff. DL software provided a wide range of effective features to maintain the library system including increased metadata standards, gave powerful searching and retrieval, multilingual support, format conversion of digital objects, saved search/search history for later browsing, fully customized, user-friendly interface, and availability and technical support 24/7. The excessive use of technology encouraged the library management system to adopt the DL software for better functioning. Research reported that digital library software helps to manage and develop the digital content and technical support effectively (Kamble, Raj, & Sangeeta, 2012).

It was anticipated that male DL software users will be higher as compared to female professionals was supported by the statistical data. Males DL software users have higher computer skills which support them to perform better on digital software usage and understandability of the software features. Literature depicted that male DL software users are more proficient in understanding the web-language support (XML, SGML, etc.), type of software license (free & open-source/commercial), interoperability support, online up-gradation, metadata standards, and powerful searching and retrieval (Rai, & Kumar, 2011). The study showed that males are more likely to attend professional training especially related to the ICT skills, which helped them to understand the features of the computer system (Hossain, & Sormunen, 2019). Female DL software users have fewer resources and opportunities as compared to male DL software users to access ICT in both developing and developed countries. Due to the gender-based division around the world males received attention in the field of ICT training. It has been seen that males are likely to be considered as having higher analytical and technical abilities as compared to females. Conclusively, male DL software users perform better at digital software as compared to female DL software users.

Conclusively, the present study has sketched significant information about the features and implementation of the DL software. D-space and E-print are heavily used worldwide to build digital storehouses instead of fedora. Among all digital library systems, D-space has a preference because of its features. It is functionally wealthier and supports an extensive range of object types, including text, images, sound, and video. D-space has detailed implementation procedures, which is helpful for software managers. D-Space appeared with the best search options, well-browsing support, and maintained metadata support. It also offers more power to manage constraints at the collection level. It has an independent platform because of its programming language JAVA. The drawback is the unavailability to upload compressed files and the installation process is tough. The e-prints have smooth functionality to upload compressed files and an AJAX-based interface. However, it has limited browsing and less implementation of access restriction features. However, Greenstone has indexing features, virtuous report generation, a variety of plugins, and support for Z39.50 and the drawback is the lack of a fixed interface for Librarians, which makes it inaccessible on some equipment.

## **Conclusion**

The present study aimed to examine the “DL software in university libraries”. Universities including public and private sectors that have implemented the DL software in their libraries. Population-based on the librarians using DL software in university libraries. Mainly, the study focused on features of DL software in university libraries. Findings exposed that private sector universities are more habitual with the usage of DL software as compared to the public sector universities. The features of DL software has established the digital content, advanced search and information retrieval, metadata standards, improved the library usability efficiently, 24/7 availability and technical support, customization facility, and user-friendly interface, satisfactory features of DL software that encouraged library management to implement. The present study revealed significant implications for the future. This study will allow many institutions, universities, and organizational libraries to move from traditional library systems to modern digital library systems. It will help to select a better software system to implement in their libraries.

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