May 2019

Use of Electronic Resources by Science Faculty and Researchers in Selected North Indian Universities

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USE OF ELECTRONIC RESOURCES BY SCIENCE FACULTY AND RESEARCHERS IN SELECTED NORTH INDIAN UNIVERSITIES

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ABSTRACT

The study investigates the use of electronic resources by the science faculty and research scholars in five universities of North India. Survey method was employed and the data was collected using a comprehensive questionnaire. The results obtained from 668 respondents indicated that the usage was highest for e-journals in comparison to other e-resources. Preference is given to search engines in finding information which is chiefly used for research and related purposes. The use of advanced search strategies like Boolean, proximity, wildcards and truncation was found to be low. Science Direct, Springer Link, Taylor & Francis and Wiley Blackwell were the most used among other resources. Less than one-fourth users were found to have attended training in use of e-resources. The study suggests conduction of more training programmes and promotion of e-resources for their optimum utilization.

KEYWORDS: E-resources, Electronic Resources, Databases, Use of E-resources

1. INTRODUCTION

Information is considered to be a vital resource in the present time and we are said to be living in the age of information. It is a dynamic and unending resource that affects all disciplines and walks of life. The progress of the human society can be attributed to the widespread use of information. In the words of futurist Alvin Toffler (1970), “the post industrial society is information society in which the striking changes are dramatically arrived directly affecting people and organizations in their work place, at home and their behavioural patterns” (p. 176).

Changes in technology have its impact on every aspect of human endeavor and libraries are no exceptions. The way information is accessed, stored and disseminated has been affected by the changing technology. “The rapid advancement of information and communication

technology (ICT) has brought a revolutionary change in the information scenario giving rise to a number of options to handle varied information sources conveniently and effortlessly" (Satpathy & Rout, 2010, p.11). As a result of this situation, these days, e-resources have become an important component of every library's collection and have helped in satisfying the user needs.

"With the growing popularity of e-resources, the traditional libraries are gradually migrating from print documents to e-resources where providing access to information is considered more important than owning it" (Thanuskodi, 2011, p. 437).

The academic system is mainly based on teaching, learning and research which are further dependent on the information resources. These information resources "are the driving forces for making an educated society. The educated society can exist only when information is stored, shared and utilised properly. In an academic arrangement, both 'education' and 'library' are inseparable – indivisible concepts, working for the promotion and evolution of teaching, learning and research for greater use of academia" (Rao & Choudhury, 2009, p. 630). The proliferation of electronic resources has had a "significant impact on the way the academic community uses, stores, and preserves information" (Heterick, 2002, p.10).

As compared to the print media, the electronic resources provide better, faster and easy access to information and thus used by them. Considering the visible tremendous benefits of electronic resources, most of the libraries today are having electronic resources as a significant part of their collection. The users can fully entrap the benefits of e-resources if they are aware about their occurrence, availability, searching and optimum usage. Libraries and information centres need to play a proactive role in reducing the gap between the information needs of the users and the availability of their required information in various sources especially in electronic form.

2. REVIEW OF RELATED LITERATURE

Several studies have been conducted at national and international level to assess the awareness and use of electronic resources especially in an academic setting.

In their investigation of utilisation of subscribed e-resources at Mzumbe University Library (Tanzania), Isubika & Kavishe (2018) revealed that "98.3% of the users understood the term e-resources and 86.7% indicated that they have heard about the library-subscribed e-resources while only 56.6% indicated that they were aware about the Mzumbe University

library-subscribed e-resources." Kaur & Verma (2009) in their study on IIT Delhi indicated the awareness of users towards library e-resources and services and stated that the main users of these e-resources were postgraduates, research scholars and faculty.

While investigating the relationships between awareness and use of digital resources among students in Isfahan University of Medical Sciences (Iran), Asemi & Riyahiniya (2007) stated that "70% of students were aware of digital resources, but only 69% of them have used them; 62% were aware of offline databases, whereas only about 19% used them through the Central Library LAN network. About 70% were aware of online databases, accessible via the Central Library web site, and about 53% of respondents have used them." Shaqour & Daher (2010) in their study on students' use of electronic resources found that "more than one half of the participants had high level of electronic media use and more than one third had moderate level of electronic media use." Renwick (2005) studied the knowledge and use of electronic information resources by medical sciences faculty at The University of the West Indies. The study found that "faculty had high awareness of the electronic resources made available by the Medical Science Library (MSL) but low use of MSL-specific resources supporting the suggested problem of underutilization."

Dadzie (2005) while studying the use of e-resources by students and faculty of Asheshi University, Ghana found that the usage of some internet resources was high, whilst the use of scholarly databases was quite low. Manda & Mukangara (2007) in their study of postgraduate students at the University of Dar es salaam, Tanzania revealed that "the use of electronic databases and electronic journals among postgraduate students was low although the use of internet search engines such as Google, Yahoo and other free internet resources was found to be high and frequent." Lwoga & Sukums (2018) in their study of health sciences faculty's usage behavior of e-resources found that "in addition to Google search engine, Wikipedia and four scholarly databases and search engines, the level of awareness of other 19 scholarly databases and search engines which are either subscribed or open access resources was less than 50%. In addition to Google search engine, Wikipedia and five scholarly databases and search engines, the self-reported usage of other 18 scholarly databases and search engines was less than 50% on the on 'daily' and 'weekly' categories."

Some studies indicated that the users prefer print as well as electronic resources. However, the tendency of the users towards electronic resources is increasing gradually. Some

studies even indicated higher preference and usage of e-resources in comparison to print. In one such study of use of e-journals by research scholars in Sri Venkateswara University and University of Hyderabad Anil Kumar & Reddy (2016) found that majority of them had prior experience in using e-journals. A high percentage of research scholars (43.92%) frequently use both print and e-journals while 29.72% use only print journals and 26.36% use only e-journals. Similarly, Nanda (2017) found that a major portion of faculty members (46.42%) preferred both print format and electronic format of journals, whereas (52.54%) research scholars preferred online form of journals. A study was conducted by Arshad & Ameen (2017) at the University of Punjab (Pakistan) to investigate the use pattern of scholarly e-journals in 12 disciplines. The study found that "the use of electronic information sources has increased among academic staff and it reveals that their preferred information source's format has also changed from print to electronic for scholarly tasks." Kaur and Kathuria (2016) stated in their study that despite the fact that e-resources have eased the task of research, respondents still prefer information in both print as well as electronic formats. Tilwani & Kumar (2007) studied the information use pattern of social scientists from web-based information resources and found that 73.33% social scientists preferred print version, 26.67% preferred only web-based information resources and 40% preferred both the version.

In a study of e-resource use by Life Scientists at Sambalpur University, Sethi & Panda (2011) found that 92.18% of them preferred to use e-resources compared to print documents and a major chunk of them used e-journals (67.18%) more frequently as compared to the other e-resources. The authors also stated that e-resources ease the access to information (51.56%) compared to all other factors, hence influence the respondents for their use. Thanuskodi (2011) examined the usage of electronic resources at Dr T.P.M. Library, Madurai Kamaraj University and found that all the three category of respondents, i.e., PhD Scholar, MPhil students and PG students preferred e-resources over print resources.

Ansari & Zuberi (2010) in their article "Use of electronic resources among academics at the University of Karachi" revealed that majority of the academics at the University of Karachi have computer skills that facilitate the use of electronic resources, although a majority have little knowledge of electronic resources, which was not a positive aspect of the findings. Most of the academics used both electronic and printed resources and some used only printed sources. Kaur & Verma (2009) found that in IIT Delhi most of the users (71%) prefered to use both print and

electronic format, 17.45% preferred electronic only, and 11.52% preferred print only. Moghaddam & Talawar (2008) investigated the use of scholarly electronic journals at the Indian Institute of Science (IISc). The results showed "a growing interest in electronic journals among the users at IISc. Electronic journals were mostly used for research needs and PDF was the most preferred format. The fact that users have free access to electronic journals at all hours from their own computers seems to be the most appealing feature." Shuling (2007) in the study titled "Investigation and analysis of current use of electronic resources in university libraries" showed that nearly half of the readers investigated were satisfied with e-resources of the university. Both the printed and electronic resources have their advantages and they cannot be replaced by each other. The e- book does not substitute the traditional printed book. The study also showed that the postgraduates and teachers made the most use of electronic resources. The results of study by Dadzie (2005) indicated that 85% of respondents used the internet to access information, and that respondents mainly accessed information in the library by browsing books on the shelves.

Ahmad & Amjad (2014) in their study evaluated the researchers' satisfaction with electronic resources in two universities of Pakistan and found that the use of electronic resources was very common among researchers of these universities than ever before, and they were largely reliant on these resources for their research work to obtain information, though they faced many problems while using these resources. The respondents mainly used Internet based resources (mean= 4.63) followed by e-mail (mean= 4.33), web resources (mean= 3.99), HEC databases (mean= 3.75), e-books (mean= 3.73) and e-journals (mean= 3.61).

As regards to frequency of using e-resources, Thanuskodi (2011) found that maximum respondents used e-resources daily. Kaur & Verma (2009) found that only 16.36% of users were using the e-journals daily, 33.22% used 2/3 times a week, 13.66% used once a week and 36.76% used occasionally. Nanda (2017) found that about 54.23% of research scholars and 51.78% of faculty members were accessing the e-journals on daily basis. Sethi & Panda (2011) revealed that, 25% of the respondents used e-resources frequently while they were used 2-3 times in week by 25% and occasionally by 23.43%. Bhat & Mudhol (2014) in their study on use of e-resources by faculty members and students of Sher-E-Kashmir Institute of Medical Science (SKIMS) revealed that 2-3 hours of access to internet was quite common among the gastroenterology and general medicine faculties and students. In a comprehensive study titled "Engagement of users with e-resources across agricultural libraries of Northern India", Bhat (2018) explored the

frequency at which users tend to use e-resources along with the average time invested by them per day in using e-resources. The study found that majority of the users use e-resources 'daily' and '2-3 times a week'.

3. OBJECTIVES OF THE STUDY

The prime objective of the study is to investigate the use of e-resources by the science faculty and research scholars. The specific objectives of the study are:

- To assess the frequency of e-resource use.
- To find out the methods of awareness regarding e-resources.
- To find out the preferred methods of using e-resources.
- To explore the methods of learning e-resources use.
- To explore the main purpose of use of e-resources.
- To study the hindrances faced while using e-resources.
- To study the use of e-resource search strategies.
- To study the use of e-ShodhSindhu consortium e-resources.

4. SCOPE AND METHODOLOGY

Survey method was adopted for the present study. In the words of Babbie (2013), "survey research is probably the best method available to the social researcher who is interested in collecting original data for describing a population too large to observe directly" (p. 229).

The population of the present study included the faculty members and research scholars of the science departments of the five Universities of Haryana, Punjab and Chandigarh namely Maharshi Dayanand University (Rohtak), Kurukshetra University (Kurukshetra), Panjab University (Chandigarh), Guru Nanak Dev University (Amritsar) and Punjabi University (Patiala). At the time of conducting the study, the total population was 3005 consisting of 734 faculty members and 2271 research scholars of the science departments of these five universities which was ascertained after visiting each of the department in these universities.

For the present study probability sampling was chosen as it is considered more scientific and useful and stratified random sampling was used for selection of the samples. For estimation of the sample size, three methods were employed - the formula by Taro Yamane (1970), table by Krejcie and Morgan (1970) and online calculator of surveysystem.com. A comprehensive questionnaire was designed and used to collect the information required for the present study.

The data was collected by personally administering the questionnaire to the users in the five universities. The final data of 668 respondents, consisting of 252 faculty members and 416 research scholars, was entered in MS-Excel and subjected to various calculation required for the study.

5. ANALYSIS AND INTERPRETATION

5.1 Use of e-resources

The respondents were asked to rate their level of use of e-resources as highly, frequently, occasionally, rarely and never. Table 1 indicates the responses towards the frequency of use of various types of e-resources.

Table 1: Use of e-resources

Electronic Resource	H	F	O	R	N	Total	Mean	Std. Dev.
E-books	135	243	220	59	11	668	3.65	0.95
E-journals	368	244	45	11	0	668	4.45	0.69
E-theses/ dissertations	102	189	242	90	45	668	3.32	1.10
E- bibliographic databases	78	149	183	74	184	668	2.80	1.37
E-conference proceedings	62	153	178	122	153	668	2.77	1.29
Indexing abstracting databases	75	156	149	84	204	668	2.72	1.40
E-research reports	120	174	162	106	106	668	3.14	1.33
E-magazines	74	149	176	145	124	668	2.86	1.27
E-newspapers	131	206	192	86	53	668	3.41	1.17
Free Internet resources	315	238	76	24	15	668	4.22	0.94
Open Access resources	219	235	100	36	78	668	3.72	1.29
Institutional repositories	29	96	135	76	332	668	2.12	1.29
H- Highly (5), F- Frequently (4), O- Occasionally (3), R- Rarely (2), N- Never (1)								

As seen from Table 1, e-journals is the most used e-resources (mean= 4.45) which were used highly by 55.09% respondents and frequently by 36.53% respondents. The next most used e-resources are the free internet resources (mean= 4.22) which were used highly by 47.16% respondents and frequently by 35.63% respondents. Some other e-resources used to a good extent by the respondents are open access resources (mean= 3.72), e-books (mean= 3.65), e-newspapers (mean= 3.41) and e-theses/ dissertations (mean= 3.32). The least used resource is

institutional repositories (mean= 2.12) which were used highly by only 4.34% and frequently by 14.37% respondents.

The results of the presented study are in concurrence with many previous studies. The study by Arshad & Ameen (2017) revealed that "academic staff consults a variety of information sources including print, electronic, and informal sources to carry out their scholarly and teaching endeavours. Academics' top most frequently used information source is e-journals. Online reference sources and discussion with colleagues are also frequently used sources. However, online indexing and abstracting services are not a frequently used source." Bhat & Ganaie (2016) stated in their study that "the I&A databases and e-journals emerge out as the most widely used e-resources, whereas the e-books and e-theses are not yet used to a desirable magnitude." Amjad, Ahmed & Naeem (2013) found that Internet, web resources, e-journals, HEC databases, e magazines, e-thesis, e-books, e-mail, and e- Newspaper were the frequent and most useable electronic resources among the academic scholars of The Islamia University of Bahawalpur (IUB), Punjab, Pakistan. Mahapatra, Swain & Jena (2012) found that a great majority of faculty members of Orissa University of Agriculture & Technology prefered e-journals, e-articles and e-dissertations and theses.

5.2 Methods of E-resource Awareness

The responses towards the methods through which the faculty members and research scholars come to know about e-resources are depicted in Table 2.

Table 2: Methods of awareness

Awareness Method	No. of response	%age
By searching bibliographic database	234	35.03%
Announcements in journals	151	22.6%
Cited in report/ journals/ conference papers	352	52.69%
Referred to me by the librarian	80	11.98%
By browsing or looking for materials	492	73.65%
E-mail alerts from publishers/ distributors, etc.	253	37.87%
By personal communication with friends, subject experts and resource persons	398	59.58%
**multiple responses were allowed*		

The most common method through which the respondents become aware about e-resources is “by browsing or looking for materials” (73.65%). Other methods of awareness are “by personal communication with friends, subject experts and resource persons” (59.58%), “cited in report/ journals/ conference papers” (52.69%), “e-mail alerts from publishers/ distributors, etc.” (37.87%) and “by searching bibliographic database” (35.03%). The methods that contribute less towards e-resource awareness are “announcements in journals” (22.6%) and “reference from the librarian” (11.98%). There seems some gap between the user and the library staff because very less respondents came to know about e-resources through the librarian.

Satpathy & Rout (2010) found that almost all the faculty members (97.5%) were aware of e-resources and the main criteria adopted by faculty was reliability followed by usability, currency and authenticity while selecting and using e-resource. Kaur & Verma (2009) showed that the users of IID Delhi started using electronic resources as per their need. Kiran Kumar & Kumbar (2015) in their study on use of electronic information resources and search pattern by the faculty of autonomous engineering colleges in Karnataka stated that the faculty members mainly became aware about newly available electronic resources by personal communication with friends, subject experts and resource persons; by browsing or looking for materials; citations in reports/ journals/ conference papers and by bibliographic database searching.

5.3 Methods of Learning to Use

The respondents were asked question on how did they learn to use e-resources. They were allowed to choose multiple responses. The obtained responses are shown in Table 3.

Table 3: Methods of learning

Method of learning to use e-resources	No. of response	%age
Trial and error	247	(37.03)
Self learning	571	(85.61)
Guidance from other colleagues	331	(49.63)
Guidance from library staff	68	(10.19)
Courses, trainings, workshops and seminars	216	(32.38)
Guidance from computing staff/ technicians	46	(6.90)
Other	7	(1.05)
**multiple responses were allowed*		

The respondents learned to use e-resources mainly by "self learning" (85.61%). Other methods through which they have learned to use e-resources are "guidance from other colleagues" (49.63%), "trial and error" (37.03%), "attending courses, trainings, workshops and seminars" (32.38%), "guidance from library staff" (10.19%) and "guidance from computing staff/ technicians" (6.9%) (See Table 3).

Thus, it was observed that the users learned the use of e-resources mainly through self learning. They also sought guidance from other colleagues and friends for learning use of e-resources but they scantily sought guidance from the library staff

Kiran Kumar & Kumbar (2015) in their study of faculty of autonomous engineering colleges in Karnataka found that most of the faculty learned to use electronic resources through self learning or by guidance from other colleagues or by trial and error. Vasishta (2014) in her study found that the primary source of acquaintance with e-resources was interaction with peers followed by browsing of the Internet. More than half of the research scholars and faculty (54%) admitted that they learn to use e-resources by hit and trial followed by 49% respondents who got guidance from other users for acquiring necessary skills to use e-resources. The results of the study by Sampath Kumar & Kumar (2010) showed that many of the students and faculty learned about the electronic information sources either by trial and error or through the advice of friends.

5.4 Preferred Methods of Use

The users use electronic resources through many ways some of which are listed in Table 4. The respondents were asked about how frequently they used these methods for accessing the e-resources.

Table 4: Methods of using e-resources

Method	MF	F	O	R	N	Total	Mean	Std. Dev.
Through University/ Library website	253	147	121	111	36	668	3.70	1.27
Directly through publisher/ vendor website	73	148	203	188	56	668	2.99	1.13
Through search engines like Google, etc.	505	150	7	6	0	668	4.73	0.52
Links to full text in databases from bibliographic databases	115	175	170	129	79	668	3.18	1.26
Subject gateways/ guides/ portals on the Internet	90	151	144	141	142	668	2.86	1.35
MF- Most Frequently (5), F- Frequently (4), O- Occasionally (3), R- Rarely (2), N- Never (1)								

As depicted in Table 4, the use of "search engines like Google, etc." is the main method through which the respondents (mean= 4.73) find electronic resources. This method was used most frequently by 75.6% and frequently by 22.46% respondents. The next most used method is "through university/ library website" which was used most frequently by 37.87% and frequently by 22.01% respondents. The "links to full text in databases from bibliographic databases" (mean= 3.18) and "directly through publisher/ vendor website" (mean= 2.99) are other methods of finding electronic resources. The method which is least used in searching electronic resources is with the help of "subject gateways/ guides/ portals on the Internet" (mean= 2.86).

Thus, the use of search engines for finding electronic resources is prevalent among the users.

Similar results were obtained in some previous studies. Swain & Panda (2009) in their study found that while the other searching options were used less, the premier web search options like Google and Yahoo! were the most frequently used search engines. Similarly, Kiran Kumar & Kumbar (2015) found that the faculty used search engines to find information and the preferred search engines in order of preference included Google, Yahoo, Bing, MSN and Alta Vista among others. Mahapatra, Swain & Jena (2012) found that almost all faculty members used Google as the most reliable searching tool followed by Yahoo! Search and the use of OPAC/ WebOPAC was found to be fairly less among the faculty. According to the study by Satpathy & Rout (2010), "most of the respondents search their required e-resources through Google/other search engine (37.2%), followed by 'as per the instruction of the library staff' (32.7%) and from the 'website of concerned e-resource' (30.1%)." Vasishta (2014) found that among the research scholars and faculty the preferred gateway to search and access e-resources was publishers' website. According to Thanuskodi (2011) the respondents searched the e-resources mainly through the library portal, followed by search engines and further followed by websites.

5.5 Purpose of Use

The respondents were asked about their opinion regarding their purpose of using electronic resources as strongly agree, agree, undecided, disagree and strongly disagree. The obtained responses are indicated in Table 5.

Table 5: Purpose of use

Purpose	SA	A	U	D	SD	Total	Mean	Std. Dev.
To update knowledge	453	207	8	0	0	668	4.67	0.50
For reading articles	399	257	10	2	0	668	4.58	0.54
For writing research paper	438	214	11	4	1	668	4.62	0.57
For writing research proposal/ projects	345	242	72	8	1	668	4.38	0.74
Preparation for seminar/ conference/ workshop	310	296	52	8	2	668	4.35	0.70
For general information	259	325	67	17	0	668	4.24	0.73
On-going research work	432	215	17	3	1	668	4.61	0.58
Preparation of teaching/ lecture notes	203	310	81	39	35	668	3.91	1.06
For guiding researchers/ peers	202	190	86	75	115	668	3.43	1.45
Exploring the research grants	161	218	181	63	45	668	3.58	1.15
Curriculum design	83	201	136	102	146	668	2.96	1.35
SA- Strongly Agree (5), A- Agree (4), U- Undecided (3), D- Disagree (2), SD- Strongly Disagree (1)								

The most important purpose of using electronic resources is “to update knowledge” (mean= 4.67) to which 67.81% respondents strongly agree and 30.9% agree. The next most important purpose is “for writing research papers” (mean= 4.62) to which 65.57% respondents strongly agree and 32.04% respondents agree. “Ongoing research work” (mean= 4.61) is another important purpose for which 64.67% strongly agree and 32.19% agree.

Other important purposes of using e-resources included: “for reading articles” (mean= 4.58), “for writing research proposals/ projects” (mean= 4.38) “preparation for seminar/ conference/ workshop (mean= 4.35) and “for general information” (mean= 4.24).

Other purposes that hold lesser significance are “preparation of teaching/ lecture notes” (mean= 3.91), “exploring the research grants” (mean= 3.58) and “for guiding researchers/ peers” (mean= 3.43). The purpose which is considered the least important for using e-resources is “curriculum design” (mean= 2.96).

Thus, it was found that the main purpose of using electronic resources among the users are to update their knowledge and for research and relates activities like reading articles, writing research papers and for ongoing research work. As regards to guiding researchers/ peers and curriculum design, these purposes held lesser significance.

The main purpose of using e-resource was found as study and teaching by Satpathy & Rout (2010) while Ahmad & Amjad (2014) found that the researchers “frequently” used the electronic resources for the purpose of learning, education, research, update knowledge, reading

articles, doing assignments and writing research proposals. Sethi & Panda (2011) found that "an overwhelming majority of the Life Scientists use e-resources primarily with an aim to keep themselves up-to-date on the subject (71.87%) and to complete assignments and seminar presentations (64.06%)." Nisha & Ali (2013) found that the users of IIT Delhi and Delhi University were using e-journals for building and updating their knowledge and for collecting relevant material for their study and research purpose. Rehman & Ramzy (2004) while studying the use of electronic information resources among health academics revealed that libraries were extensively used for research needs, preparation of lectures, and for obtaining current knowledge. Qasim & Khan (2015) stated that the main purpose of using e-journals by the scientists of IGIB, Delhi, India was to update knowledge and for research related activities.

5.6 Hindrances in Use of E-resources

The responses received related to hindrances faced in the use of e-resources by the respondents are presented in Table 6.

Table 6: Hindrances faced in using e-resources

Hindrances	SA	A	U	D	SD	Total	Mean	Std. Dev.
Only a limited number of titles available	104	292	153	108	11	668	3.55	0.99
Limited access to back issues	94	291	174	101	8	668	3.54	0.95
Difficulty in finding relevant information	69	289	105	191	14	668	3.31	1.06
Do not have access from home	166	280	95	107	20	668	3.70	1.10
Limited access to computers	58	174	129	260	47	668	2.90	1.13
Slow download speed	78	167	90	246	87	668	2.84	1.09
Difficult interface design	37	162	282	159	28	668	3.03	0.93
Lack of search techniques	49	187	180	225	27	668	3.01	1.04
Lack of guidance/ assistance from library staff	59	171	219	184	35	668	3.05	1.05
Instability of electronic resources	46	196	211	192	23	668	3.08	1.00
Discomfort in online reading	68	249	101	223	27	668	3.16	1.12
Credibility and quality issue	41	179	207	226	15	668	3.01	0.97
Information overload	51	231	198	173	15	668	3.20	0.98
Retrieval of irrelevant / junk information	77	264	166	151	10	668	3.37	1.00
Frequent power failure	51	169	135	276	37	668	2.88	1.09
Lack of IT knowledge	42	142	149	284	51	668	2.76	1.07
SA- Strongly Agree (5), A- Agree (4), U- Undecided (3), D- Disagree (2), SD- Strongly Disagree (1)								

The major hindrances or problems faced while using electronic resources by the respondents are: “do not have access from home” (mean= 3.7), “only a limited number of titles available” (mean= 3.55), “limited access to back issues” (mean= 3.54), retrieval of irrelevant / junk information (mean= 3.37) and “difficulty in finding relevant information” (mean= 3.31).

Other hindrances which were faced to little less extent included: “information overload” (mean= 3.2), “discomfort in online reading” (mean= 3.16), “instability of electronic resources” (mean= 3.08), “lack of guidance/ assistance from library staff” (mean= 3.05), “difficult interface design” (mean= 3.03), “credibility and quality issue” (mean= 3.01) and “lack of search techniques” (mean= 3.01).

The problems faced to the least extent are: “limited access to computers” (mean= 2.9), “frequent power failure” (mean= 2.88), “slow download speed” (mean= 2.84) and “lack of IT knowledge” (mean= 2.76).

Thus, it is found that the users face some problems to a greater extent than the other problems in the use of electronic resources. The major problems faced by them included non-availability of access from home, limited access to archives and retrieval of irrelevant information during the search of electronic resources. Power failure is not much of a problem these days as observed from the responses. Lack of IT skills is also not a major problem as the respondents seemed good in IT skills.

Several problems were identified in the use of e-resources by authors of different studies. Sohail & Ahmad (2017) indicated slow downloading and blockage of website as the hurdle in proper utilisation of electronic resources. Similar results were obtained by Nanda (2017) who found that slow downloading is the major barrier for faculty members (58.92%). Anil Kumar & Reddy (2016) found that majority of the research scholars (71.40%) faced problems in using e-journals. The main problems faced by them included ‘slow Internet connectivity’, ‘not familiar with searching e-journals’ and ‘inaccessibility of back volumes of periodicals’.

Nisha & Ali (2013) in their study also revealed several inherent problems like slow downloading, non-availability of particular issue, lack of training and limited access to terminals. Isubika & Kavishe (2018) found several barriers to the effective use of e-resources by respondents at Mzumbe University library, Tanzania. Major among these included: lack of searching skills (35%), unstable network connectivity (71.7%), lack of computer facilities (40%) and lack of computer skills (36.7%). Kiran Kumar & Kumbar (2015) identified through their

study that the main problems faced by the faculty includes 'retrieval of irrelevant/ junk information', 'unfamiliar file formats', 'poor internet connectivity' and 'unorganized information content'.

5.7 Use of E-resource Search Strategies

The responses obtained towards the use of various e-resource search strategies used by the respondents are listed in Table 7.

Table 7: Use of e-resource search strategies

Search Strategy/ Option	MF	F	O	R	N	Total	Mean	Std. Dev.
Author	228	251	156	32	1	668	4.01	0.88
Article title	445	181	35	6	1	668	4.59	0.65
Journal title	306	236	92	28	6	668	4.21	0.90
Subject	302	222	108	30	6	668	4.17	0.92
Keyword	317	199	88	46	18	668	4.12	1.05
Year/ Date	135	181	204	113	35	668	3.40	1.14
Abstract	153	220	175	77	43	668	3.54	1.15
Publisher	119	169	206	124	50	668	3.27	1.17
Author address/ affiliation	69	118	185	180	116	668	2.77	1.23
DOI	108	149	155	133	123	668	2.98	1.34
Boolean operator "AND"	50	103	140	136	239	668	2.38	1.31
Boolean operator "OR"	41	83	124	152	268	668	2.22	1.26
Boolean operator "NOT"	33	59	116	169	291	668	2.06	1.19
Phrase search	50	118	155	134	211	668	2.49	1.30
Proximity operator "NEAR", "BETWEEN"	13	31	99	171	354	668	1.77	0.99
Truncation (# or $)	12	17	71	155	413	668	1.59	0.91
Wild cards	10	28	64	147	419	668	1.60	0.93
Limiters	8	23	78	148	411	668	1.61	0.91
MF- Most Frequently (5), F- Frequently (4), O- Occasionally (3), R- Rarely (2), N- Never (1)								

The most preferred search strategy for using e-resources is "article title" (mean= 4.59) which was used most frequently by 66.62% and frequently by 27.1% respondents. The next most preferred option is "journal title" (mean= 4.21) which was used most frequently by 45.81% and frequently by 35.33% respondents. This is followed by "subject" search (mean= 4.17) which was used most frequently by 45.21% and frequently by 33.23% respondents. Next follows "keyword" search (mean= 4.12) and "author" search (mean= 4.01).

The search strategies which are moderately used includes “abstract” (mean= 3.54), “year/ date” (mean= 3.40), “publisher” (mean= 3.27), “DOI” (mean= 2.98) and “author address/ affiliation” (mean= 2.77). The less used search options includes “phrase search” (mean= 2.49) and Boolean operators AND, OR, NOT (mean= 2.38, 2.22 and 2.06 respectively). The search strategies which were least used included “proximity operators” (mean= 1.77), “limiters” (mean= 1.61), “wildcards” (mean= 1.60) and “truncation” (mean= 1.59) search. Thus, the use of advanced search strategies was less prevalent among the respondents.

Kiran Kumar & Kumbar (2015) found that the faculty prefered to use both basic and advanced search option for searching relevant e-information resources and keyword based field search was the most popular search method. Nanda (2017) also indicated that keyword searching was adopted by majority of faculty members and research scholars. Qasim & Khan (2015) found that keyword, author and journal title were mainly used to search the articles by the scientists and very less scientists used Boolean operators. According to Anil Kumar & Reddy (2016), the search methods used by the researchers are author, date of publication, title of article, keywords, title of the journal, subject and table of contents. Anasuya (2017) found that most of the respondents prefer title to search their information followed by author, subject and publisher.

In a comprehensive research work Kiran Kumar & Kumbar (2010) studied the use and search pattern of electronic resources by faculty members in five autonomous engineering colleges (Bengaluru) and found that the faculty made use of the basic/ simple search (30.44%) followed by advanced search (19.06%) while 50% faculty preferred and used both basic and advanced search options. In another comprehensive study on search strategies, Bhat & Ganaie (2016) found that majority of users search the information through “title” followed by “keywords/subject terms”. The users were not yet well-versed with most of the advanced search techniques, as less than half of them were able to use only Boolean operators, and less than 10% of them claim to know other search techniques.

5.8 Use of e-Shodhsindhu E-resources

The e-ShodhSindhu Consortium of India provides access of current as well as archival content of more than 15,000 core and peer-reviewed journals and a number of bibliographic, citation and factual databases. The response obtained towards some selected resources of the consortium pertaining to science stream are shown in Table 8.

Table 8: Use of e-ShodhSindhu consortium resources

e-ShodhSindhu E-resources	Daily	2-3 times a week	Once a week	Once a month	Never	Total	Mean	Std. Dev.
American Chemical Society	43	62	55	101	407	668	1.85	1.27
American Institute of Physics	7	33	39	42	547	668	1.37	0.88
American Physical Society	14	37	35	56	526	668	1.44	0.97
Annual Reviews	32	101	78	177	280	668	2.14	1.25
Cambridge University Press	19	63	79	171	336	668	1.89	1.12
Institute of Physics	7	23	25	47	566	668	1.29	0.78
ISID	2	11	23	47	585	668	1.20	0.60
JCCC	4	12	28	74	550	668	1.27	0.68
MathSciNet	19	30	26	62	531	668	1.42	0.97
Nature	65	129	113	172	189	668	2.56	1.34
Oxford University Press	39	85	94	160	290	668	2.14	1.26
Portland Press	3	13	27	31	594	668	1.20	0.64
Project Euclid	4	7	24	40	593	668	1.19	0.60
Royal Society of Chemistry	51	72	49	82	414	668	1.90	1.34
Science Direct	243	209	90	59	67	668	3.75	1.30
SciFinder Scholar	90	106	80	80	312	668	2.37	1.52
SIAM	24	33	38	36	537	668	1.46	1.05
Springer Link	219	225	105	54	65	668	3.72	1.27
Taylor & Francis	141	139	106	69	213	668	2.89	1.56
Web of Science	115	98	85	104	266	668	2.54	1.54
Wiley Blackwell	105	131	86	79	267	668	2.59	1.54

Among the respondents, the most used e-resource is found to be "*Science Direct*" (mean= 3.75) which is used daily by 36.38% and 2-3 times a week by 31.29% respondents. The next most used e-resource is "*Springer Link*" (mean= 3.72) which is used daily by 32.78% and 2-3 times a week by 33.68% respondents.

This is followed by "*Taylor and Francis*" (mean= 2.89), "*Wiley Blackwell*" (mean= 2.59), "*Nature*" (mean= 2.56), "*Web of Science*" (mean= 2.54), "*SciFinder Scholar*" (mean= 2.37), "*Annual Reviews*" (mean= 2.14) and "*Oxford University Press*" (mean= 2.14).

The e-resources which were least used by the faculty members included "*Royal Society of Chemistry*" (mean= 1.9), "*Cambridge University Press*" (mean= 1.89), "*American Chemical Society*" (mean= 1.85), "*SIAM*" (mean= 1.46), "*American Physical Society*" (mean= 1.44), "*MathSciNet*" (mean= 1.42), "*American Institute of Physics*" (mean= 1.37), "*Institute of Physics*" (mean= 1.29), "*JCCC*" (mean= 1.27), "*ISID*" (mean= 1.2), "*Portland Press*" (mean= 1.2) and "*Project Euclid*" (mean= 1.19).

Gupta (2017) in her study of e-ShodhSindhu consortium use at Banasthali University found that the most popular publisher in Physical sciences was found to be Springer (77%). Nanda (2017) in her study of Veer Surendra Sai University of Technology (VSSUT) found that majority of faculty members and research scholars preferred to search Science Direct which was followed by Springer. Anil Kumar & Reddy (2016) found that the databases which were more used by research scholars included JCCC, Science Direct, Springer Link and Taylor and Francis. The analysis of publishers in the study by Moghaddam & Talawar (2008) showed that while Elsevier electronic journals (63.9%) were most popular among users at the IISc while Sage Publications journals ranked lowest (2.51%).

5.9 Training in Use of E-resources

Out of the total 668 respondents, only 142 (21.26%) have attended any training programme in the use of electronic resources (See Table 9). Among these also, more than half have attended training programme only once. Those users who attended e-resource training attributed the main benefit towards knowing more e-resources in their field, better use of search engines and learning more about search strategies.

Table 9: Number of training programmes attended

Number of training programmes attended (last five years)	No. of response	%age
All programmes organized by the library	1	0.15%
More than 5	6	0.90%
4-5 times	1	0.15%
2-3 times	47	7.04%
Once	87	13.02%
No programme attended	526	78.74%
Total	**668**	**100%**

The main reason for not attending e-resource training programmes is lack of information regarding training (50.76%). Many respondents attributed to the reason that the library doesn't organize training programmes (35.74%) again indicating a lack of communication regarding the training programmes. 37.26% attributed heavy workload as the reason while 22.05% responded that they don't require any training (Table 10).

Table 10: Reasons for not attending training

Reasons for Not Attending Training	No. of response	%age
Library doesn't organize any such training	188	35.74%
Don't require any training	116	22.05%
University doesn't give permission	9	1.71%
Heavy workload	196	37.26%
Lack of information regarding training	267	50.76%
Any other	10	1.9%
**multiple responses were allowed*		

The users were inquired about their preference for mode of e-resource training programmes (Table 11). It was found that the most preferred mode of e-resource training was training in department which was preferred by 66.02% respondents while 42.66% preferred training by video or powerpoint tutorial on University website. 25.90% respondents wanted customized training programmme, 22.01% wanted to attend training in library and 1.35% wanted training through some other mode.

Table 11: Preferred mode of training

Mode of training	No. of response	%age
Training in library	147	22.01%
Training in Department	441	66.02%
Video/ PowerPoint tutorials on university website	285	42.66%
Customized training programme	173	25.90%
Any other	9	1.35%
**multiple responses were allowed*		

The importance of training in the use of e-resources has been highlighted in many studies. Ali (2005) in his study on use of electronic resources at IIT Delhi library laid emphasis on the training of the library staff who play a major role in encouraging the use of e-resources. Similarly, Madhusudan (2008) also in his study emphasized that "there appears to be some need for academics to be provided with training in using e-journals." Isubika & Kavishe (2018) recommended that Mzumbe University library "should equip library users with intensive training on information searching skills to increase utilisation of the subscribed e-resources." In the study by Rehman & Ramzy (2004) a large number of the respondents proposed a variety of measures of formal orientation and training to become more effective users.

Walmiki, Ramakrishnegowda & Prithviraj (2010) in their study on faculty members found that about 37% of them were aware of and participated in user education programmes conducted by their university libraries. Anil Kumar & Reddy (2016) found that a good majority of research scholars (67.90%) of Sri Venkateswara University and University of Hyderabad participated in training programmes in using e-journals conducted by the libraries. The study by Kaur & Kathuria (2016) indicates that respondents were not fully aware of the 'library education programme/training' as well as its significance in achieving the academic targets. Contrary to other studies, Qasim & Khan (2015) is their study stated that none of the life scientists faced any difficulty in using e-journals and no need of training was felt amongst them.

6. CONCLUSIONS AND RECOMMENDATIONS

The findings of the present study indicate that the usage is highest for e-journals in comparison to other e-resources. The awareness of e-resources mainly comes through browsing or looking for materials by the users and maximum of them learned to use e-resources through self learning. The use of search engines is the preferred way when it comes to finding e-resources which are mainly used for research and related activities.

The main hindrances faced by the users included non-availability of access from home, retrieval of irrelevant information during search, availability of limited number of titles and limited access to archives and back issues. In searching e-resources, the use of advanced search strategies like Boolean operators, proximity, wildcards, truncations, etc. is low as the users mainly searched by article title, journal title, subject, keyword and author. As regards to e-ShodhSindhu consortium, the most used e-resources included Science Direct, Springer Link, Taylor & Francis and Wiley Blackwell.

Less than one-fourth of the users have attended any training in the use of e-resources and the main reason for this situation is lack of information regarding training programmes and conduct of less number of such programmes by the libraries. This is a major area of concern on which the university libraries need to focus more.

The study suggests that the university libraries should focus more on promoting e-resources using traditional as well as new methods. Traditional methods of promotion can include the use of posters, banners, leaflets, pamphlets, etc. The university libraries need to

employ the use of ICT especially Web 2.0 technologies like social networking sites (e.g. Facebook), Blogs, RSS Feed, etc. for promotion of electronic resources.

User training in the use of e-resources is one area which needs dire attention of the libraries. The frequency of the training programmes should be increased and such training can be organized by the library staff or with the help of publishers/ vendors. Libraries should properly communicate about the e-resource training programmes. Simply organizing training programmes is not enough. Proper communication is necessary so that maximum users can participate in such programmes. Multiple methods need to be employed for providing training to the users. Apart from formal training programmes conducted for the users, online (self-help) tutorials need to be prepared for the users and made available on the university library portal so that the users can use these tutorials and learn from them at their convenience.

The users can also contribute proactively by providing valuable suggestions to the libraries in providing better services especially in terms of electronic resources and by enthusiastically participating in the e-resource training programmes organized by their concerned libraries.

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