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***Library Philosophy and Practice* 2011**

ISSN 1522-0222

Use of E-Resources by Life Scientists: A Case Study of Sambalpur University, India

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Introduction

E-resources in collaboration with Internet have become a sign of modern age being an invaluable tool for teaching, learning, and research. The library and information landscape has transformed with the onset of the digital era and today traditional libraries have changed their roles to serve as 'Knowledge Centers' with priority on value added electronic information services. Academic and research institutions are focusing on how best they can facilitate research by canalizing specific information services which compliment as cutting-edge technology. With the advent of globalization in the realm of education, there has been an information explosion. Most of the science and technology, academic institutions as well as R & D Organizations have changed their contemporary outlooks towards the functions, operations and services. The traditional environment has been rapidly changing to an electronic one and the demand for Internet and e-resources among the academic and research community has increased manifold over the years being the most popular source of undertaking research. However, the literature review reveals that, there is a dearth of studies on use of e-resources and internet in context of academics, researchers and students not only in India but also across the globe.

The present decade has been dubbed as the information age. While this concept is not a new phenomenon especially when viewed against its historical perspective, the revolution in Information and Communication Technology (ICT), and particularly the internet, is exerting profound effects on information-based services. The proliferation of new technologies opens a number of challenges for teaching, learning and research. Notable among these are those associated with the adoption and institutionalization of these emerging technologies in teaching, learning, and research. As a result, in the last few years, there have been many initiatives to enhance the developed and developing countries capacity to harness this technology in reshaping their educational sectors in ways that are consistent with current knowledge societies.

India has a strong research and development base, both in the governmental and private sectors, in science and technology. This has led to an impressive quantity of research publications. But the Indian scientific community has noted with great concern that Indian research findings, especially those reported in Indian journals, are under represented in the global knowledge base. This is of concern not only for India but for other developing nations as well. A global effort is on the way to make scientific information affordable by bypassing the profit-making commercial scientific journal publishers. Internet, therefore, has created the possibility of establishing alternative models for the dissemination of information. The above problems may be addressed by facilitating free access to scientific information in electronic form to users worldwide. In India, many science, technology, and medical journals are now available online for a global audience through the initiatives of government and private non-profit publishers (Kumari, 2008).

Use of Internet by research scholars, therefore, is an important area of study in today's information environment. The Internet has now-a-days become an important component in academic institutions as it plays a pivotal role in meeting the information and communication needs of institutions. ''It makes it possible to access a wide range of information, such as up-to-date research reports, from anywhere in the world. It also enables scholars and academic institutions to disseminate information to a wider audience around the globe through having web sites and a way to search them and organize the output'' (Madhusudhan, 2007).

The emergence of the internet and e-resources particularly the World Wide Web, as a new medium of information storage and delivery represents a revolution, which will have a lasting impact on the publishing and information delivery system in the twenty-first century. Increasing numbers of publishers – both commercial and private, as well as individuals – are using the internet as a global means to offer their publications and writings to the international community of scientists and technologists, as well as students. Electronic journals are simply serial publications in which the end products are made available in digital formats and online whose contents may or may not be peer reviewed (Khan and Ahmad, 2009).

The internet boom in India, therefore, has become one of the major contributors to the economic growth of the country. The use of internet has increased more than 11 times in the last seven years. This rise has led to the growth of cybercafés and internet parlors throughout India with easy accessibility and cost effective services helped by the enhanced speed of the internet. A study conducted by Business mapsofindia.com (2008) reveals that, the number of internet users since the year 2000 has increased by a staggering 69 times in the metropolitan areas and 33 times in the semi-urban towns. It has been predicted that, the internet boom in India is still on the rise at present, and as per the ongoing trends, it would continue on its path of glory until things might change. Blecic et. al. (2007) pointed out that, indeed, electronic information sources and more particularly the internet resources have become an increasingly substantial component of academic library collections over the last decades. In another study, Mary Case (2004) has reported that, "between 1994/1995 and 2001/2002, expenditures on electronic resources for the typical university research library have grown almost 400 per cent to almost $1.4M, while the overall library materials expenditures have grown only 61 per cent. Electronic journals account for the greatest proportion of the electronic expenditures claiming 92 per cent of these dollars in 2001/2002 (Kumar and Kumar, 2010).

UK universities have taken full advantage of the enhanced provision of e-journals over the past five years. It is now estimated that 96.1 per cent of journal titles in science, technology and medicine, and 86.5 per cent of titles in the arts, humanities and social sciences are now available online (Rowlands, 2009).

An ever increasing amount of money is being spent on e-resources in contemporary libraries so are the number of titles which come in electronic format. For example, as per a study commissioned by British Library, UK, it is estimated that, by 2020, 40% of UK monographs will be available in exclusive electronic format while another 50% will be available in both print and digital. British Library predicts a switch from print to digital publishing by the year 2020, with 90 per cent of the British research monographs being published in electronic format by that date (Bhat, 2009).

Recent Developments in Information Accessibility in India

The past few years have witnessed a spectacular growth in information production, acquisition, and dissemination. The period of budgetary restrictions in research libraries have led to a period known as the serial cutting era. Data compiled by the Association of Research Libraries (ARL) show that, from 1986 to 2001 though the research library spending has been increased by 210 per cent but the purchase of serial titles decreased by 5 per cent. There were apprehensions also that electronic journals would force small publishers out of business, and mergers and high cost of acquisitions would eliminate the competition. The new millennium has also ushered the concept of virtual library with seamless access to an integrated collection of print, electronic, and multimedia resources regardless of their physical location or ownership. Scientists, policy makers, and reference librarians world over are coming together to introduce reforms to make scientific knowledge affordable. The concept of free access to information in electronic formats is also gaining momentum for the advancement of scientific knowledge. The trend is to liberate scientific publishing from the clutches of commercial profit-making bodies and make it easily available to the generators of the knowledge and rightful users. Leary aptly argued that: "Legislation should be introduced to make results of federally funded research available to public" and thus, efforts are afoot around the world to evolve methodologies to bypass commercial publishers. Several international groups are now using the power of Web to disseminate scholarly information free and with minimal barriers of copyright and licensing, while the cost of publication being met out of research grants, rather than subscriptions to scientific journals (Kumari, 2008).

Objectives of the Study

The main objective of the study was to investigate and unfold the awareness, utilization level of electronic information service (EIS) and the search strategies adopted by the faculty members, research scholars, M. Phil. and P. G. students of the P. G. department of Life Sciences, Sambalpur University. This study, therefore, aims to unearth the following:

- To identify the extent of use and perceived importance of Internet and E-Resources among the life scientists;
- To explore the core purpose of Internet and E-Resources use;
- To understand difficulties encountered by the Life Scientists in browsing the Internet based e-resources;
- To identify users' requirements and priorities of internet-based e-resources;
- To unmask the level of users' satisfaction/dissatisfaction relating to infrastructure facility and e-resources available to them;
- Ranking and evaluation of e-resources by the users; and
- To investigate information seeking behavior of Life Scientists.

Methodology

A structured questionnaire was used to gather data required for this study covering a number of broad areas of e-resources use such as:

i. Purpose of accessing e-resources;

ii. Frequency of use of such resources;
iii. Importance attached to and influence of e-resources on their study/research efficiency;
iv. Place of accessing e-resources; and
v. Key constraints and deficiencies that prevent the Life Scientists from effective use of e-resources.

In addition to these, efforts were made to gain a deeper understanding of academics, researchers and students attitude towards different internet-based e-resources, most importantly the e-journals.

Scope of the Study

The present study focuses on the use of e-resources and to identify the information requirements of faculty members, research scholars, M. Phil and P. G. students of the department of Life Sciences of Sambalpur University. The main aim of this study is to identify the key information needs of users in general and to identify the extent of use of e-journals in Life Sciences available in Sambalpur University through UGC-Infonet programme in particular. The geographical area of the present study is primarily restricted to the Department of Life Sciences, Sambalpur University (India) only.

Size of the sample

In order to assess the use habit of e-resources by the Life Scientists, the study is based upon the following class of respondents that constitute the database for this investigation: (i) Faculty Members; (ii) Research scholars (SRF/JRF); (iii) P. G. and M. Phil students.

Out of 101 questionnaires distributed and 64 filled-in questionnaires were received back with a moderate response rate 63.36 %.

E-Resources: A Conjecture

Bavakenthy et. al. (2003) in discussing the concept viewed that, e-resources are resources in which information is stored electronically and are accessible through electronic systems and networks. 'E-resource' is a broad term that includes a variety of publishing models, including OPACs, CD-ROMs, online databases, e-journals, e-books, internet resources, print-on-demand (POD), e-mail publishing, wireless publishing, electronic link and web publishing, etc. In this context, the term primarily denotes "any electronic product that delivers collection of data be it in text, numerical, graphical, or time based, as a commercially available resource".

In view of IFLA ISBD (ER) 1:

> An electronic resource consists of materials that are computer-controlled, including materials that required the use of a peripheral (e.g. a CD-ROM player) attached to a computer; the items may or not be used in the interactive mode. There are two types of E-resources: *data* (information in the form of numbers, letters, graphics, images, and sound, or a combination thereof) and, *programs* (instructions or routines for performing certain tasks including the processing of data and programs (e.g. online services, interactive multimedia), (Haridasan and Khan, 2009).

Graham (2003) says that, electronic resources are the mines of information that are explored through modern ICT devices, refined and redesigned and more often stored in the cyber space in the most concrete and compact form and can be accessed simultaneously from infinite points by a great number of audience. The phrase "electronic resources", has broadly been defined as, information accessed by a computer, may be useful as bibliographic guides to potential sources but, as of yet, they infrequently appear as cited references in their own right. E-resources, therefore, refer to that kind of documents in digital formats which are made available to library users through a computer based information retrieval system. The Internet is said to be the right and most extensively used channel to catch hold of the majority of e-resources through different search engines (e.g. Google, AltaVista, Msn, Yahoo, etc. etc.) and Webopac and, of course, some offline databases in CD/DVD formats that can even be accessed without the help of internet (Swain and Panda, 2009, pp. 76).

However, electronic resources have become very important these days as they are up-to-date, multi- dimensional and directional in nature and also can be accessed as well as used anywhere, crossing all geographical boundaries. Such resources add value to all spheres of human activities. Thus, the present study "Use of e-resources by the Life Scientists: A Case study of Sambalpur University" was selected to study and analyze the utility and effectiveness in use of different e-resources and their significance for conducting academic and research activities by the Life scientists at Sambalpur university, India.

ICT Status of Sambalpur University (India)

"Established in 1967" (http://suniv.ac.in/abtaboutus.html), the Sambalpur University, Orissa, India is one of the premier universities of the country and known for its high standards in teaching and research. It offers quality education in varied disciplines such as in Arts, Science and other professional courses through 21 Postgraduate Departments and 180 affiliated Colleges. E-Governance being in the final stage of completion has added a further leaf in the best tradition of this University. First phase of Networking has been completed comprising main academic and administrative building and second phase covering hostel and residential area has also been completed successfully. The University has entered into an agreement with the UGC of India and the INFLIBNET to participate in the countrywide Infonet e-journal consortium since 2004 while, e-resources were accessible only in the Central Library of the University. But, at present the University has a campus wide computer network with a state-of-the-art fiber optic and wireless network link to the internet providing 2 Mbps line to all premises of main academic, administrative and residential area including hostels and 10 mbps has already been commissioned since last few months, for browsing of electronic journals and databases in sciences, social sciences and humanities. Students, Teachers and Research scholars can access information without having to pay for the service from their respective departmental Laboratories, Library, and Hostels or even from their laptops connected to the network. This network is being instrumental in introducing the community to electronic resources and facilitated by the high technological infrastructure.

The Sambalpur University has revolutionized its library services, undertaking and extending information technology based resources to a student population around 1200 as well as more than 100 faculty and 400 administrative staff and around 100 researchers by accessing UGC-Infonet 4300 e-journals out of which some are freely available with full-text to meet the requirements and expectations of academic and research community. It is, therefore, more apt and essential to ascertain as to how far the Faculty Members, Ph D and M Phil scholars of Sambalpur University are making use of UGC-Infonet e-journals. Hence, the need is felt to study in detail the use of UGC-Infonet e-journals by researchers and teachers of the P. G. Department of Life Sciences. The present paper attempts to unearth the extent of use of UGC-Infonet e-journals primarily by the research scholars and academia of this premier discipline of Sambalpur University (India).

Profile of the P. G. Department of Life Sciences, Sambalpur University

The Post- Graduate Teaching Department of Life Sciences was established in 1969 with intake strength of 8 students and 4 faculty members which grew there after from strength to strength. The said department (currently known as School of Life Sciences) is having 64 P. G. Students, 18 M. Phil. Students and 10 Research scholars include collectively 92 students spread over four courses, namely, M. Sc. and M. Phil. in Life Sciences, M. Sc. in Bio-Technology and M. Sc. in Bio-Informatics and runs regular Doctoral and Post-Doctoral programmes. It has now a dozen of experienced and well qualified faculty members, 36 supporting staff. Its other resources include around three thousand volumes in the seminar Library, and have several well equipped computer and scientific labs at its credit. This school has also been inducted under DAS/DRS/COSSIST Programmes of UGC/DST and other bodies. Its faculty has acclaimed international recognition in the field of Photosynthesis, Bio-diversity, Plant science research, Cloning, and identification of Abiotic stress induced Genes, Molecular Biology, Rice-breeding Technology, Earth Worm and several such domains. 60 scholars so far have been received their Ph. D. and D. sc. degrees under the guidance of faculty members of this school successfully.

Review of Earlier Studies

Several studies have been carried out on the use of e-journals as well as other forms and formats of e-resources in India and abroad by University/College faculty members, Ph D, M Phil scholars and advanced students of Library and Information Science. In light of this topic, a survey of available literature is made here to make the study more strengthen and widen. Dulaymi, et al. (2004) in their study entitled “The growth of electronic journals in academic libraries in Saudi Arabia” came to the conclusion that, the usage of e-journals has been expanding and gaining importance over print Journals in Academic Libraries in Soudi Arabia since 1996. In relation to problems encountered by the users, the study reveals that, 60 percent of users face difficulties while browsing e-information. The study shouts to find out the problems that hindered in access to electronic resources are due to lack of extensive awareness among the users and inadequately availability of terminals discussed by Dadzie (2005). In order to evaluate the impact of nation-wide access to e-journals at Iceland, a study was conducted by Gylfadottir and Hlynsdottir (2006) which marked a spiraling growth of downloads continued up to 2004 and peaked at almost half a million, but appears to have leveled off in the first six months of 2005. Most of the studies, however, have reported high usage of UGC-Infonet E-resources (Chauhan and Chand, 2007; Raza and Upadhyay, 2006; Cholin, 2005; Chakravarty and Singh, 2005). The electronic resources are highly useful for the research and academic community in the present environment as was highlighted by Kumbar et. al. (2006). Out of several problems, (i) lacks of training and (ii) slow downloading were found to be most vital as discussed by Raza and Upadhyay (2006) in their study. They highlighted some usage implications to assist the academic community from the practicability point of view. The most important one is that the authorities of the university library must conduct the user awareness programs to train the research and academic community with the aim to accelerate the research out put by maximizing the utilization of electronic resources more effectively and efficiently the study advocated. The other implications are: “E-journals are becoming increasingly in demand both as a means of rapid desktop access to current research materials and as a way to view back runs at an extended quantity” (Sreekumar and Sunitha; 2006). Some of the reasons attributed to the high usage of UGC-Infonet e-resources are the reduced gaps between rural and urban, privileged and less privileged, reachable and unreachable frontiers within the Country. This has revolutionized the Indian university campuses with a dynamic digital culture (Murthy; 2008).Haridasan and Khan (2009) focusing on the impact and use of e-resources by social scientists pursuing research in NASSDOC library indicate that, a large number of users are aware enough and involved widely in the use of e-resources for their research work. NASSDOC library is quite rich in e-resources and able to satisfy its majority of users, the study observed. Madhusudhan (2008) focuses on the use of UGC-Infonet e-journals by research scholars and students with the core aim to identify their ever increasing needs and requirements. Khan and Ahmad (2009) jointly had undertaken a study in order to find out the level of awareness and use of e-journals by the researchers at AMU and BHU in India, where the survey revealed that most of the research scholars are quite aware of the availability of e-journals and largely use them for reference purposes in their research and also have agreed that the usage of e-journals substantially improves the quality of their research work due to enrich contents and materials of appurtenance leading to high-quality manuscripts.

Data Analysis and Results

Under the Present Study, the data were collected through a pre-ordained structured questionnaire from the universe of Teachers, Ph D and M Phil scholars of Sambalpur University and then were critically examined and interpreted rationally for reaching out a definite generalization for this investigation. Out of 101 questionnaires distributed among the respondents, 64 (63.36%) duly filled-in were returned back which helped to oxygenate a formidable contribution to this piece of research.

Demographics

There are different categories of users of e-resources in the P. G. Department of Life Sciences of Sambalpur University, out of which three important categories were included randomly to carry out this study. The users responded from teaching community were 6(66.66 %) out of a total of 9 questionnaires distributed to them; followed by M Phil and Ph D scholars who constitute 18(64.28%) of the total 28 as well as P. G. students involved 40(62.5%) out of total 64. This collectively constitute 64(63.36%) of the total response which is quite encouraging. It is observed that, the highest percentage of faculty members have shown vigorous interest for conveying their valued response in this study.

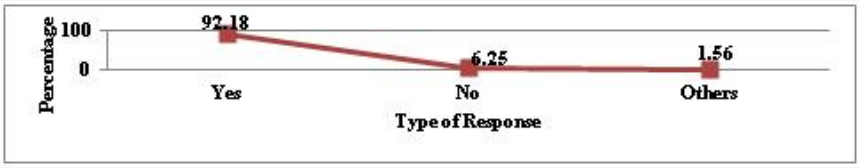
Preference to use e-resources in addition to Printed Documents

Sl. No.	Type of Response	No. of Respondents	Percentage
1	Yes	59	92.18

2	No	04	6.25
	Others	01	1.56

The table 10.2 above has clearly demonstrated the preferences of the respondents in the use e-resources in addition to printed documents as one of the key findings that the present study sought. A highest of 92.18 percent of the total respondents prefer to use e-resources, followed by only a very small section of the respondents (6.25 %) said 'No' and 1.56 percent of the total respondents surprisingly neither prefer e-resources nor printed documents which is quite insignificant.

Figure 1



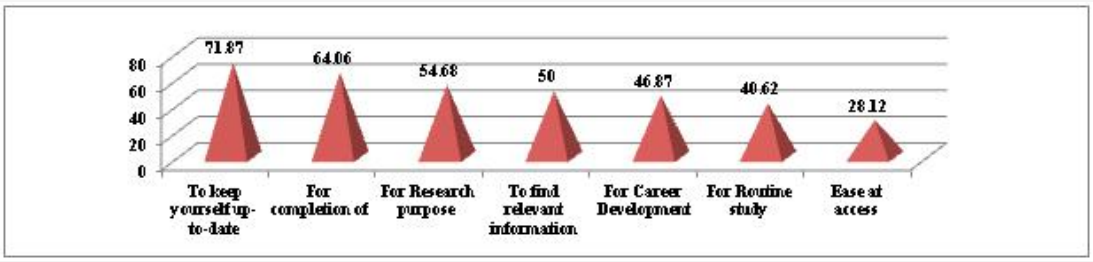
10.3 Purpose of Accessing e-resources

Sl. No.	Purpose to read and search e-resources	No. of Respondents	Percentage
1	To keep yourself up-to-date on the subject	46	71.87
2	For completion of Assignments and Seminar presentations	41	64.06
3	For Research purpose (Thesis/Dissertations/Project works)	35	54.68
4	To find relevant information in the area of your specialization	32	50
5	For Career Development	30	46.87
6	For Routine study	26	40.62
7	Ease at access	18	28.12
8	Economy in terms of cost	14	21.87

Note: Respondents were permitted to provide multiple answers

Table 10.3 discussing on a generic question as was asked to the respondents "purpose of accessing e-resources" found that more than 70 percent respondents use e-resources with the aim of keeping up-to-date on the subject, followed by 64.6, 54.68 and 50 percent respondents need for the purpose of 'completion of seminar and assignments', 'research activities' and 'finding relevant information in the area of specialization', where as on the other hand 46.87, 40.62, 28.12 and 21.87 percent of the respondents provoked that their need for accesses e-resources primarily aim at 'career development', 'routine study', 'ease to access' and 'economy in terms of cost', etc.

Figure 2



10.4 Type of e-resources most frequently used

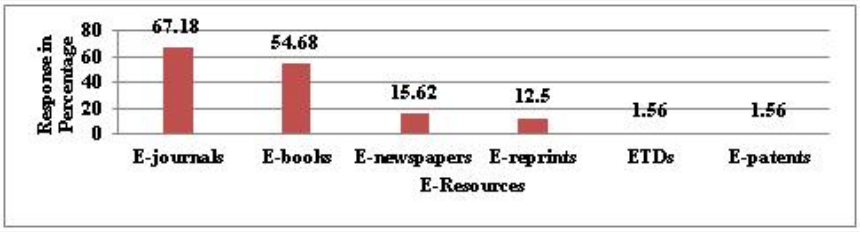
Sl. No.	E-Resources	No. of Respondents	Percentage	Order
1	E-journals	43	67.18	1

2	E-books	35	54.68	2
3	E-newspapers	10	15.62	3
4	E-reprints	8	12.5	4
5	ETDs	1	1.56	5
6	E-patents	1	1.56	6

Note: Respondents were permitted to furnish multiple answers

With regard to most frequently and highly utilized e-resource varieties as presets in the table 10.4 it is revealed that, 'e-journals' and 'e-books' are more popular among the Life Scientists with 67.18 and 54.68 percent respondents which rank 'first' and 'second' in order respectively. Even though 'e-news papers', 'e-reprints', 'ETDs'and 'e-patents' are in use but they constitute only 1-16 percent of the total response which appears to be quite insignificant as more crystally displayed in figure III.

Figure 3



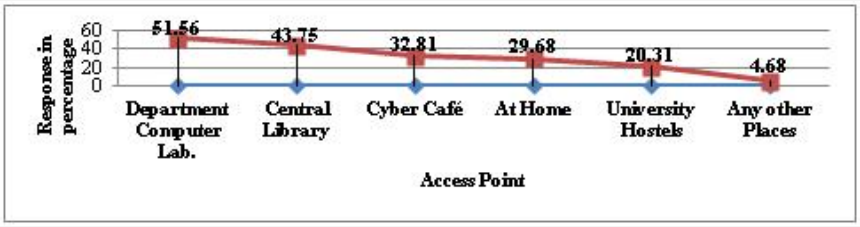
10.5 Access point of e-resources

Sl. No.	Access point	No. of Respondents	Percentage	Order
1	Department Computer Lab.	33	51.56	1
2	Central Library	28	43.75	2
3	Cyber Café	21	32.81	3
4	At Home	19	29.68	4
5	University Hostels	13	20.31	5
	Any other Places	3	4.68	6

Note: Respondents were permitted multiple answers

From table 10.5 it can be seen that, more than 50 percent of respondents use the department computer laboratory for surfing e-resources. Moreover, in addition to department laboratory; University Central Library, Cyber café, Residence and University Hostels are also being used to access e-resources by 43.75, 32.81, 29.68 and 20.31 percent life scientists of Sambalpur University to fulfill their information needs, while only 4.68 percent users depend on other places to access internet-based e-resources which is quite insignificant. Thus, Department laboratory and Central library are the two major access points for surfing e-resources that remain between 44 % and 52 % of the total response.

Figure 4



10.6 Factors Influence the Usage of Electronic Resources for Study & Research

Sl. No.	Factors	No. of Respondents	Percentage
1	Easier access to information	33	51.56
2	Improve professional competence	25	39.06
3	Access to a wider range of information	21	32.81
4	Provides instant access to current up-to-date information	21	32.81
5	Easier access to information than printed equivalent	14	21.87
6	Expedited the research process	12	18.75

H0: The factors influence using electronic resources for study or researches are independent.

H1: The factors influence using electronic resources for study or researches are dependent.

O = 33 25 21 21 14 12 = ∑O=126

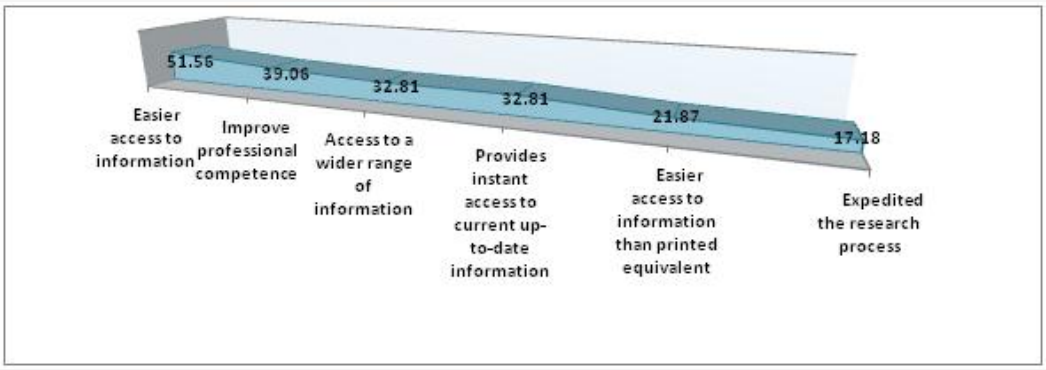
E = 21 21 21 21 21 21 = ∑E =126

= 144 16 0 0 49 81

= 6.8 0.7 0 0 2.3 3.8 = = 13.6

Tabulated value 11 < calculated value 13.6

Figure 5

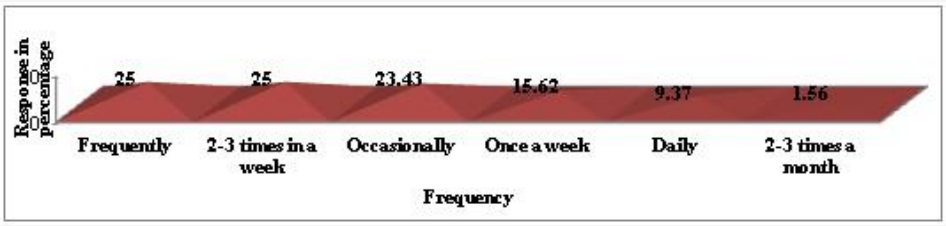


10.7 Frequency of Use of e-resources

Sl. No.	Frequency	No. of Respondents	Percentage
1	Frequently	16	25
2	2-3 times in a week	16	25
3	Occasionally	15	23.43
4	Once a week	10	15.62
5	Daily	6	9.37
6	2-3 times a month	1	1.56

One of the principal objectives of this study is to unearth the frequency at which the Life Scientists are using e-resources. The responses are grouped under six frequencies as depicted above table 10.7. Analysis of the consolidated responses reveal that, variables like, ‘frequently’ and ‘2-3 times in a week’ equally constitute 25 % each; followed by use of e-resources occasionally remains in the second rank with 23.43 %. Interestingly, only less than 10 % of the Life Scientists use e-resources daily this appears too insignificant.

Figure 6



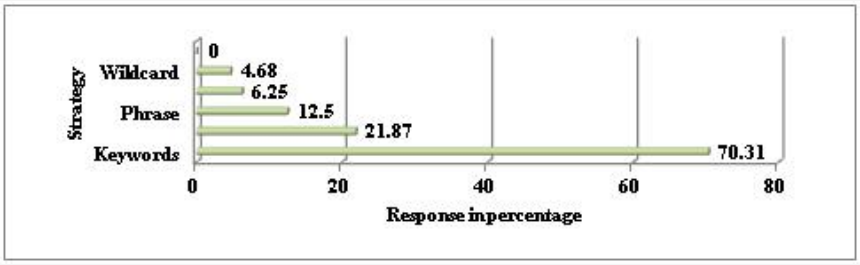
10.8 Employment of Search Strategy by the Respondents

Sl. No.	Strategy	No. of Respondents	Percentage
1	Keywords	45	70.31
2	Field Search	14	21.87
3	Phrase	8	12.5
4	Boolean Operator	4	6.25
5	Wildcard	3	4.68
6	Truncation	0	0

Note: Respondents were permitted multiple answers

The table 10.8 discloses the search strategy employed by the users during the course of their surfing for e-resources. It is seen that, the majority of the readers which constitute 70.31 percent of the total response follow the “keyword” searching method which is highly significant. Those who use field searching account for 21.87 percent, where as ‘Phrase’, ‘Boolean Operator’, ‘Wildcard’ and ‘Truncation’ are used by a few ranging between 0-13 percent of the total users. Hence it is learned that the Life Scientists keep required knowledge on the information-searching technique and skill and adhering ‘keywords’ in surfing e-resources predominant among all the search strategies.

Figure 7



10.9 Most Preferred format for Reading Full-text Articles

Sl. No.	Formats	No. of Respondents	Percentage
1	PDF	51	79.68
2	HTML	15	23.43
3	Hard copy	6	9.37

H0 = Most preferable format for reading full-text articles are co-related

H1 = Most preferable format for reading full-text articles are not co-related

O = 51 15 6 = ∑O = 72

E = 24 24 24 = ∑O = 72

(O – E = 729 81 324

(O – E = 30.3 3.3 13.5 =

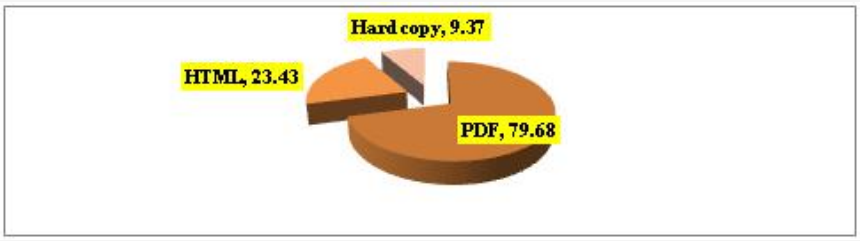
V = 3-1 = 2

Tabulated value 5.9 < calculated value 47.1

We reject H0 and accept H1 that most preferable format for reading full-text articles is not co-related (uncorrelated).

Thus, PDF format is considered as the most preferred and extensively used format among the Life Scientists for accessing e-resources compared to other two formats- 'html' and 'hard copy' which is quite significant.

Figure 8



10.10 Useful Mediums for Accessing e-resources

Sl. No.	Mediums	Useful	%	Very Useful	%	Not Useful	%	Can't say	%
1	E-mail	19	29.68	23	35.93	03	4.68	02	3.12
2	WWW	16	25	37	57.81	02	3.12	03	4.68
3	E-journals	14	21.87	37	57.81	01	1.56	01	1.56

Here the factors of variation are the mediums (E-mail, WWW, E-journals).

We set up the hypothesis:

H0: All the mediums are effective and 'useful'

H1: At least two of the mediums are 'not useful'

Level of significance:

With usual notation

N = n1 + n2 + n3 = 4 + 4 + 4 = 12

E-mail: 19 + 23 + 3 + 2 = 47 (T1); WWW: 16 + 37 + 2 + 3 = 58 (T2); E-Journal: 14 + 37 + 1 + 1 = 53(T3)

G = =158; += 2209 + 3364 + 2809 == 8382

Raw SS (RSS) = =++ = 4108

G = 158

CF= = = 2080.33

= + $_{+}$ – CF = 2080.33 = 15.17

= TSS - SST= 2027.67 – 15.17 = 2012.5

Sources of Variation	Sum of Squares	df	NSS	Variance Ratio

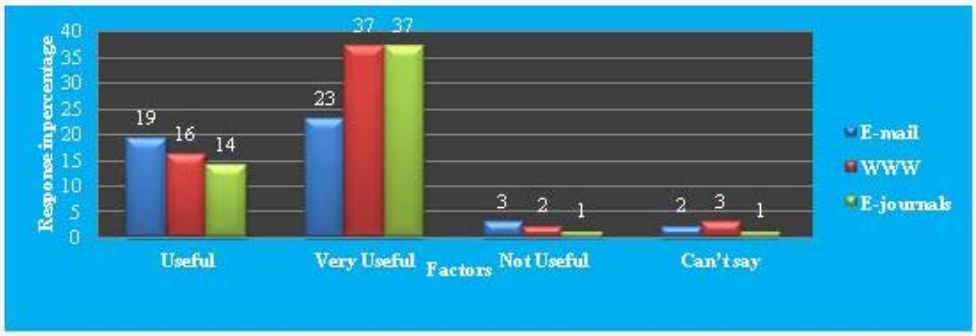
Treatment (Sources)	15.17	3-1=2		F =
Error	2012.5	11-2=9	= 223.6	
Total	2027.67	12-1=11		

The critical value of F for (2, 9) difference and ∑ = 0.05 level of significance is = 4.26

4.26 > 0.03

Table 10.10 above clearly reveals that among the three mediums such as e-mail, www and e-Journals used for accessing e-resources are considered as 'very useful' having 37 (57.81 %) each; followed by e-mail with 23 (35.93 %) respondents. The number of respondents who considered the mediums 'not useful' range between 1 - 3 which is quite insignificant.

Figure 9



10.11 Ranking of familiar Search Engines

Sl. No.	Search Engines	Rank-1	Rank-2	Rank-3	No Rank
1	Google	46	06	11	0
2	Yahoo	08	27	08	05
3	Info seek	02	0	03	10
4	Excite	0	02	03	09
5	Hotbot	0	01	04	09
6	Any other	01	01	02	03

We set up the hypothesis: H0: Variation between varieties (Search Engines) and between blocks (Rank given by respondents) does not differ significantly from the variance due to R Error.

We have taken here sum of all ranks of individual search engines as 'V' and sum of individual ranks as 'B'.

V1=63; V2=48; V3=15; V4=14; V5=14 and V6=07

B1=57; B2=42; B3=26; B4=36

Sum of V1 to V6 = G = 161

N=24

Correction factor = = = 1080

Sum square between block =

=

= =84.1

Sum square between varieties (Search engines) =

=

Total sum of squares = [] – CF = 3475 – 1080 = 2395

Error sum of square = 2395 – (84.1 + 654.75) = 1665.15

Source	Degree of freedom d.f.	Sum of square	MSS	Variance Ratio
Varieties	5	654.75	130.95	= 1.25
Block	3	84.1	28	
Error	16	1665.15	104	= 0.26

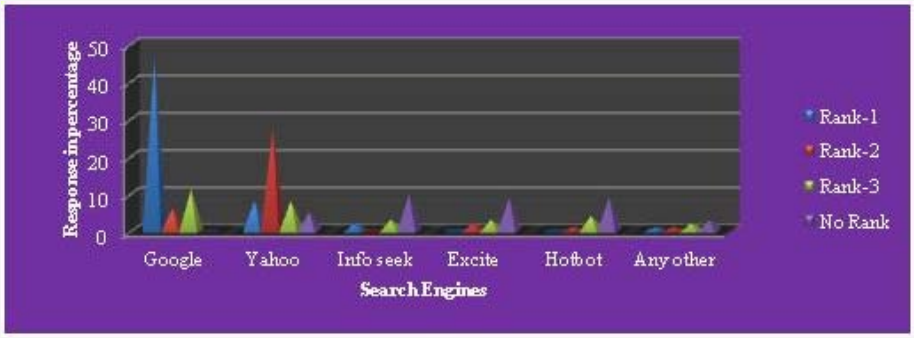
Tabulated value for (5, 16) at 5 % level = 2.85

Tabulated value for (3, 16) at 5 % level = 3.23

Tabulated value 2.85 > calculated value 1.25 and Tabulated value 3.23 > calculated value 0.26

Hence, we accept null hypothesis H0 that variation in search engines and the rank given by the respondents about search engines do not differ significantly from the variance due to random error.

Figure 10



In regard to the familiarity of the respondents with different Search Engines the study unfolds that, Google search remained at 1st rank with 46, followed by Yahoo with 08. Similarly, in rank-2, Yahoo topped with 27, followed by Google with 06. Hence, the ranking of Search Engines do not differ significantly.

10.12 Ranking of Consortium

Consortium	Rank-1	Rank-2	Rank-3	No Response	X	Y	Z	D1 = X- Y	D2= X - Z	D3= Y - Z			
a. UGC-Infonet	30	03	02	28	1	3	5	-2	-4	-2	4	16	4
b. CSIR_DST Consortium	05	09	01		2	1	6	1	-4	-5	1	16	25
c. INDEST Consortium	01	01	03		3.5	5.5	3	-2	0.5	2.5	4	0.25	6.25
d. Academic Libraries of Indiana	0	04	03		5.5	2	3	3.5	2.5	-1	12.25	6.25	1
e. NISCAIR Consortium	01	02	04		3.5	4	1	-0.5	2.5	3	0.25	6.25	9
f. NSDL Consortium	0	01	03		5.5	5.5	3	0	2.5	2.5	0	6.25	6.25
								∑d1=0	∑d2=0	∑d3=0			

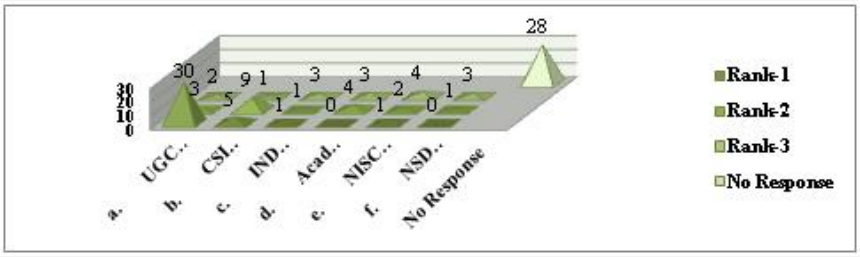
P (X, Y) = 1- = 1- = 1 - = 1 – 0.657

P (X, Y) = 1- = 1- = 1 - = 1 – 1.1542 = 0.542

P (X, Y) = 1- = 1- = 1 - = – 0.542

Since P (X, Y) is maximum, we conclude that the Rank 1 and Rank 2 approaches to common linkage with consortiums.

Figure 11



10.13 Usefulness of e-resources than conventional sources an evaluation by the respondents

Sl. No.	Factors	No. of Respondents	Percentage
1	Yes	61	95.31
2	No	03	4.68

In response to users view point on usefulness of e-resources over conventional sources, it is ascertained that about 95.31 percent respondents opt 'yes' while, the remaining 4.68 percent claimed 'no' which appears to be insignificant.

Figure 12

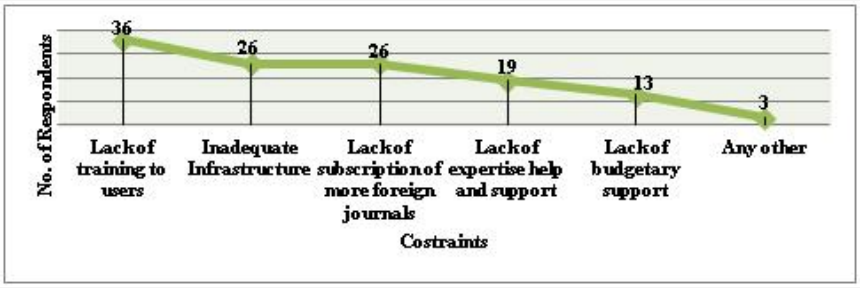
10.14 Key Constraints that Prevent Effective Use of e-resources

S. No	Constraints	No. of Respondents	Percentage
1	Lack of training to users	36	56.25
2	Inadequate Infrastructure	26	40.62
3	Lack of subscription of more foreign journals	26	40.62
4	Lack of expertise help and support	19	29.68
5	Lack of budgetary support	13	20.31
6	Any other	3	04.68

Note: Respondents were permitted multiple answers

All constraints are encountered on the way of effective use of e-resources need attention of the library administrators. The main constraint that prevent the respondents from effective use of e-resources is 'lack of training to users' with 36 respondents which constitute 56.25 % of the total response; followed by the constraints 'inadequate infrastructure' and 'lack of subscription of more foreign journals' with 26 each (40.62 %). Similarly, other constraints like, 'lack of expertise help and support', 'lack of budgetary support' and any 'other' are also often affecting the use of e-resources with 29.68 %, 20.31 % and 04.68 % respectively. Hence, it may be accepted that, there is modest need of training to the users for surfing, handling and maintaining skillfully e-resources and also adequate funds are to be allocated to allow the subscription of some additional e-resources as are significant resource for researchers and faculty members.

Figure 13



Major Findings of the Study

The present study has made several useful disclosers. The study has unearthed the fact that 92.18 % of the respondents preferred to use e-resources compared to print documents, so also 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 %). A major chunk of Life Scientists surveyed use e-journals (67.18 %) more frequently compared to other e-resources. Similarly, 51.56 % of the total respondents access e-resources in their respective department laboratory, followed by 43.75 % in the Central library. E-resources ease the access to information (51.56 %) compared to all other factors, hence influence the respondents for their use. The study further reveals that, an equal percentage of the respondents use e-resources frequently and 2-3 times in week with 25 % each. Interestingly, a majority of the Life Scientists (70.31 %) use key words as their search strategy; followed by 79.68 % of them preferred PDF format for reading full-text articles. Similarly, the majority of the respondents considered e-mail and www as 'very useful' mediums for accessing e-resources, 'Google' Search Engine remained as the most preferred and extensively used Search Engine by the Life Scientists and as such ranks-1 with 46 responses. Surprisingly, lack of appropriate training to the users to access e-resources is considered as one of the major constraints in effective use of e-resources.

Recommendations

Based upon the analysis of data and observations made on the objectives of using e-resources, their frequency and accessing points, performances and constraints, the following recommendations have been offered for effective use of e-resources.

i. The Library should continue in developing its electronic resources;

ii. There is a need for the Library to manage the journal archive carefully. An electronic archive should be provided wherever possible. When this cannot take place, the physical archive needs to be retained;

iii. The Library should increase its access to back files of e-journals;

iv. There is clear direction from this study that the library should increase the number of e-journal subscriptions;

v. Library should conduct periodical training for the Life Scientists on the use of Internet-based e-resources;

vi. Training in reference management should continue to be offered to users' community;

vii. Since an optimal number of academics and researchers access e-resources in their respective department's computer laboratory, it is, therefore, necessary for the library to expand its e-resources and services including internet lab. to attract the users;

viii. Even if more than 90% respondents viewed e-resources are more useful over conventional sources yet, the print journals are still found significant. Therefore, the library should continue to monitor its collections' print/ electronic balance and not to ignore its' paper copy provision.

Conclusion

This study has brought forth results that deserve a close and careful scrutiny. It is established that an overwhelming majority of the life scientists of the Sambalpur University actively use e-resources. By and large, they visit their department computer laboratory and the university central library quite frequently and use it on an ongoing basis. They need to use the library for research, teaching, and continuing professional development. This no doubt, appears to be a healthy sign.

A significant conclusion from this study is that across the Faculties, Students and Researchers share the same perceptions about e-resources. The study has shown that e-resources perform an increasingly important role in research. Not only are required the current e-resources, but academics also needed to be able to use significant electronic back runs as well. There is an ever increasing demand for subscriptions to more e-journal titles of international repute. More importance is attached to subscriptions to more current e-journal titles as well as provision of back runs.

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