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# INFORMATION SEEKING BEHAVIOUR OF SCIENTISTS IN THE ELECTRONIC INFORMATION AGE: A STUDY OF THE UNIVERSITIES OF PUNJAB AND CHANDIGARH

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**Abstract** *The paper explores information seeking behaviour of the scientists working in the universities, examines their information seeking patterns and methods to retrieve and effectively use information for research and teaching. A thoroughly planned structured questionnaire was designed for data collection and subsequent interpretation. Personal interviews were conducted to fill in gaps if any in the questionnaire. Collected data was analyzed with the help of SPSS. The results of the study show that majority of the scientists seek information for 'research and updating their knowledge', use internet in their 'departmental personal room' and use databases for 'research'. Taking some deductions from the findings of the study, some suggestions have been put forward to improve the e- information seeking ways of the scientists.*

**Keyword:** *Information Seeking Behaviour, Information Search Patterns, User Study, Electronic Environment*

## INTRODUCTION

Recent advances in information communication technologies and their use in the libraries have revolutionized the role of libraries in disseminating information services to their information seekers. Scientists, today, are visibly more efficient in their communication and they access current information quickly. Electronic media, in this context, has a growing role to address the changing information needs of the scientists. They are continuously discovering and using electronic media for scholarly communication. Academics, scientists and researchers have found the potential value of the media for their various information requirements.

The plethora of electronic information available in the form of e-journals, e-books, e-theses and dissertations, bulletin boards, and other such sources have opened up plenty of novel channels for communication thereby promoting a great revolution in the advancement of computer and information communication technologies. As a result, the process of information acquisition, storage, preservation, and dissemination has witnessed a new horizon causing a change of information seeking pattern of users (Zawawi & Majid, 2001).

## INFORMATION SEEKING BEHAVIOUR: CONCEPT

“Information seeking behavior is a broad term encompassing the ways individuals articulate their information needs, seek, evaluate, select, and use information (Wilson, 2000)”. According to Pettigrew (1996), “information-seeking behaviour involves personal reasons for seeking information, the kinds of information which are being sought, and the ways and sources with which needed information is being sought”.

It is an approach that identifies the basic requirements of the users. To understand the concept of information seeking behaviour, it is essential to examine the information needs of the users and to analyze the factors that motivate their information seeking.

## REVIEW OF LITERATURE

Some of the studies which are directly related to the present study conducted at national and international levels are as under:

Brown (1999) in her study reported that a majority of the scientists at the University of Oklahoma found recent

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information through citations at the end of journal article and preferred journal articles in print. 62% to 65% of the scientists preferred print journals while 23% to 31% preferred electronic version. Gleeson (2001) in her study reported that due to emergence of e-journals scientists' physical visits to the library decreased 'substantially'. Similar results were reported in Hallmark (2003)'s study. The study stated that 91% of the respondents had access to the Internet in their office or laboratory. Sharma and Pant (2004) in their study found that 45.45% of the scientists felt need for library instructions.

Patitungkho and Deshpande (2005) in their study stated that 82% of the faculty members sought information for preparing class lectures followed by keeping knowledge up to date (79%) and writing and presenting papers (54%). Kuruppu and Gruber (2006) in their study revealed that students and faculty in the sciences preferred to work from their offices or labs rather than coming to the library unless it was absolutely necessary.

Kaur (2006) in her study found that 35.83% of the respondents succeed in the range of 75-99%, 35% in the range of 50-74%, 15% in the range of 25-49% and 14.17% in the range of less than 25% for finding the required information with the help of e-resources and services. She revealed that 95.8% of the respondents faced difficulty of slow network due to bandwidth being less. Kuruppu and Gruber (2006) in their survey emphasized the need for formal library instruction for graduate students. Hemminger et al (2007) in their survey found that while some researchers clearly favour one format over the other for reading, the majority utilized both formats. Respondents preferred to retrieve articles in both (61%) followed by print hard copy only (26%) and electronic computer only (13%). Viber et al (2007) in their study suggested that formal training on the specialized online information resources should be introduced. Jamali and Nicholas (2008) in their survey found that all of the participants preferred using electronic journals and rarely used the library. Their first choice for obtaining journal articles was to get them online. Varghese (2008) in her survey found that all the respondents accessed internet resources once a day (80.9%) followed by network based services (44.1%).

Ray and Baby (2008) in their study found that textbooks and reference books were considered the most adequate sources, journals/ periodicals and e-collections as adequate but non-book materials were considered inadequate. Chowdappa, Chandrashekara and Ramasesh (2009) in their study revealed that users relied on internet for availing e-mail facility (95%) and accessing e-journals (93%).

Egberongbe (2011) in his study revealed that 65.2% of the lecturers and 65.7% of the scholars usually used e-resources followed by sometimes (26.8% and 28.65% respectively).

Kumar and Shukla (2011) in their study found that more than half of science researchers (51.25%) used on line resources to get recent information. Similarly, Tahira, Alias and Ameen (2012) in their study revealed that there was positive response for the preferred online sources in case of science and technology faculties. Kaur (2012) in her study revealed that 96.7% of the teachers gave preference to workplace for accessing e-journals. Chaurasia and Chaurasia (2012) in their study revealed that majority of the respondents agreed that too much information was retrieved (59.2%) while accessing the e-resources followed by not having sufficient familiarity with e-resources (50%).

## SIGNIFICANCE OF THE STUDY

“Understanding the information needs, information-seeking behaviour, and information use of academic science scholars is challenging. This task becomes more complicated when we consider they are likely to perform several functions simultaneously (e.g., researcher, educator, planner, administrator and supervisor), that their interests and needs change with time, and that technological advances continuously affect how they find and use information (Kuruppu & Gruber, 2006)”.

Electronic media have an impact on information seeking habits of the scientists. They are the first to accept and adapt the changes brought by technological developments in their information activities. New technology has made information easily available to them in different formats. Electronic library, now-a-days, is considered a gift to the researchers and scientists as it provides an easy and quick access to more and better information. Therefore, this study has been taken to know information needs, information seeking behaviour of scientists of the universities in electronic environment.

## OBJECTIVES OF THE STUDY

The main objectives of the present study are:

- To determine the purpose of information seeking of the scientists.
- To determine different types of sources and methods of information seeking adopted by the scientists
- To determine electronic information seeking patterns of the scientists.
- To examine the impact of e-resources and services on information gathering habits of the scientists and their visits to the library.
- To ascertain the problems faced by the scientists while accessing and using e-resources.
- To suggest measures to improve e-resources and e-services.

## RESEARCH METHODOLOGY

In the present study, following research tools have been employed to collect data.

- (i) Questionnaire: A questionnaire was designed for the science faculty members and research scholars to assess their information seeking behaviour and their level of satisfaction with library e-collection, e-resources and services.
- (ii) Interview: Informal interviews were conducted with the respondents whenever there was need to do so to fill in the gaps if any.
- (iii) Sample of the study: In all, data was collected from 793 respondents as shown in table 1

**Table 1. Sample of the study**

University	Teachers	Research scholars	Total respondents
GNDU	60	100	160
PU	60	100	160
PUP	60	100	160
PAU	100	131	231
GADVASU	60	22	82
Total	340	453	793

- (iv) Collection of data: For collection of data for the study all the universities were visited several times and questionnaires were distributed personally to the faculty members and research scholars.

## ANALYSIS AND INTERPRETATION OF DATA

### Purpose of information seeking

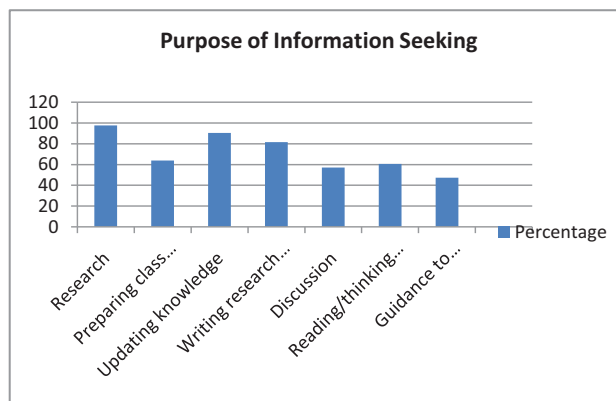
**Table 2. Purpose of information seeking**

Purpose	Frequency	%
Research	774	97.6
Preparing class lectures/ notes	506	63.8
Updating knowledge	716	90.3
Writing research paper and its presentation	646	81.5
Discussion	453	57.1
Reading/thinking (creativity)	480	60.5
Guidance to researchers	375	47.3

Table 2 & figure 1 exhibit that the main purpose for searching information is 'research' (97.6%) followed by 'updating knowledge' (90.2%), 'writing' the research paper and its presentation' (81.4%) and preparing class lectures/

**Table 3. Methods of seeking information**

Methods	Most preferred	Somewhat preferred	Least preferred
Follow up the references	708 (89.3%)	56 (7.1%)	29 (3.7%)
Subject specific bibliographic services	533 (67.2%)	175 (22.1%)	85 (10.7%)
Seek in library (goal oriented)	518 (65.3%)	164 (20.7%)	111 (14%)
E-mail alert service	458 (59.6%)	195 (24.6%)	140 (17.7%)
Book reviews	473 (60.4%)	198 (25%)	122 (15.4%)
Follow hyperlinks	479 (79.3%)	195 (24.6%)	119 (15%)
General search engine	629 (79.3%)	91 (24.6%)	73 (9.2%)
Hints from others	355 (44.8%)	240 (30.3%)	198 (25%)



**Figure 1. Purpose of information seeking**

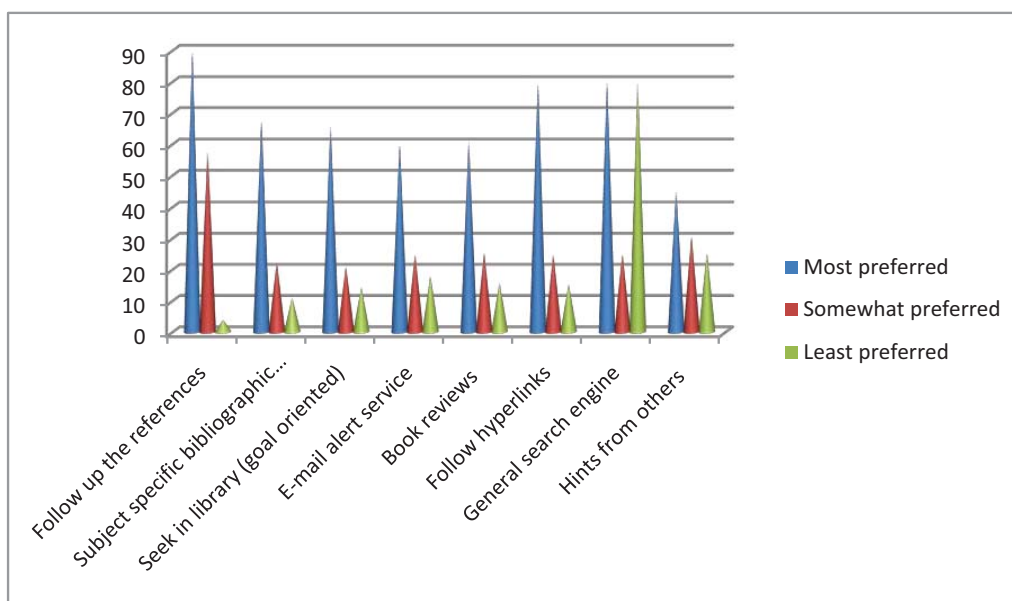


Figure 2. Methods of seeking information

notes (63.8%), reading/thinking (60.5%) and guidance to the researchers (47.2%). Patitungkho and Deshpande (2005) in their study stated that 82% of the faculty members sought information for preparing class lectures followed by keeping knowledge up to date (79%) and writing and presenting papers (54%).

**Methods of seeking information**

Table 3 and figure 2 depict that the scientists heavily favour to follow up the references (89.3%) for seeking information followed by the general search engines and hyperlinks (79.3%), subject specific bibliographic services (67.2%) and

seek in the library (65.3%). Kumar and Shukla (2011) in their study also found that more than half of science researchers (51.25%) used on line resources to get recent information.

**PREFERRED METHODS TO KEEP UP TO DATE**

Table 4 and figure 3 give methods preferred by the scientists to keep their knowledge up-to-date in their respective fields. The most preferred method is ‘reading e-journals’ (87.1%) followed by browsing ‘websites’ (81.5%) and ‘reading e-reviews’ (64.9%). The least preferred method is ‘discussion with professionals’ (56.6%).

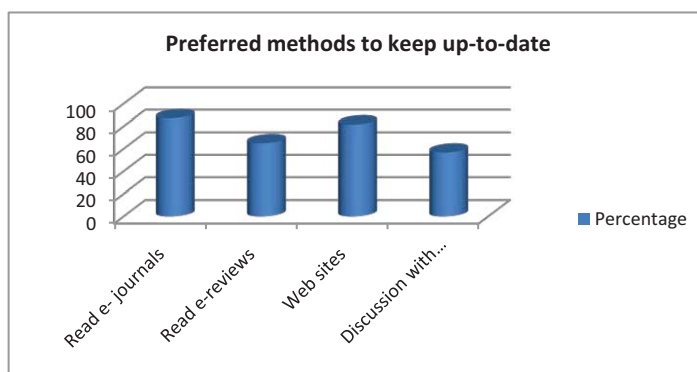


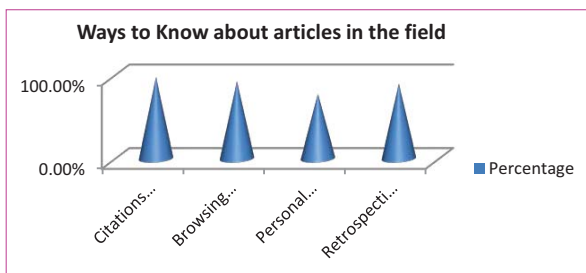
Figure 3. Preferred methods to keep up-to-date

**Table 4. Preferred methods to keep up-to-date**

Method	Frequency	%
Read e- journals	691	87.1
Read e-reviews	515	64.9
Web sites	647	81.5
Discussion with professionals	449	56.6

**Table 5. Ways to know about articles in the field**

Ways to know about articles in the field	Frequency	%
Citations given at the end of articles	771	97.2%
Browsing through old volumes	730	92.1%
Personal conversation	613	77.3%
Retrospective search of indexes/ abstracting tools	708	89.3%



**Figure 4. Ways to know about articles in the field**

### WAYS TO KNOW ABOUT ARTICLES IN THE FIELD

Table 5 and figure 4 reveal that majority of the scientists prefer ‘citations given at the end of articles’ (97.2%) to search an article followed by ‘browsing through old volumes’ (92%) and ‘personal conversation’ (77.3%). Brown (1999) in her study stated that scientists found recent information through citations given at the end of journal articles.

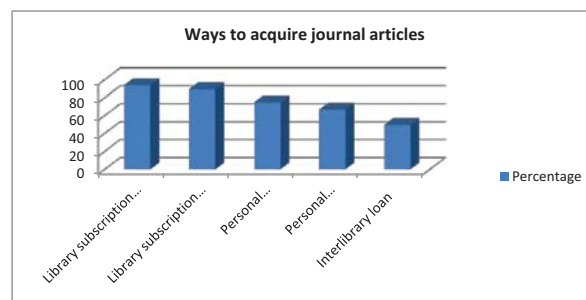
### WAYS TO ACQUIRE JOURNAL ARTICLES

Table 6 and figure 5 show that the respondents mostly prefer to acquire articles through ‘library subscription to online journals’ (93.9%) and ‘library subscription to print journals’ (89.5%) followed by ‘request to authors’ (77.6%), personal subscription to online, print journals (75% and 66.8% respectively) and interlibrary loan (49.6%). Jamali and

Nicholas (2008) in their survey found that all the respondents reported their preferences on the use of electronic journals however they mentioned that they rarely visited the library. Moreover they opined that, their first and foremost choice for obtaining journal articles was to acquire such resources through online mode. Similarly, Tahira, Alias and Ameen (2012) in their study revealed that there was positive response for the preferred online sources in case of science and technology faculties.

**Table 6. Ways to Acquire Journal Articles**

Acquire journal articles	Frequency	%
Library subscription to online journals	745	93.9
Library subscription to print journals	710	89.5
Personal subscription to online journals	595	75.0
Personal subscription to print journals	530	66.8
Interlibrary loan	394	49.6
Request to author	616	77.6
Others	12	1.5



**Figure 5. Ways to acquire journal articles**

### PREFERRED FORMAT TO SEARCH AND READ ARTICLES

**Table 7. Format to Search and Read articles**

Search and Read articles	Print format	Electronic format	Both
Prefer to search articles	77 (9.7%)	258 (32.5%)	458 (57.8%)
Prefer to read retrieved journal articles	240 (30.3%)	104 (13.1%)	449 (56.6%)

Table 7 depicts the preferred format to search and read articles by the scientists. 57.8% of the scientists prefer to search articles in ‘both print and electronic formats’ of journals followed by ‘electronic format’ (32.5%). For reading articles, most of the scientists (56.6%) prefer ‘both

‘print and electronic formats followed by ‘print format’ (30.3%). Brown (1999) in her study revealed that journals in print forms are preferred by majority of the scientists at the University of Oklahoma. 62% to 65% of the scientists preferred print journals while 23% to 31% preferred electronic version. Hemminger et al (2007) in their survey found that while some researchers clearly favoured one format over the other for reading, the majority utilized both formats. Respondents preferred to retrieve articles in both (61%) followed by print hard copy only (26%) and electronic computer only.

### PREFERRED PLACE TO USE INTERNET

Table 8. Place to use Internet

Place to use Internet	Frequency	%
University library	275	34.6
Department personal room	507	63.9
Home	447	56.3
Internet café	62	7.8
Department library	162	20.4
Department laboratory	207	26.1
Any other (Pl. specify)	5	0.6

Table 8 and figure 6 reveal that majority of the scientists (63.9%) use the internet in their departmental personal room followed by home (56.3%). Similar results were reported in a study by Hallmark (2003). The study stated that absolute majority of the respondents preferred to access Internet conveniently at their office or their respective internet laboratories. Kaur (2012) in her study also revealed that 96.7% of the teachers gave preference to workplace for accessing e-journals.

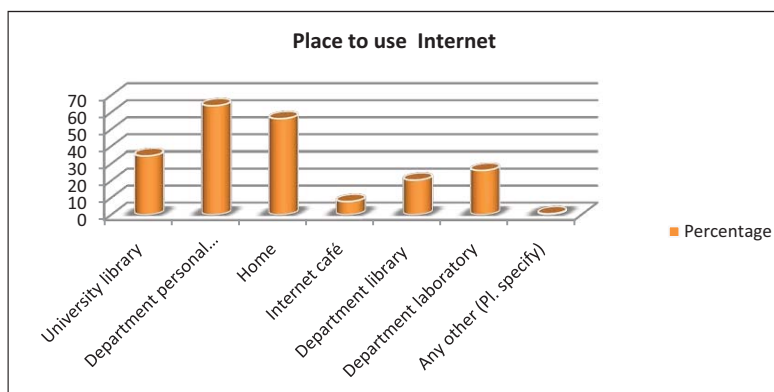


Figure 6. Place to use Internet

### IMPACT ON INFORMATION GATHERING HABITS AND ON THE VISITS TO THE LIBRARY

Table 9 and figure 7 exhibit that the use of e-resources and services affected information gathering habits of the scientists ‘moderately’ (52%) and their visits to the library ‘substantially’ (50.3%). Gleeson (2001) in her study indicated that due to emergence of e-journals scientists’ physical visits to the library decreased ‘substantially’. Kuruppu and Gruber (2006) in their study revealed that students and faculty in the sciences preferred to work from their departmental offices or their respective internet laboratories instead of coming to the library unless the situation demanded.

Table 9. Impact on Information Gathering Habits and Visits

Impact	Affected information gathering habits	Affected visits to the library
Substantially	334(42.1%)	399 (50.3%)
Moderately	412 (52.0%)	293 (36.9%)
Not at all	47 (5.9%)	101 (12.7%)

### IMPACT OF E-RESOURCES AND E-SERVICES ON THE USE OF INFORMATION FOR RESEARCH

Table 10 and figure 8 show that 92.8% of the scientists agreed that e-resources and e-services have made use of information easy for their research and teaching activities. Chowdappa, Chandrashekara and Ramasesh (2009) in their study revealed that users relied on internet for availing e-mail facility (95%) and accessing e-journals (93%). Egberongbe (2011) in his study found that majority of the lecturers and

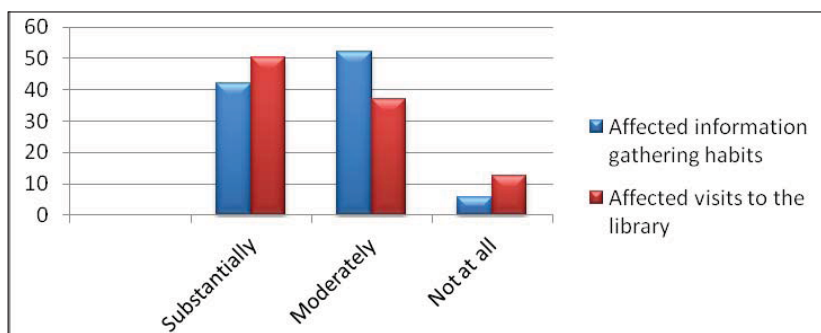


Figure 7. Impact on information gathering habits and visits

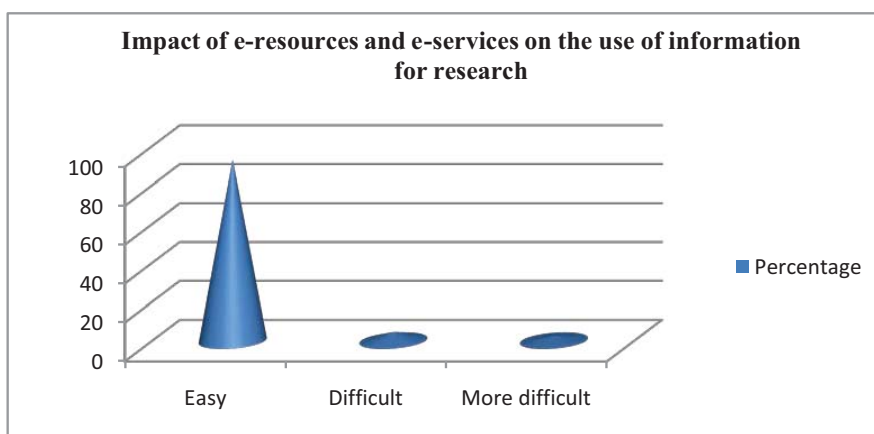


Figure 8. Impact of e-resources and e-services on the use of information for research

research scholars preferred to use e-journals followed by e-mail and www.

Table 10. Impact of E-Resources and E-Services on the use of Information for Research

Use of information for research has become	No. of responses	%
Easy	736	92.8
Difficult	35	4.4
More difficult	22	2.8

## FORMAL TRAINING FOR THE EFFECTIVE USE OF TECHNOLOGY

Table 11. Formal Training for the Effective use of Technology

Formal training	Frequency	%
Very useful	390	49.2

Useful	294	37.1
Somewhat useful	51	6.4
Not useful	58	7.3
Total	793	100.0

Table 11 and figure 9 reveal that majority of the scientists (49.2%) admitted that formal training is very useful for effective use of technology. Formal training would help them to use electronic resources efficiently. Sharma and Pant (2004) in their study found that 45.45% of the scientists felt need for library instructions. Kuruppu and Gruber (2006) in their survey recommended that graduate students should get regular library and information literacy library instruction for the effective use of library and information resources. Viber et al (2007) in their study suggested that there must be introduction of formal training on the specialized online information resources.

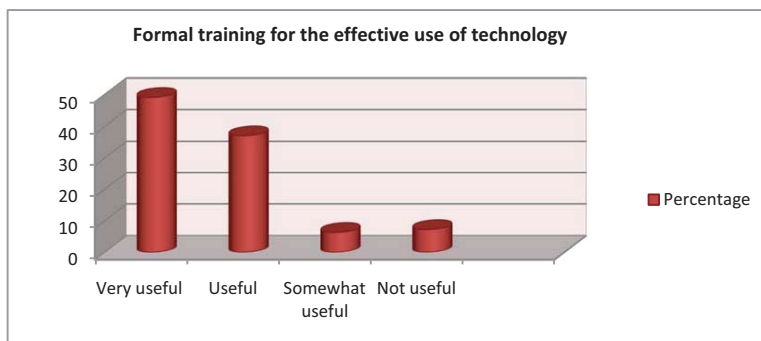


Figure 9. Formal training for the effective use of technology

### PROBLEMS FACED WHILE USING E-RESOURCES FOR GATHERING E- INFORMATION

Table 12. Problems faced while using e-resources

Problems	Frequency	%
Lack of knowledge what is available	567	71.5
Too much information is retrieved	674	84.9
Lack of IT knowledge to utilize the services effectively	548	69.1
Time consuming	633	79.8
Limited access to computers	506	63.8
Using e-resources often distracts from doing work	509	509
Library staff is non-cooperative	386	48.6
Slow network	649	81.8
Potential inhibition to use the new techniques	404	50.9

Table 12 and figure 10 reveal that the major problem faced by scientists is that ‘too much information is retrieved’ (84.9%) while using e-resources. Other difficulties faced

are ‘slow network’ (81.8%), ‘time consuming’ (79.8%) and ‘lack of knowledge about what is available’ (71.5%). Kaur (2006) in her study revealed that 95.8% of the respondents faced difficulty of slow network due to bandwidth being less. Chaurasia and Chaurasia (2012) in their study revealed that majority of the respondents agreed that too much information was retrieved (59.2%) while accessing the e-resources followed by not having sufficient familiarity with e-resources (50%).

### SUCCESS RATE OF FINDING CURRENT INFORMATION

Table 13 and figure 11 depict the success rate of finding current information using e-resources and services. Majority of the scientists (58%) succeed in the range of 75-99% for finding required information with the help of e-resources and services. Kaur (2006) in her study found that 35.83% of the respondents succeed in the range of 75-99%, 35% in the range of 50-74%, 15% in the range of 25-49% and 14.17% in the range of less than 25%.

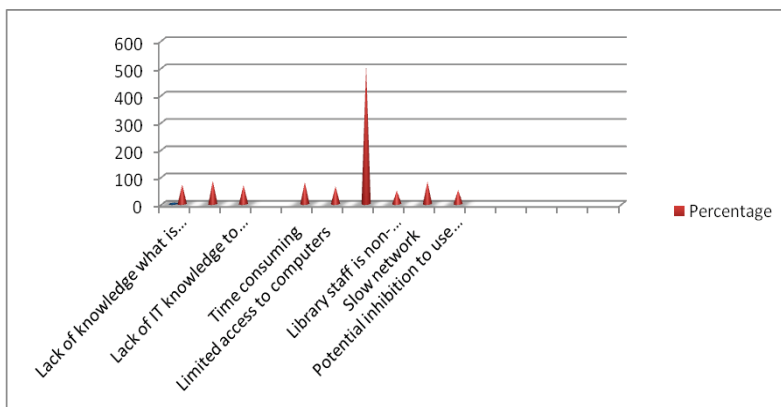


Figure 10. Problems faced while using e-resources

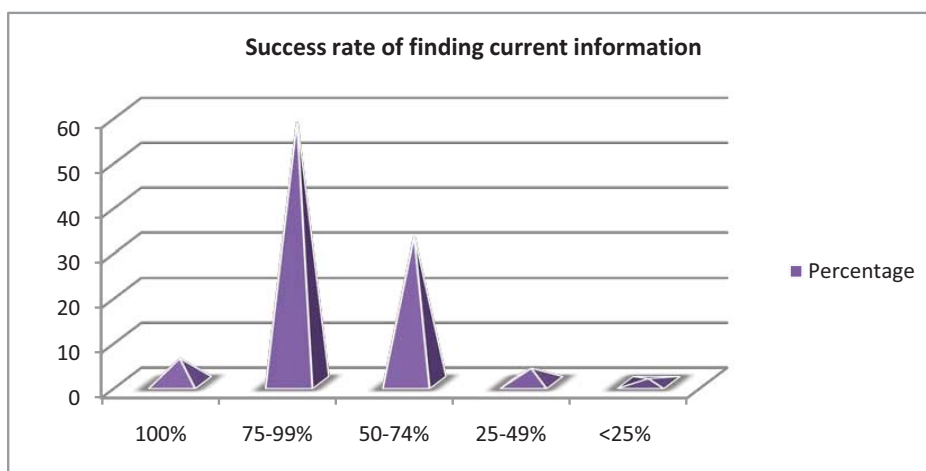


Figure 11. Success rate of finding current information

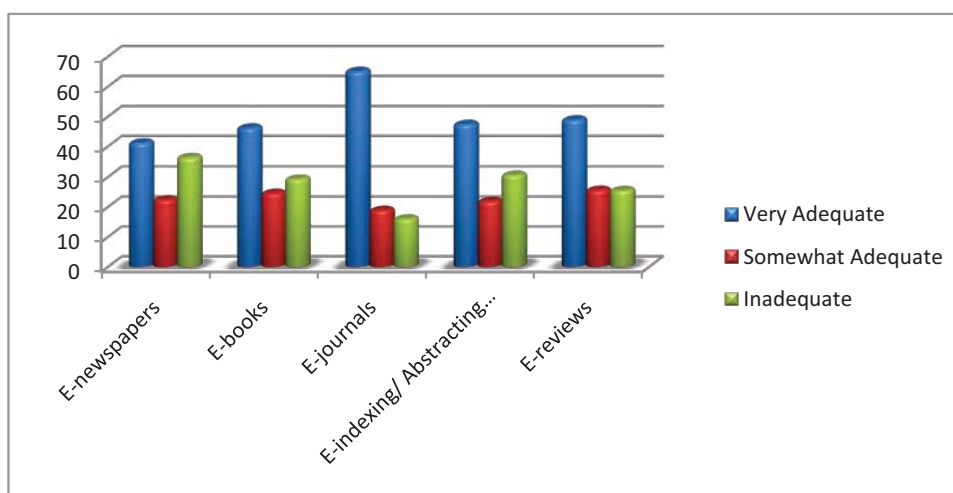


Figure 12. Adequacy of library e-collection

Table 13. Success rate of finding current information

Success rate	Frequency	%
100%	43	5.4
75-99%	460	58.0
50-74%	258	32.5
25-49%	25	3.2
<25%	7	0.9

Table 14. Adequacy of library e-collection

Library e-collection	Very Adequate	Somewhat Adequate	Inadequate
E-newspapers	327 (41.2%)	178 (22.4%)	288 (36.3%)
E-books	366 (46.2%)	195 (24.6%)	232 (29.3%)
E-journals	516 (65.1%)	150 (18.9%)	127 (16.0%)
E-indexing/ Abstracting services	376 (47.4%)	174 (21.9%)	243 (30.6%)
E-reviews	388 (48.9%)	203 (25.6%)	202 (25.5%)
E-reference materials	376 (47.4%)	187 (23.6%)	230 (29.0%)
E-theses	305 (38.5%)	193 (24.3%)	295 (37.2%)

## ADEQUACY OF LIBRARY E-COLLECTION

Table 14 and figure 12 show the adequacy of electronic collection in the library. Majority of the respondents (65.1%) in all the universities consider e-journals as 'very adequate' followed by library 'e-reviews' (48.9%). Ray and Baby (2008) in their study found that textbooks and reference books were considered the most adequate sources, journals/periodicals and e-collections as adequate but non-book materials were considered inadequate.

## CONCLUSIONS

A majority of the scientists seek information for 'research', 'updating knowledge', 'writing the research paper and its presentation', 'preparing class lectures/notes', 'reading/thinking' and 'guidance to the researchers'. Most of the scientists prefer 'follow up the references' for seeking information followed by 'general search engines', 'subject specific bibliographies', and 'seek in the library'. A majority of the scientists prefer 'to keep their knowledge up to date by reading e-journals' followed by 'browsing websites' and 'reading e-reviews'.

A majority of the scientists find information about the articles mostly through 'citations given at the end of articles' and by 'browsing through old volumes'. Scientists mostly prefer to acquire articles through library subscription to 'online journals' and 'print journals'. Majority of the scientists prefer to search articles in 'both print and electronic formats' followed by 'electronic format'. For reading articles, most of the scientists prefer 'both print and electronic formats' followed by 'print format'. Most of the scientists admit that e-resources and e-services have affected their visits to the library 'substantially'.

Majority of the scientists confirm that due to e-resources and services, the use of information has become 'easy' for academic activities. A majority of the scientists consider the need of training either 'very useful or useful' for the effective use of information technology. The greatest problem faced by the scientists while using e-resources is that 'too much information is retrieved'. A majority of the scientists succeed in the range of 75-99% for finding current information with e-resources and services. Majority of the respondents consider 'e-journals' of the library very adequate.

## SUGGESTIONS

- Proper training should be given to the existing library staff in the use of modern gadgets of information technology, so that they are able to help the scientists in making efficient use of these.
- E-collections/infrastructure of the libraries should be upgraded regularly to meet e-information needs of the scientists.
- Libraries should develop OPAC/Web-OPAC by adding new entries quickly and regularly providing hyperlinks through Web-OPAC to other libraries for accessing e-resources.
- The libraries should increase bandwidth to solve the problem of slow access speed and to ensure faster access to save the time of the scientists.
- Regular training programmes should be organized for the scientists to make them fully aware of e-resources and e-services.
- E-resources and services of the library should be popularized by using a variety of communication methods such as printed pamphlets, email, phone, personal communications etc.
- Active interaction should be maintained with the academic faculty in order to understand their information needs as well as their awareness of and perception about the library e-resources and services.
- The libraries should earmark more budget for e-resources collection and development as per demand of e-environment.
- Online guidance should be provided to the scientists as how to access e-journals and online databases.
- There should be separate well equipped instruction room in the library to deal with the queries of the scientists.

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