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Awareness and Use of DRDO e-Journal Consortium by the Scientists of Bengaluru based DRDO Labs in India

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Abstract

To examine and evaluate the use of e-journals covered under DRDO e-journals consortia by the Bengaluru based DRDO lab scientists. This study is beneficial for the administering/implementing body (DESIDOC) of the DRDO e-journal consortium, improving access to e-journal service based on the results and suggestions. Analyses revealed that the majority of the users are well aware of e-journals and consortia and consult them for research and development, finding relevant information for the projects, and update their subject knowledge. The study findings reveal that the lack of free Wi-Fi connectivity slows downloading were reported the barriers linked to access of e-journals, whereas other deficits like limited access to PCs and lack of training/guidance are also significant impediments for accessing e-journals. This paper will help strengthen the utilization of e-journal services and effectuate the demands and needs of researchers all over DRDO labs in India.

Keywords: E-Journals, DRDO E-Journal Consortium, Use, User survey, DRDO, Bengaluru, India.

1.   INTRODUCTION

Electronic resources (e-resources) are essential to the research library for research requirements for library users. One such e-resource in research and development activity is electronic journals (e-journals), which play a significant role in developing any new product and provide in-depth knowledge on a subject to the scientists. "Access to resources is now considered more important than building onsite collections, especially if electronic access is perpetual"[1]. The DRDO libraries are engaged in incorporating electronic information resources and services to cater to the S&T personnel demands. Due to the vast advantages of e-journals, the e-journal consortium was established by many organisations and institutions for resource sharing among peers. One such consortium available in India is the DRDO e-journals consortium, and this paper discusses the use and awareness of this consortium among the research community working in Bengaluru based Defence Research and Development Organisation (DRDO) labs.

1.1   DRDO and e-Journals Consortium

Defence Research and Development Organisation (DRDO) is a premier R&D Organisation of the country working in various fields of military S&T. "DRDO was established in the year 1958 with a few technical inspection units"[2]. At present, it has 52 laboratories spread all over the country and has about 7500 scientists. DRDO has established several Centres of Excellence in premier academic institutions of the country for research in the niche and cutting futuristic edge technologies.

DRDO e-Journals Consortium has been implemented by Defence Scientific Information & Documentation Centre (DESIDOC) during the year 2009 to fulfill the ever-increasing user demands, the proliferation of literature, and availability of e-resources. "DRDO e-journal consortium facilitates sharing of resources and improving access to information. The resources are shared among DRDO libraries that have common missions, goals, and usage and act on those commonalities. The users of DRDO laboratories get benefitted by accessing more than 1000 scholarly e-journals from famous publishers. All the e-resources under the consortium are accessible through the consortia website"[3], which is available to all DRDO labs through IP (Internet Protocol) based access. Remote access facility has been extended to users to access e-journals subscribed for their libraries beyond the boundaries of IP based restrictions.

2. REVIEW OF RELATED LITERATURE

Some of the notable studies reported in different disciplines worldwide have been reviewed on the subject are: A recent study by Malabanan & Bayeng[4] analyzes the "level utilization and satisfaction of users to EBSCOhost. The analysis presented in this research can provide insight into the usability of developing countries. The study revealed that the respondents have the same level of satisfaction and utilization of EBSCOhost regardless of their user type, age, gender, and educational attainment. Furthermore, there is a significant relationship between the respondents' level of satisfaction and level of utilization of EBSCOhost."

Saxena[5] underlines that "there are five factors (institutional; task complexity; relevance and application; information quality; and technical) that are responsible for impacting the usage of academic journal articles by PhD students in their scholarly work. Such factors are linked with resource constraints faced by universities, lack of motivation on the part of teachers and students, non-availability of an electronic library." Ye, Yang & Lin[6] "share some experiences and practical activities related to the use and management of user data in the Digital Resource Acquisition Alliance of Chinese Academic Libraries (DRAA) as a reference for library consortia engaged in providing usage statistics services of e-resources to member libraries. This paper has pertinence and broader implications for library consortia engaged in providing e-resources usage statistics services to member libraries."

Another interesting study by Senthil & Madhusudhan[7] tries to "evaluate the implementation of DRDO e-journals, coverage of publishers and titles, subject-wise distribution of titles among DRDO laboratories, need of e-journal consortium among the labs, and expenditure details along with yearly growth. The study also highlights the usage of e-journals publisher-wise in the consortium and would be helpful in the efficient collection development policy of e-journals. The authors highlighted that the usage of e-journals is not up to the mark as expected, and only a few labs have been using e-journals to the optimum level." Arshad & Ameen[8] demonstrated that "academics made more frequent use of e-journals, online reference sources, and discussion with colleagues for scholarly activities. E-journals were used predominantly for research-related activities rather than for teaching and instruction." Frandsen et al.[9] explored "that training sessions multiply the usage of library e-resources undoubtedly; yet, the outcome seems to be short-lived and limited as

training sessions alone may not boost the comprehensive everlasting usage." Kaur & Walia[10] examined the "modern practices related to e-resource collection development in management libraries of India. They established that management libraries are passionately committed to building e-resource collection." Qasim and Khan[11] concluded that "there is an immediate requirement for training in using e-resources and retrieving pinpointed information from the databases."

Nisha & Ali[12] examined "the use of e-journals by the users of IIT Delhi and Delhi University. However, this study also revealed several inherent problems with the use of e-journals, e.g., slow downloading as revealed by maximum IIT Delhi and Delhi University users. Other mechanical deficits, like non-availability of a particular issue, lack of training, and limited access to terminals, are also present while using e-journals." Madhusudhan[13] determines the "use of e-resources, users' skills in handling e-resources, and the purpose of their use. Further, the paper aims to highlight the problems faced by research scholars in accessing e-resources, their opinions on the feature of e-resources, and their views on the usefulness of e-resources compared to that of conventional sources. The paper concludes that electronic resources have become an integral part of the information needs of research scholars at Kurukshetra University. Further, it finds that e-resources can be good substitutes for conventional resources, if the access is fast, and more computer terminals are installed to provide fast access to e-resources."

Rekha and Madhusudhan[1] highlight the "problems in accessing e-journals, degree of utilization, and influence of e-journals on research work. The study shows that there is a need for user orientation for efficient searching of e-journals. The most common problem faced by the respondents is that there is difficulty in accessing full text, and many of the respondents are not satisfied with the Internet facilities available at Goa University. They provide some constructive suggestions for improving the accessing of e-journals." Madhusudhan[14] focuses "on the use of UGC-Infonet e-journals by research scholars and students. The study shows that e-journals perform an increasingly important role in research, not only current e-journals are required, but research scholars and students need to be provided the use of significant electronic back runs as well. There is an ever-increasing demand for subscriptions of more e-journal titles, and the need for training is around managing references."

3 STATEMENT OF THE PROBLEM

"Electronic journals present an innovation in the way scientific information is communicated to the research community. They are the most important vehicle in the overall dissemination and are the first place where findings are presented as a permanent record to researchers"[15]. It has revolutionized the idea of research, making information more accessible. The scientific community widely uses the e-journals consortium established by DRDO for enhancing research activities. The e-journals assist in developing cutting-edge technologies and help in understanding the research problem and resolving it efficiently.

"Scientific journals play an important role in the dissemination of scientific and technical (S&T) knowledge as they are the primary channels of scholarly communication. Journals also enhance the S& T capacity or research scientists and are widely used by them to carry out day-to-day quality research" [15] but, there is still a

lack of consistent and relevant information related to the use of e-journals and search strategies exploited by the scientific community in DRDO laboratories in India. The present study brings an exhaustive analysis of the topic. It will suggest an idea for the study of the use of e-journals at various DRDO Labs in Bengaluru, India.

4   OBJECTIVES OF THE STUDY AND METHODOLOGY

The objectives and purpose of the study have been given as follows:
- to identify the perception of Scientists working in Bengaluru based DRDO labs,
- to know the purpose of using e-journals;
- to ascertain search techniques and file formats popular among scientists;
- to understand the problems and barriers that discourage/demotivates them from using e-journals; and
- to recommend valuable measures for the efficient utilisation of e-journals.

A *random sampling technique* was used for this study. A total sample of 150 scientists was selected from the total strength of 1360 scientists (11percent) from nine DRDO labs in Bengaluru, India (Table 1), according to Neuman's rule of thumb approach because "sample was moderate population (10,000), a smaller sampling ratio (about 10percent) is recommended for equal accuracy"[16]. A *survey* was conducted with the help of a *structured questionnaire*. The investigator visited in person, had interactions with the respondents, circulated structured questionnaires to 150 scientists, and collected 139 duly filled-in questionnaires from October to December 2019, eliciting a response rate of 90.67 percent. Due to deficiencies in the answers, correctly filled 136 questionnaires were taken as samples for the final study. All the 136 filled-in questionnaires were included in the analysis and interpretation of data. The response to 22 questions was analyzed in the form of tables and figures using descriptive statistical methods.

5   DATA ANALYSIS AND INTERPRETATION

5.1 Demographic characteristics

Data collected from the nine studied DRDO Labs in Bengaluru, India, called ADE, CABS, CAIR, CEMILAC, DARE, DEBEL, LRDE, GTRE, and MTRDC (Table 1).

Table 1: Participating in DRDO Labs in Bengaluru

Sl. No.	DRDO Labs in Bengaluru	Abbreviation
01	Aeronautical Development Establishment	ADE
02	Centre for Air-Borne Systems	CABS
03	Centre for Artificial Intelligence & Robotics	CAIR
04	Centre for Military Airworthiness & Certification	SIMILAC
05	Defence Avionics Research Establishment	DARE
06	Defence Bio-Engineering & Electro Medical Laboratory	DEBEL
07	Electronics & Radar Development Establishment	LORDE
08	Microwave Tube Research & Development Center	MDC
09	Gas Turbine Research Establishment	GTR

5.2 *Awareness, use and receipt of e-Journals alerts*

Awareness of e-resources is a prerequisite by every scientist for an effective and intellectual way of using them. The respondents asked a question regarding awareness of e-resources, consortium, and use of e-journals (Table 2).

**Table 2- Awareness of e-Journals**

Lab	Total	Male	Female	Aware of e-journals	Aware of Consortium	Use of e-journals for research	Receipt of alerts
ADE	30	22	08	30	29	26	03
CABS	18	12	06	18	17	15	03
CAIR	18	13	05	17	17	17	09
SIMILAC	05	04	01	05	01	01	01
DARE	07	05	02	07	07	07	05
DEBEL	09	05	04	09	08	08	04
GTR	17	13	04	17	16	16	08
LORDE	25	17	08	23	22	22	02
MDC	07	04	03	07	07	07	02
	136	**95**	**41**	**133**	**124**	**119**	**37**

As indicated in Table 2, out of 136 users who responded, 95 were male and 41 females, which mean a 70:30 percent ratio of gender distribution. Table 2 reveals that the majority of the respondents (97.79 percent) were aware of e-journals. However, a significant chunk of 124 respondents (91.17 percent) were aware of the DRDO e-journals consortium. The data shows that the respondents from the DARE and MTRDC labs are 100 percent aware of the DRDO e-journals consortium followed by CABS, GTRE, CAIR, and DEBEL, where only one respondent was unaware of the DRDO e-journals consortium. In CEMILAC, all five respondents were aware of e-journals, but only one user was aware of consortium and makes it with 20 percent.

Two more supplement questions were posed to the respondents; the first one is regarding e-journals for their research work. Out of 136, 119 respondents (87.5 percent) claimed that they use e-journals solely for research purposes. Another question is to find out the status of e-mail/ SMS alerts receiving from their libraries. Out of 136, only 37 respondents (27 percent) revealed that they receive the alerts.

5.3 *Frequency of use of e-Journals*

The appraisal of the frequency of use of e-journals is the most essential and fundamental factor for any research by the researchers, which is direct, linked research output. An attempt is made to find how frequently respondents access e-journals shown in Figure 1.
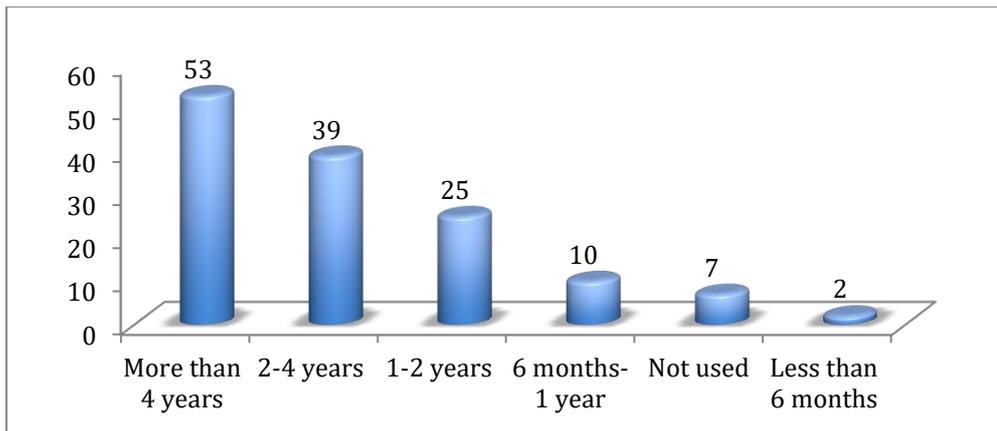
Figure 1 - Frequency of use of e-Journals

Figure 1 reveals that out of 129 respondents who are using e-journals, 39 percent of respondents mentioned that they have been using e-journals for more than 4 years, whereas 28.7 percent have been using it for 2-4 years. 18 percent of the respondents believed that they have been using e-journals for 1-2 years, whereas 7 percent has started accessing them within a year, i.e., 6 months-1 year. Very few of them, i.e., 1.47 percent, opined that they have started using it recently, i.e., less than 6 months. Only a small percentage of respondents, i.e., 5 percent, mentioned that they never used e-journals. It can be discerned that a fair percentage of users are utilising e-journals for more than 4 years that reflects the popularity of e-journals among the scientific community.

5.4   Purpose of using e-Journals

E-journals are used for a variety of reasons[12]. Scientists study e-journals for many purposes, so to find out the purpose of using e-journals, a multiple-choice question with seven reasons is provided to respondents to find out the various purposes of using e-journals (Figure 2).
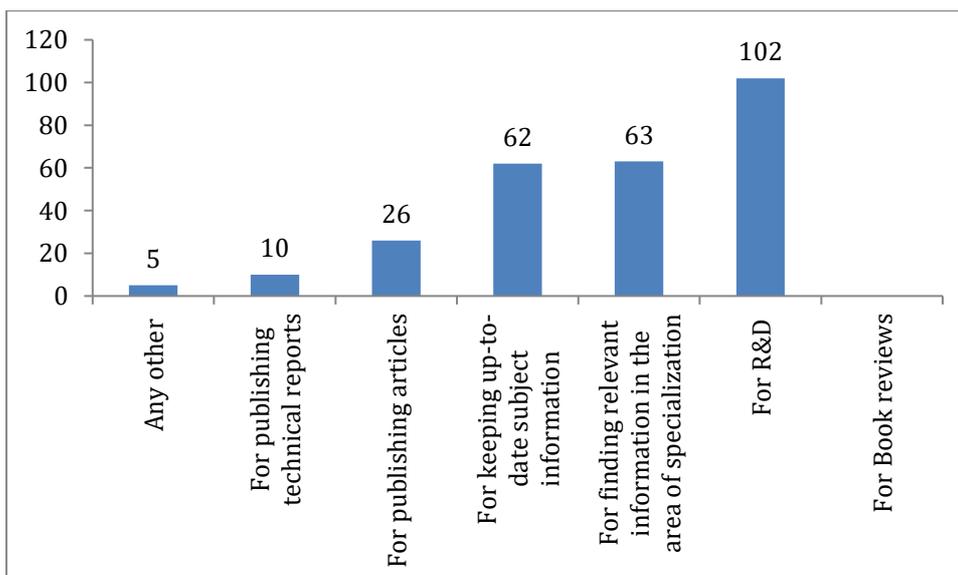

Fig 2: Purpose of using e-journals

Note: Multiple answers are permitted.

So, it can be enumerated from Figure 2 that research and development occupy the first place with 85 percent of users, followed by finding relevant information in the area of specialisation with 52 percent. The data also reveals that almost the same 52 percent of users are using e-journals for keeping up-to-date with the subject information. Around 36 (30 percent) respondents preferred to use e-journals for publishing articles. It has been concluded that the DRDO scientists are widely using e-journals for research & development activities compared to publishing papers.

5.5 *Component /Part of e-journal accessed*

Scientists prefer to access a few components or parts of e-journals that fulfill their information needs. Each component may have its value depends on the expectation of the users. The comprehensive data for accessing various aspects of e-journals are displayed in Figure 3.
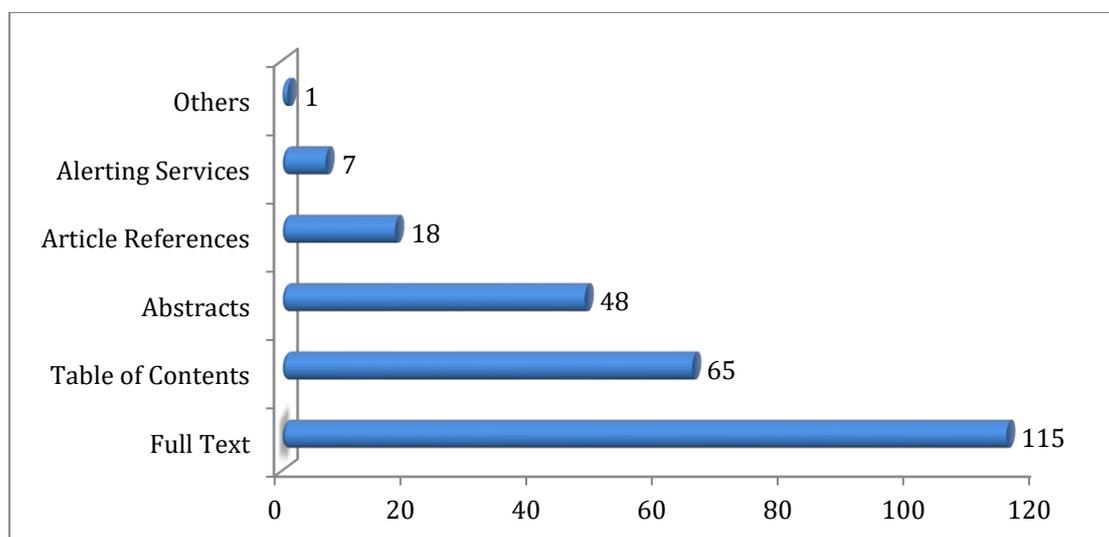
Figure 3 - Component /Part of e-journal accessed
Note: Multiple answers are permitted.

A glimpse of figure 3 reveals that 115 respondents (84.56percent) were accessing the full-text content, followed by Table of content 47.79 percent, abstracts 35.29 percent, the article references 13 alerting services 5 percent. It was observed that the majority of the respondents were accessing full-text content and considers it highly useful for research purposes.

## 5.6 *Benefits of e-Journals over Print Journals*

Every activity has its merits and demerits; however, e-journals have more benefits than print journals.

Table 3 -Benefits of e-Journals over Print Journals

Sl. No	E-journals are beneficial over print journals	Participants (n=136)	Percentage
01	Yes	123	90.44
02	No	13	09.56

Table 3 shows the data for the benefit of e-journals over print journals. 90percent of the users agreed that e-journals are beneficial over print journals.

A supplement question was asked the respondents with seven options to know the preferred reasons listed for using e-journals (Figure 4). The data revealed that 24x7 access was quoted as the primary reason by 86, followed by 81 respondents replied respondents and convenient to use. The data dig out that multimedia content was not of much attraction in e-journals since it occupies at last place with 15 answers contributing to 11percent. It concludes that users are much interested in anytime access and convenience of use.
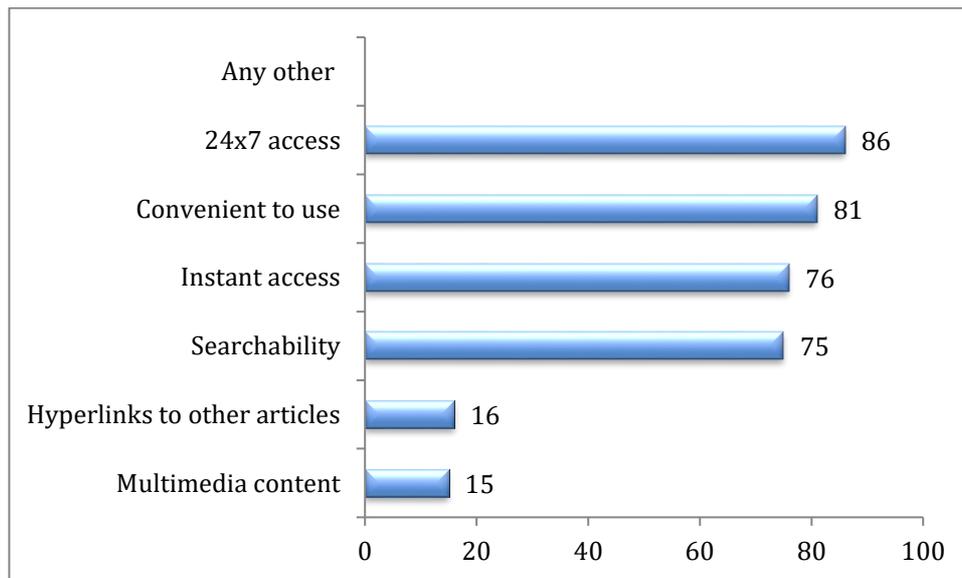

Figure 4 - Preferred reasons listed for e-journals use
Note: Multiple answers are permitted.

5.7 Awareness about ICT Facilities

During the last three decades, ICT has spread its wings across all the fields. This trend also spread across the library, and every user wants ICT facilities in the library. A multiple-choice question was asked the respondents to check the awareness of ICT facilities, remote access facilities, information literacy programmes, and Wi-Fi facilities, and the data has been tabulated and presented in Figure 5.
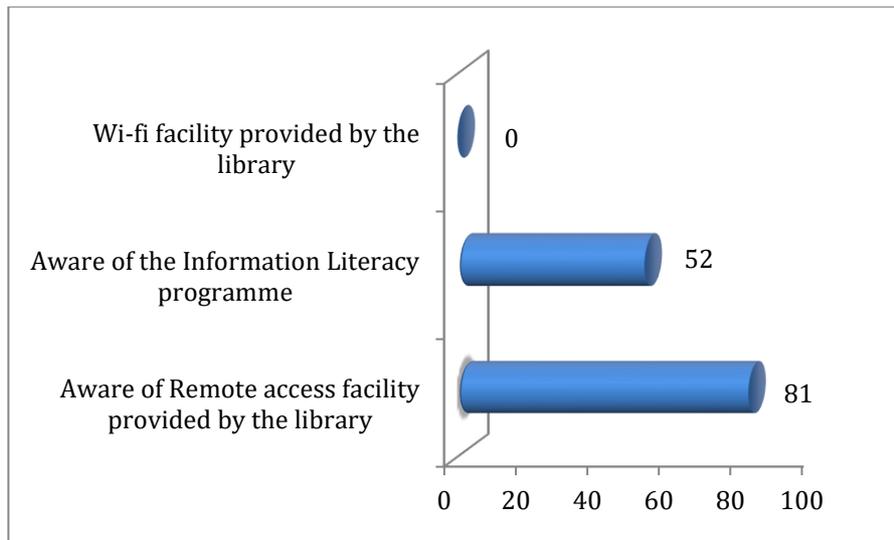
Figure 5: Awareness about ICT facilities
Note: Multiple answers are permitted.

Figure 5 disclosed that 59.56 percent of the scientists were aware of remote access facilities available under the DRDO e-journals consortium, and 38 percent responded that they were aware of the ILP programme. All respondents mentioned that they were not sure of the Wi-Fi facility provided by the library. The data demonstrate that none of the DRDO libraries is equipped with a Wi-Fi facility for accelerating access to e-journals.

5.8 Preferred File format

An attempt was made to find out the various preferred file formats of e-journals. Almost all publishers have publishing e-journals with multiple full-text file formats, either PDF, HTML, Text, or e-pub. The preference for accessing and using various file formats differs from user to user. To check the preferred file format in accessing e-journals is presented in Figure 6. Irrespective of many options available in e-journals, 125 users preferred PDF file format. It has been established that users are familiar and comfortable with PDF file format compared to any other format. In the e-journal industry, PDF file format is always considered a preferred medium of access among the user community. The publishers have to note it even though they have come with new file formats like e-pub in addition to existing HTML format, but users are interested in pdf, which is playing a significant role in the preferred file format.
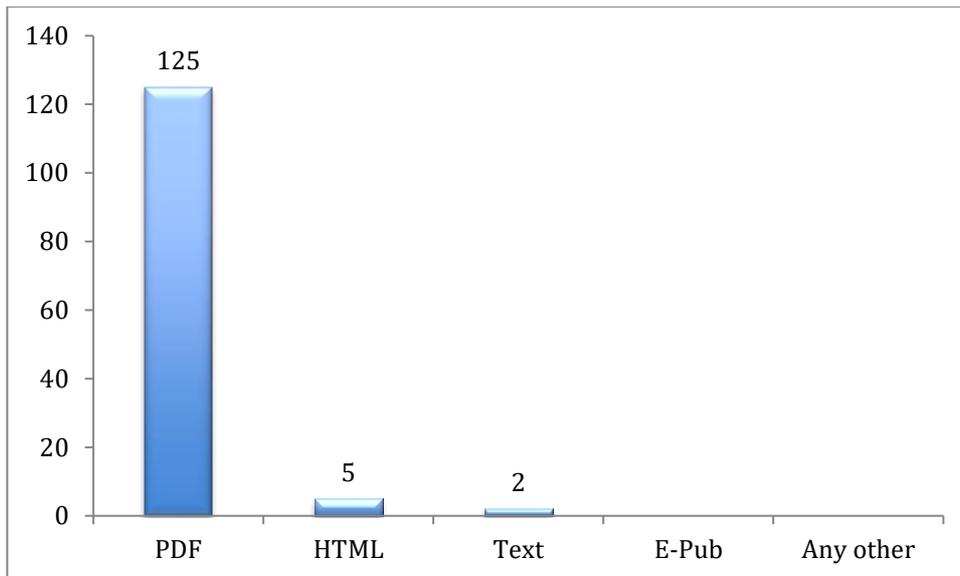
Figure 6: Preferred File format

5.9 Search Techniques

E-journals have multiple search options to check the full-text content or bibliographic data. These search options help users find out known or unknown content easily instead of remembering multiple fields. The preferred search techniques were asked of the users (Figure 7). Out of 119 e-journal users, 101 preferred to use the article's title, followed by a Keyword search with 96 users, Author search and journal search with 78 and 53 users, respectively. The federated search technique was found to be the least preferred search technique among users. The revealed that the users mainly used the title, keywords, or author to search e-journals databases compared to other options available on the publisher's website. Even none of the users are preferred to use the ISSN number for searching.
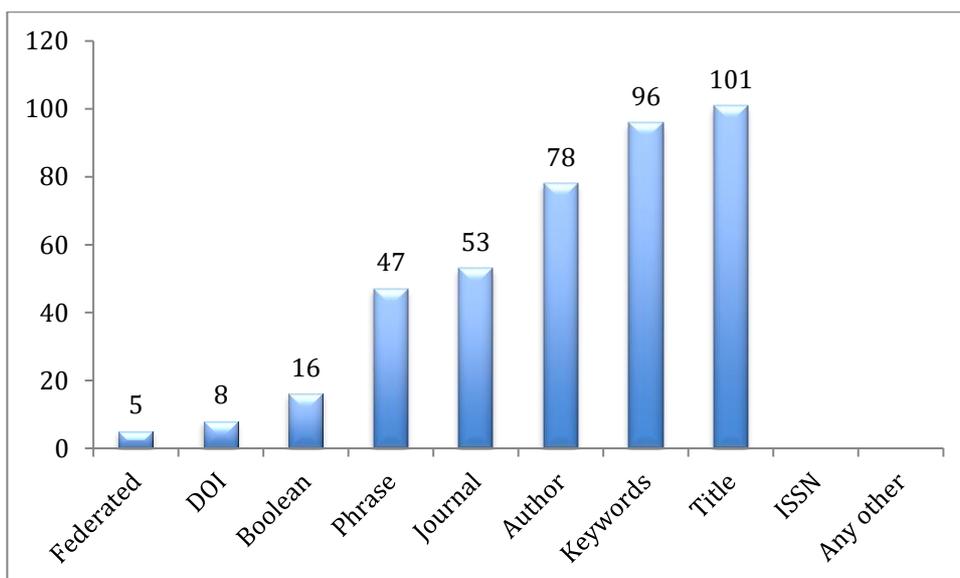

Figure 7 - Search Techniques

5.10   Impact of using e-Journals

The impact has direct relevance to any R&D project to find out the usefulness. The same implies the use of e-journals in the area of work and trends towards the usage of e-journals. A multiple-choice question with five options was asked the scientists to rate and foresee the impact of usage of e-journals in their research during the last five years.

Figure 8 reveals that 33.08 percent of the users opined that e-journals usage has increased over the years, whereas 28.57 percent opined that impact had been too decreased. 24.06 percent of respondents stated that the usage first increased than decreased, and 13.53 percent of users rated that initially, the usage first decreased then increased. Interestingly, 3 percent of respondents did not answer this question.
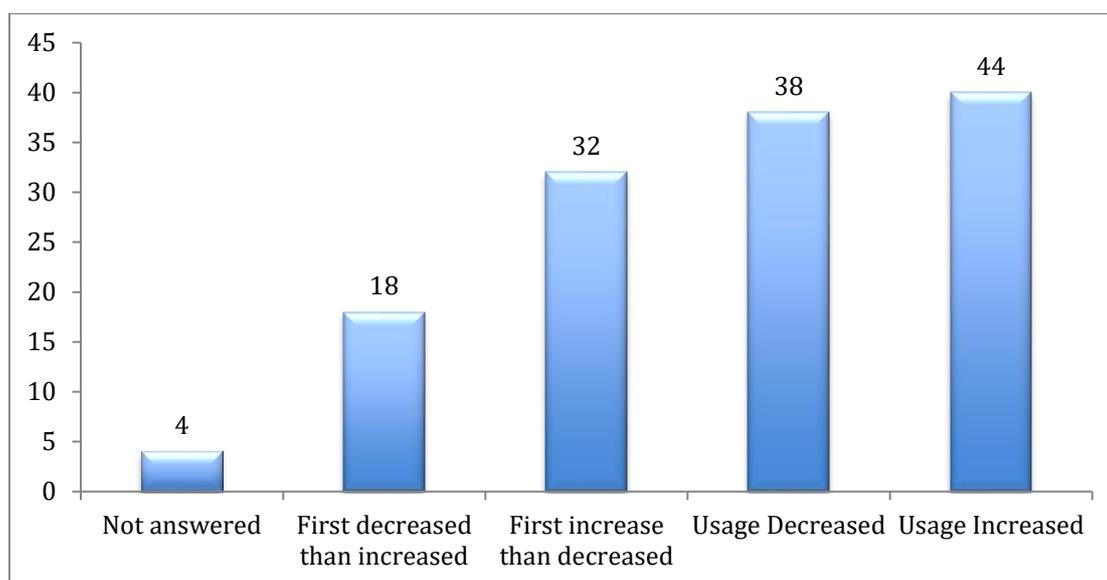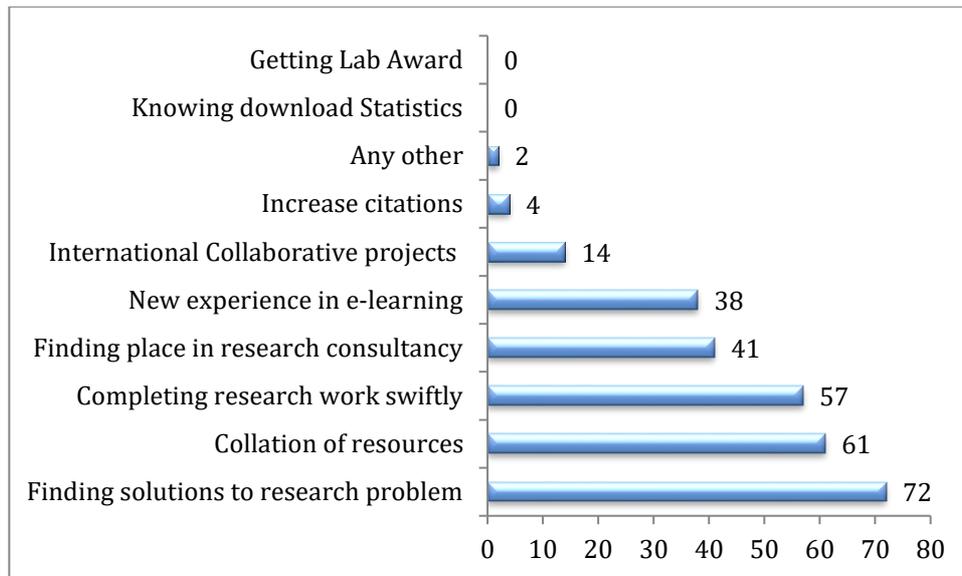

Figure 8- Impact of using e-Journals (n=133)

5.11   Benefits of using e-journals

"Electronic resources are invaluable research tools which complement print-based resources in any traditional library" (Madhusudhan, 2008). Scientists always find a tool to resolve the emerging R&D thrust, and e-journal is one among them. Figure 9 presents the benefits of using e-journals. By observing Figure 9, it is stated that 72 respondents (52.94 percent) cited finding solutions to the research problem to be the most beneficial feature of using e-journals followed by collation of resources, i.e., 44.85 percent. Completing research work carries 42 percent, whereas finding a place in research consultancy constitutes 30 percent of responses.

There is a significant response that 38 users are interested in experience in e-learning and international collaborative projects with 14 responses. Increasing citation occupies the last place with 4 responses, proving that the researcher is primarily interested in R&D activities and not in publishing research papers.

Figure 9: Benefits of using e-journals (n=133)

5.12 Barriers in using e-journals

Every new resource comes with both benefits and problems. In the activity, there may be a barrier that embraces scientists to use it. This barrier depends on the users' perception and may change from person to person. The respondents asked a multiple-choice question with nine options related to problems/challenges encountered while using e-journals and the responses are shown in Figure 10.
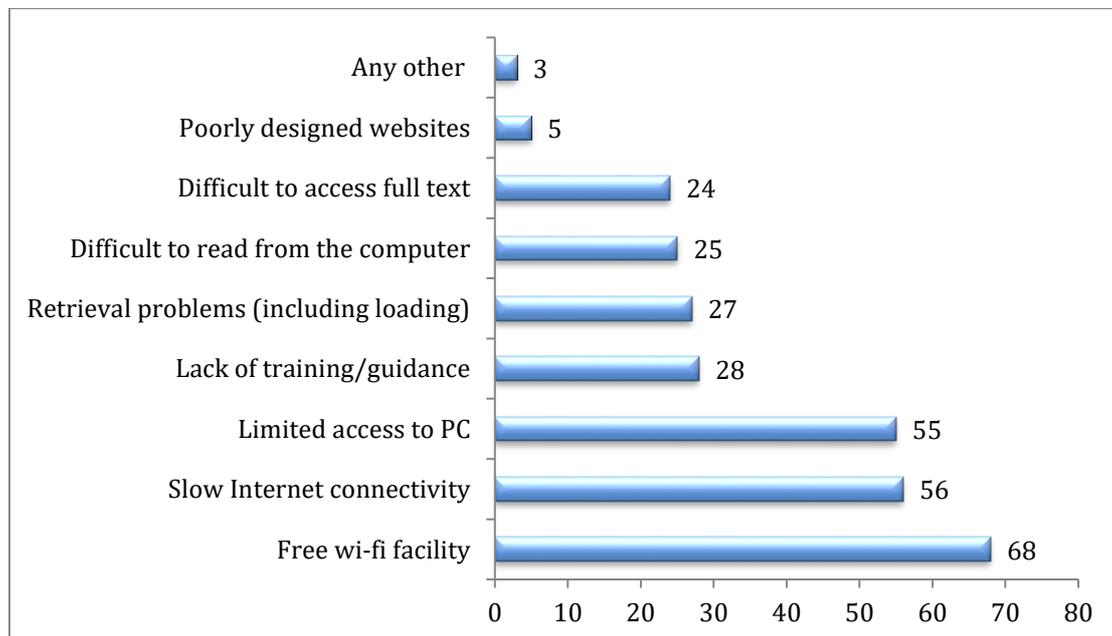
Figure 10- Barriers in using e-journals (n=133)

As depicted in Figure 10, accessible Wi-Fi facility (51percent), slow internet connectivity (42 percent), and limited access to PC (41.35 percent) are the three top most common barriers for accessing e-journals. Furthermore, 21 percent of the respondents mentioned that lack of training, retrieval problem (20 percent), difficulty to read from the computer (18.79 percent), and difficulties in accessing full text (18

percent) are other significant barriers while accessing e-journals. Surprisingly, 3.75 percent of respondents feel that poorly designed websites are a hindrance in accessing e-journals.

5.13   Training Requirement

Training is a continuous process to keep abreast of the activity and achieve a common goal in the research environment. The requirement for e-journals was raised, and the response to the training requirement for accessing e-journals is highlighted in Table 4.

Table 4: Training Requirement

Sl. No	Training requirement	Respondents (n=136)	Percentage
1	Yes	57	41.91
2	No	79	58.09

Table 4 reveals that most respondents (58.09percent) did not show any interest in e-journals training, whereas 41.91 percent of respondents are interested in undergoing training for adequate access to e-journals. These respondents should not be ignored, and the requirement needs to be fulfilled at the lab level. In this context, a supplement question related to different training modes was posed to the respondents who were looking for training (57 respondents), and responses are shown in Figure 11. The data depicted in Figure 11 reveals that 35.08 percent of users prefer the training through onsite mode, followed by 24.56 percent of users interested in training through the Information Literacy Programme (ILP), and 17.54 percent of them are interested in a presentation by publishers. Surprisingly, 14.03 percent of them had a keen interest in the presentation by their librarians and through webinars (8.77 percent). These findings indicate the requirement of online training through a webinar.
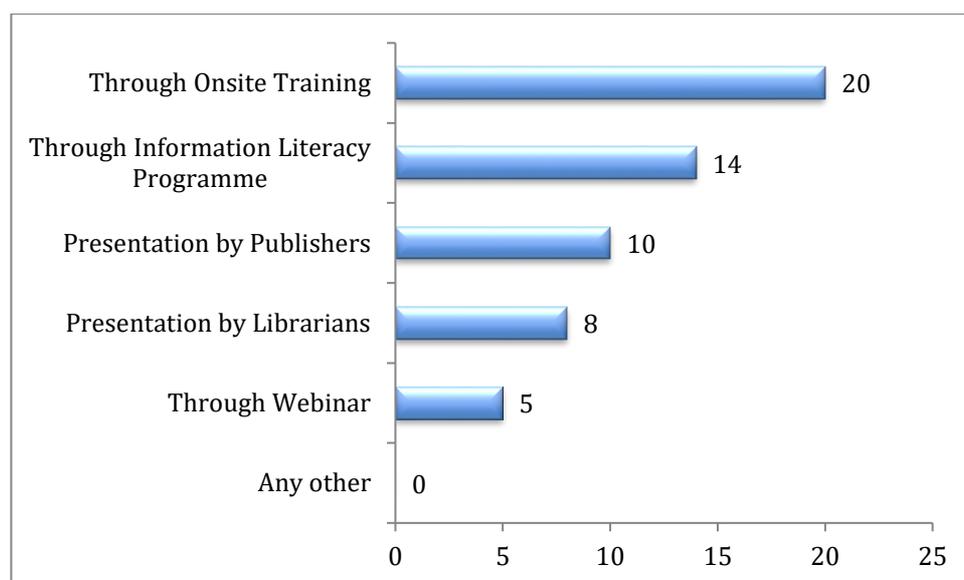
Figure 11: Mode of Training (n=57)

5.14   Preference for Getting e-Journal Alerts

To keep abreast of the latest trends and know about the technologies, most e-journal service providers alert the users through various means. The users of e-journals are having their own choice of obtaining the alerts from the publishers or librarians. The foremost question of how to get the alerts on e-journals is mentioned in Figure 12. Out of 136 users, 60.29 percent were interested in getting the alert through e-mail, which was placed first, and SMS (53.67 percent) and WhatsApp (52.94 percent) alerts occupy the second and third places. The fourth place occupies 13.97 percent through Facebook, and the remaining options are insignificant (below 7 percent). The data shows that most respondents are interested in getting alerts through either e-mail or mobile devices/social media tools.
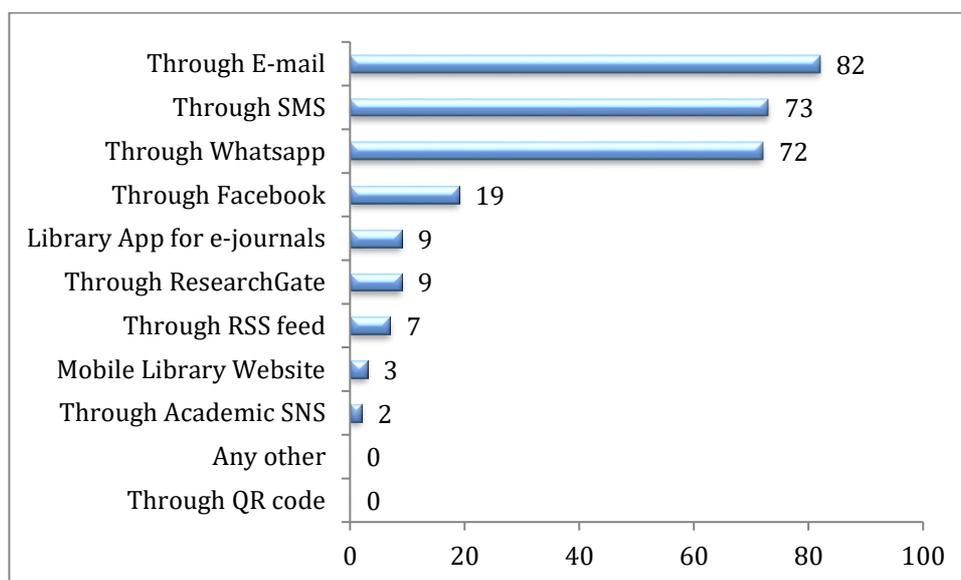

Figure 12 - Preference of Getting Alerts (n=136)

6   SUGGESTIONS FOR EFFECTIVE USE OF E-JOURNALS

After analyzing the data provided by the scientists, the various suggestions/recommendations are presented as follows for the use of the DRDO e-journal consortium,

- More e-journals and publishers have to be included in the consortium for better utilization and to enhance e-journal access and sustainability of the consortium.
- Most users are engaged in R&D activities, and the user orientation programmes have to be organised at regular intervals, if possible, once in six months to overcome any shortfalls. The hands-on training should mainly focus on using e-journals, and features like federated search techniques have to be elaborately provided.
- The remote access facility has to be extended to maximum scientists to access the e-journals beyond IP-based access.
- The librarians should focus on subscribing more to e-journals than print journals; since e-journals have been adopted for R&D activities, most scientists can access them from their desktops instead of visiting the library.

- Users are widely interested in the research articles in PDF file format. The publishers have to note that PDF should be continued even the full-text articles are published in various other file formats.
- Providing free Wi-Fi connectivity at least within the library premises, if not possible, to extend to the entire Lab would be of great help.
- The librarians should regularly send alert services through e-mail and SMS to prompt the use of e-journals under consortium.
- Most importantly, users are aware of the e-journal consortium. However, they are not utilizing e-journals for research purposes. More user orientation programmes are conducted from time to time to solve the issue.

8   CONCLUSION

The study found that in the usage of e-journals, almost 57.14 percent of the users were given a positive rating and believed that the usage has increased. However, the usage was decreased almost at the same percentage, which is alarming and needs to be taken care of by the implementing Lab, i.e., DESIDOC, to include more publishers in the consortia. As calculated, the Return of Investment (ROI), thus decreasing usage by 50 percent, directly impacts the cost of e-journals and proves that half of the budget spent on subscribing to e-journals is underutilized. More user training programme also needs to be organised in addition to publisher presentations.

It was found that Wi-Fi connection and slow internet speed are the significant barriers for accessing e-journals, which can be resolved by providing high-speed Internet connection with Wi-Fi facility to all scientists and provide adequate personal computers with the high-speed configuration in the Lab. The finding also enumerated vital areas of concern that most of the libraries are not providing e-mail/SMS alert services to the users, revealing that the users are unaware/not interested in obtaining alert services provided by the publishers. This study concludes that the DRDO scientists' community is widely using e-journals for R&D activities compared to publishing papers. The study also proves that most scientists are satisfied with the content, and they prefer e-journals to carry out R&D activities. The study is of paramount importance and an innovative attempt to find out the usage of e-journals through DRDO e-Journals Consortia among the scientists of a specific region, i.e., Bengaluru in India.

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