Use of online journals and databases: a case study based University of Moratuwa

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Abstract

The objective of this case study was to explore the use of online databases, user perception towards online databases, user satisfaction with facilities provided by the library for using online resources. The participants of the user survey were dawn from four categories of the University; academic staff members, postgraduate students, undergraduate students and students of Institute of Technology – University of Moratuwa (ITUM). Total of 400 participants were selected for the survey. Analysis confirmed that frequency of use of electronic databases have been restricted only to few databases (Blackwell Synergy, Science Direct and Wiley Inter Science). Relatively a lesser usage level was observed for the online journals compared to print journals. User groups have satisfied with the programmes conducted for promoting online resources. They have highlighted different areas that should be improved by the library. Providing printing facility and offering remote access facility were main requests of the users. Academic members and postgraduate students had higher online resource usage than the undergraduate students and ITUM students. The major problems examined within the study included, lack of computer and Internet facilities, lack of awareness to electronic resources provided by the library, ineffective communication channels, and irrelevancy of articles in the provided databases and inefficient support of the library.

Key Words: Online databases, Information retrieval, Electronic journals, Electronic Media, User Survey, Information Searches

Introduction

In the past the main role of the libraries was ownership and storage of print materials. However, today it has been replaced with accessibility and availability of materials. Traditional environment and the expectations of a library have completely changed. Traditional books and periodicals have moved towards their electronic versions. Librarians and information workers have created variety of tools for organising the knowledge. Computers and their related technologies have a major impact on information handling. Computer databases and their indexes have become important resources for organising the knowledge. These new technologies have gradually replaced the traditional tools by introducing number of applications. Developments of these new services mainly depend on feed back of the end users. Therefore conducting a user survey was very important to obtain the exact situation of the services of the library.

Electronic databases play a major role as information sources in today's libraries. Most of the indexing and abstracting journals appear as electronic bibliographic databases and information retrieval systems. They provide quick access to information through the computers. Over the past several years, libraries have realized the benefits of using the electronic databases. Costs for print subscriptions have increased by a very high percentage compared to the average price increase of its counterpart electronic version. Other than indexes and abstracts, there are different types of electronic databases, which include different type of information sources or references. Electronic databases are now very popular among the librarians and library users due to several factors like speed, flexibility, wide range and the currency (BIAD, 1998).

The first electronic journal appeared in 1970s. After 1995, the activities of electronic journals were started at a much-accelerated speed. There was a rapid development and distribution of electronic journals with the appearance of Internet, World Wide Web, computer and software capabilities, digital input standards and codes (SGML, HTML) and widespread use of desktop computers. Most of the major publishers published electronic journals and offer them as special services or databases (e.g. ScienceDirect (Elsevier); SpringerLINK (Springer)).

When online database first became available in 1970, its users were mainly librarians and other information workers (Chu and Law 2005). Today many other people have started to use online databases without the help of intermediaries due to the easy accessibility and the user-friendly interfaces, which have been specially designed for the users. The biggest advantage of online databases was the currency of the information, where as printed reference sources take some time to find their way to the library shelf.

Different features have been offered to the users by different databases. Othman and Halim (2004) conducted a user survey to examine the common and unique retrieval features of online databases and the difficulties faced by the users in applying the features. This study identified that all database systems have two levels of searching mechanisms. Those were basic and advanced searching methods. Further, databases have provided information according to the subject and the year. Different kinds of users preferred different levels of retrieval features.

Understanding the user population and their needs was developed through regular in-site interactions. Users were assisted to find information. Their search behaviours were monitored to assist at any

difficulty. The regular interactions with on-site users have enabled a clear understanding of the needs and patterns of the users. With the increase of electronic resource usage, the user patterns have changed. The ability of connecting with the library services through the Internet and accessing information from other sources have reduced the capacity of characterizing and categorizing of users (Debowski, 2000). As a result of new electronic environment, the number of physical bodies entering the library was diminishing and virtual usage was increasing. Librarians and other information providers have faced a critical problem of identifying the needs of this 'hidden' user.

User attitudes and user perception were very important to any library to evaluate their services. McKnight (1997) described a variety of user attitudes towards the electronic journals. He considered different projects conducted in early 1980s to 1997. McKnight has observed that users preferred some traditional methods to use electronic documents. Most of the users were reluctant to read electronic documents on the screen and preferred to obtain a print out of those electronic documents. Some users did not like to have much complicated browsing. They expected the correct results with minimum number of searching. According to McKnight, electronic journals still have not supported the tasks, which the user preferred. They tended to be negatively perceived because journal publishers tend to be author-oriented.

A study was conducted by Liew, Foo and Chennupati (2000) on graduate student's use and perception of e-journals compared with its print counterparts. The data collected from the study indicated a growing interest in e-journals among this group of end-users. There was a strong acceptance, high expectation and enthusiasm for the e-journals.

According to Liew, Foo and Chennupati, the designers and the publishers of e-journals must fully exploit the electronic medium's basic properties - by considering interactivity as the main feature.

A research study was conducted to determine the use of online biomedical journals and databases and to assess user characteristics associated with the use of online resources in the library of Health Science, University of Illinois at Chicago by DeGroote and Dorsch (2003). They found that users preferred online resources than the print materials and majority of the users accessed online resources outside the library. Major factors in selecting online resources were full-text availability and convenience. The researchers identified that many users use only a small portion of the resources available to them. Users tended to select limited number of databases and seem to be unaware of the availability of databases other than those they regularly use. Lack of training and lack of information about online databases were perceived as the most common obstacles to the use of electronic information and technologies. Therefore DeGroote and Dorsch have highlighted the major role of the librarians to enhance the awareness of the online databases among the users.

Possession of computer skills alone was not adequate for efficient use of e-resources according to the results of the survey conducted by Ibrahim (2004). More organized training programmes were needed to familiarise the e-resources with the users.

Troll (2001) has conducted a survey to determine what obstacles stand in the way of effective accessing of online resources. He has emphasized that traditional performance measures were less effective in demonstrating the library's contribution to higher education. According to

Troll, librarians have used traditional measures that quantify the library's raw-materials or potential to meet the user needs ("inputs"), the work done with these raw materials ("outputs"), and the fledgling efforts to assess the impact of the library collections and services on users ("outcomes"). The purpose of all inputs and outputs was to achieve outcomes, but neither inputs nor outputs indicated how well the user needs were being met, the quality of library collections and services or whether the library was accomplishing its mission within the larger institution.

These factors have realised the importance of conducting user surveys to obtain the exact situation of the library services. A user study was carried out to find out the extent of accepting electronic journals and databases by the user community of Library University of Moratuwa for the period of January to December 2006.

The University of Moratuwa Library (UoML) is one of the most prominent engineering libraries in the country. Its main areas of specialisation are Engineering, Architecture and Information Technology. It was the first fully automated University library in Sri Lanka. Computers and computer applications have been widely introduced within the library and an integrated library management system (Libsys) has been installed since 1998. Library, University of Moratuwa provided access to number of e-resources. Among those online resources some were subscribed online databases. Access was given to other databases by special programmes such as PERI (Programme for the Enhancement of Research Information) under SIDA/SAREC Library Support to Sri Lankan Universities.

Since 2003, the UOML has subscribed several electronic databases. Many of these databases were more related to science and technology because

University of Moratuwa was a pioneer engineering University in Sri Lanka. Table-1 shows the online databases, which were subscribed by Library, University of Moratuwa for the period of 2003 to 2006.

Table 1: Subscribed online databases at library, University of Moratuwa

Year	Subscribed Database(s)	Subscription Period	Remarks
2003	IEE	Jan – Dec	Print + Online
2004	ACM Digital Library	Feb 2004 – Jan 2005	Online
	IEE	Jan – Dec	Print + Online
	IEEE	Jan – Dec	Online
2005	EmeraldInsight	Aug 2005 – July 2006	Online
	IEE	Jan – Dec 2005	Print + Online
2006	ACM Digital Library	Feb. 2006 – June 2007	Online
	EmeraldInsight	Till August 31st 2006	Online
	IEE	Jan.– Dec. 2006	Print + Online
	IEEE	Jan. – Dec. 2006	Online
	ScienceDirect (Engineering Modules Only)	Jan. – Dec. 2006	Online

(Source: Annual report of the library, University of Moratuwa)

Under PERI (Programme for the Enhancement of Research Information) project several online databases were available for the users of the library. Blackwell – Synergy, Ebscohost, Wiley Interscience were major full-text databases. There were some free online journals, which offered free access with its subscribed print versions. Archaeological Dialogues

(Formerly Architecture Research Quarterly), The Economist, Hydrological Sciences and Engineering News Record (ENR) were those free access online journals.

Purpose of the study

The objectives of this study were finding out the use of online databases by specific user categories, investigating the user perceptions towards online databases, finding out the user satisfaction on the services provided by the library for online databases and identifying the obstacles faced by the users in using online databases and their services.

Research approach

Case study method was adopted in this research. Academic staff members, postgraduate students, undergraduate students (3rd year and 4th year) and 3rd year students of Information Technology University of Moratuwa (ITUM) were the elements of the user population. Random stratified sampling technique was utilized as the sampling method. In this study, target populations were divided according to the individual's department. Undergraduate and ITUM students were further divided according to their year of study. The sample size was determined according to the table proposed by Krejcie and Morgan (1970) for determining sample size for research activities. In this research, the total population size was 2750. According to the table of Krejcie and Morgan, the sample size was 400.

Results

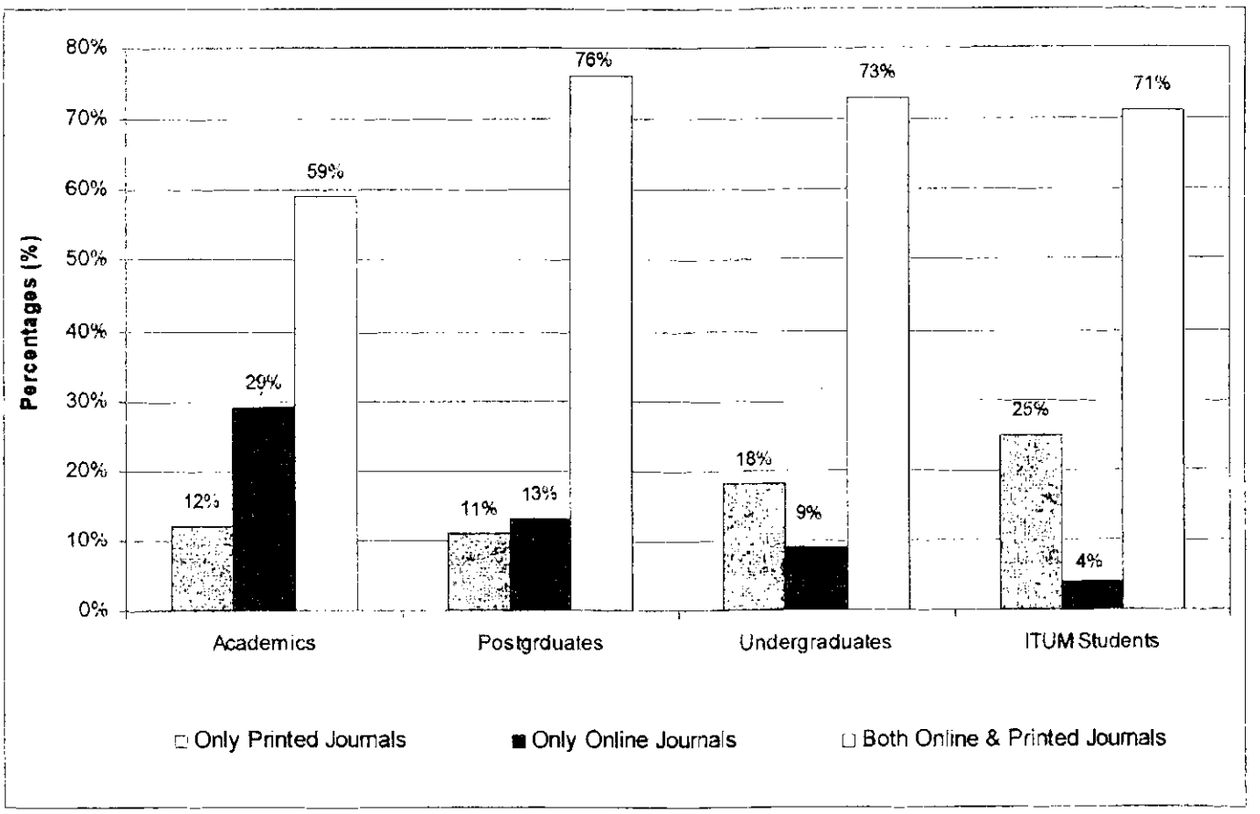
Out of the total of 400 selected users of the Library, University of Moratuwa, 330 respondents had returned the questionnaires. The total response rate of the survey was 82.50%. The survey investigated 73 (22.12%) academic members, 87 (26.36%) postgraduate students, 139 (42.12%) undergraduate students and 31 (9.39%) ITUM students. Most of the respondents of the survey were males, 230 or 69.70%. Total number of female respondents of the survey was 100 (30.30%).

Survey results have provided information about the use of computers and the Internet by academic staff, postgraduate students and undergraduate students. Overall, a higher percentage of the participants (67.27%) have reported having '5 years and more' experience in using computers. 55% of respondents has accessed the Internet more than 5 years.

There was a significant correlation between user categories and locations used for the Internet access. Majority of the respondents (46%) have accessed the Internet from computer centres of the University. 40% of respondents had the Internet access at their home and 39% of participants connected with the Internet from their office. Only 21% of participants depended on the library to access the Internet.

Results of the survey have proved that most of the respondents (70%) preferred to use both print and online journals. Out of all the respondents, 14% of them preferred only online journals and 16% of the participants preferred only print journals (Figure 1).

Figure 1: Distribution of preferred journal type of the user categories

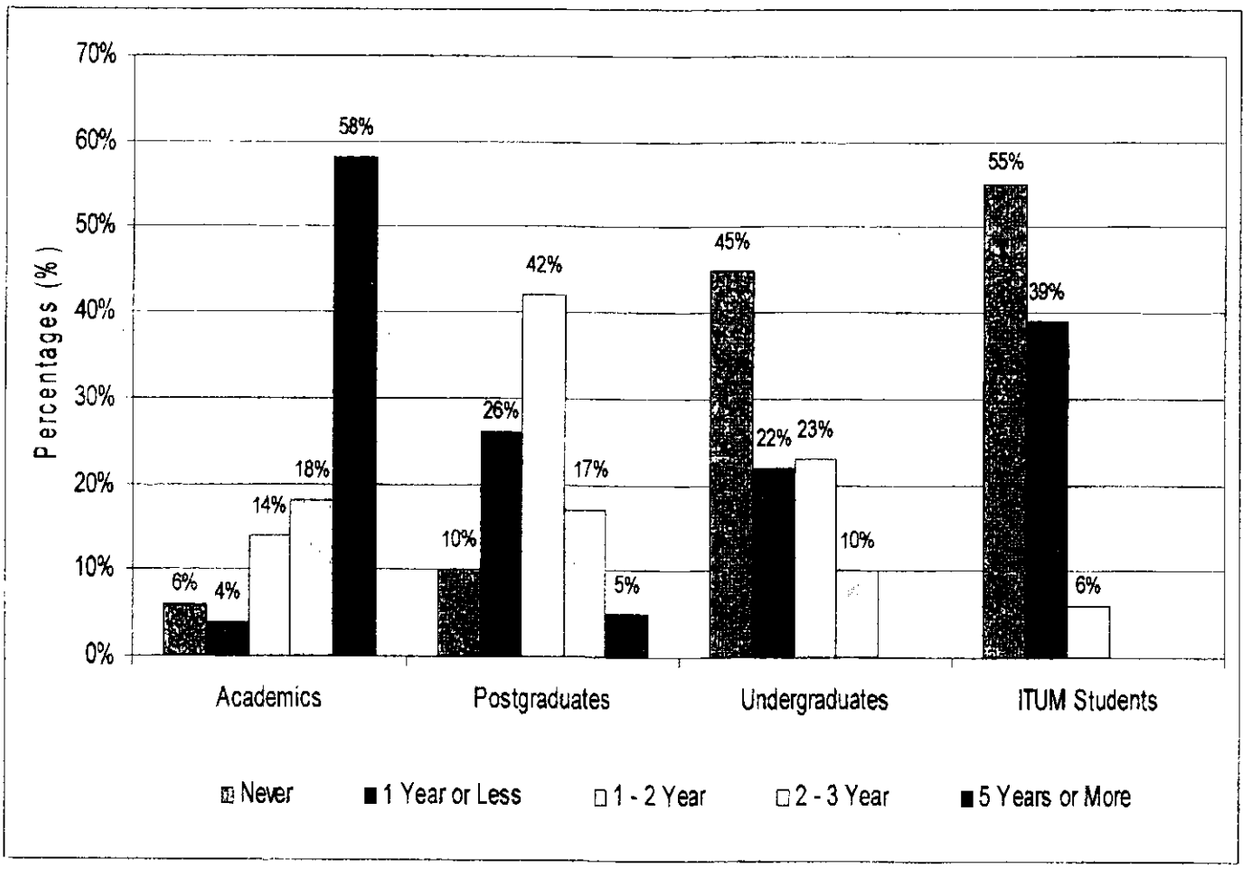


Majority of the participants had more experience with print journals compared to electronic journals. 93.5% of participants had the experience with print journals. Experience with electronic journals has been reported by 72% of the participants. Out of all the participants, 55% of ITUM students and 45% of undergraduate students have never used online journals. Postgraduate students (10%) and academic members (6%) had the lowest percentages among the 'non-users' of the online journals.

Majority of academic members (58%) had five years or more experience with electronic journals and databases. Most of postgraduate students (41%) had 1-2 years of experience with electronic journals. 23% of undergraduate students have accessed online databases 1-2 years and

39% of ITUM students have used online journals less than one year (Figure 2).

Figure 2: Online journal experience of the participants



The relationship between participants' online journal experience and academic research experience was analysed with Kruskal-Wallis test at 1% significance level. Result of the test has displayed in Table 2.

Table 2: Kruskal-Wallis Test results for experience of online journal vs. academic research experience of the participants

Research Experience	N	Median	Ave Rank	Z
None	31	2.000	74.3	-5.30
Less than One Year	56	2.000	113.2	-3.87
1 - 2	80	3.000	132.8	-2.59
3 - 4	69	3.000	140.6	-1.52
Five Years or More	73	5.000	259.3	11.42
Overall			155.0	

H = 143.84, DF = 4, P = 0.000

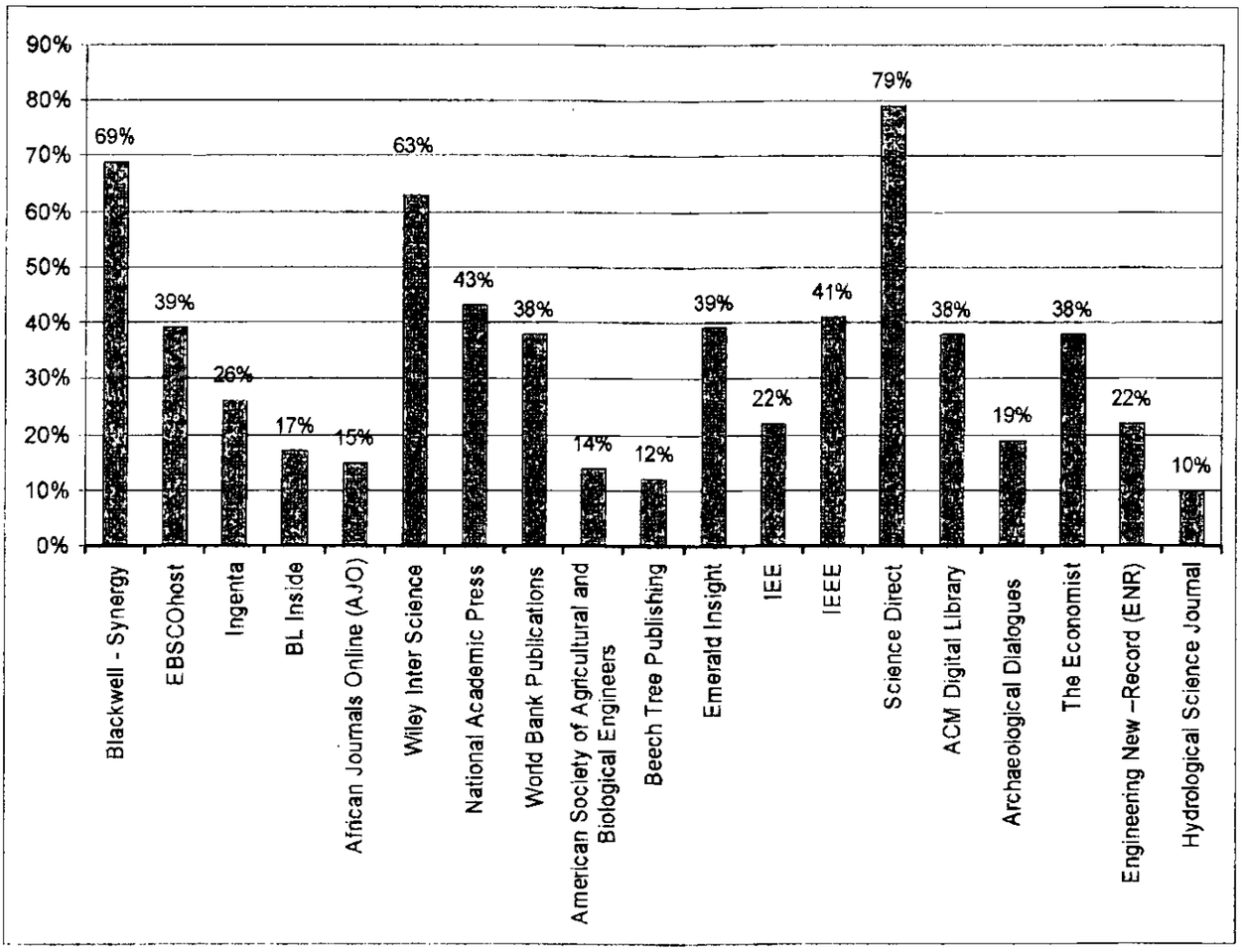
H = 152.64, DF = 4, P = 0.000 (adjusted for ties)

According to the Table 2, the test statistic (H) has a p – value of 0.000, adjusted for ties, indicating that the null hypothesis can be rejected at 1% significance level. There were differences between experience of online journals and academic research experience of the participants. Smallest Z-values (-5.30) has revealed that the difference was mostly affected with the participants who were not having any experience in conducting academic research.

73% of the respondents have indicated that they accessed online resources independently without the assistance of others. Out of all the participants, 16% of them have used online databases with the assistance of peers. Only 11% of the respondents have obtained the

assistance of the library staff for searching the online resources. Most of the participants (50%) have used library to access online journals and databases. 43% of the respondents have accessed these resources from their office. Only 19% of participants have reported accessing of online resource from home. A higher percentage of respondents (14%) have used different locations such as computer centres of the University for accessing e-resources.

Figure 3: Usage percentages of online databases

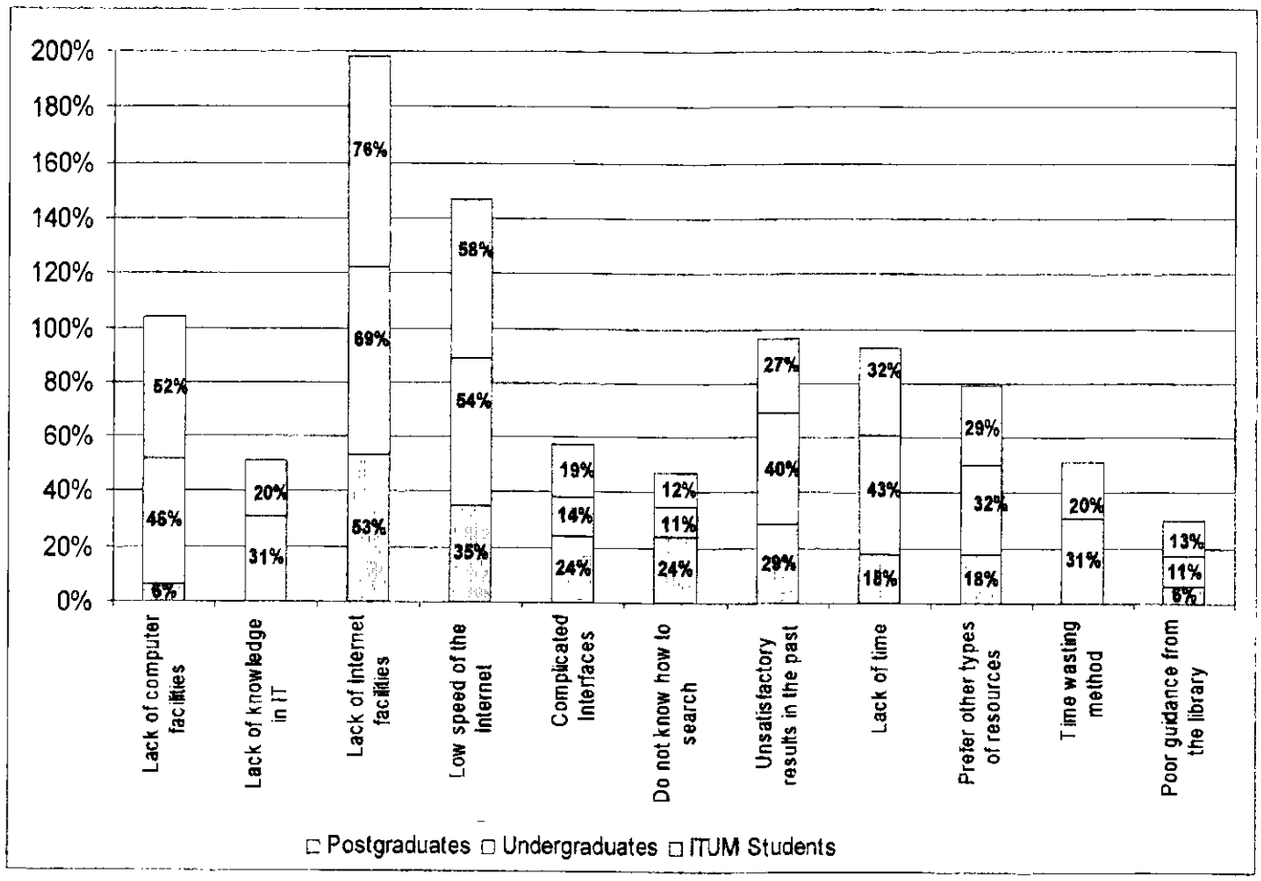


Survey data has demonstrated how often users have utilized the various online databases. Usage percentages of online databases were presented in Figure 3. Only three databases have shown at least 50% or more usage. They were Blackwell – Synergy, Wiley Inter Science and Science

usage. They were Blackwell – Synergy, Wiley Inter Science and Science Direct. The usage percentage of Blackwell – Synergy was 69%. Out of all the respondents there was 63% of usage for Wiley Inter Science Database. Science Direct (79%) has the highest usage percentage among all the online databases. All the other journals and databases had much lower usage.

Library guides and the leaflets (38%) had become the most effective mechanism to inform about the available online databases to the respondents. Web site of the library (34%) was much affected for passing the information of online materials to the users. 34% of participants have identified online materials of the library through their friends or colleagues. Staff of the library (27%) has also actively participated to popularize the online databases among the users. Different alert services of the library (21%) such as emails had a direct connection with the user awareness of online databases. 12% of the participants have been informed about the online databases through the library instruction tours.

Figure 4: Reasons for not using online databases by different user groups



Majority of the reasons highlighted by the non – users of online databases were very similar to the obstacles, which were mentioned by the users of the online databases. Reasons of different user groups for not using online databases have been displayed in Figure 4. The difficulties affected for the user groups in accessing online databases were low speed of the Internet (54%), lack of awareness on e-resources (33%), limited computers in the library (31%), previous unsatisfactory results (28%), irrelevancy of the databases (15%), difficulties in reading from the computer screen (12%), complex searching mechanisms (9%), difficulties in handling e–formats (9%) and poor guidance of the library (7%).

The results of the survey have proved that most of the respondents preferred to read electronic materials after taking a print out (75%) instead of reading them directly from screen (24%). Out of all participants, 58% of them preferred to read articles as PDF document. Only 12% of participants preferred to read articles in HTML format.

Out of all the participants, 45% of users have satisfied with the adequate access provided by the library. Forty seven percent of the participants have agreed with the provided bibliographic instructions by librarians and library staff to use the online databases. There were 32% of the participants who have not satisfied with the training provided by the library for accessing online databases. Majority of the participants (51%) have satisfied with the methods used by the library to popularize the online databases.

Discussion

The four user categories of this study have shown different usage levels for online databases. This study has proved that usage of online journals and databases was comparatively low compared to usage level of print journals. As a group, academic members have reported the highest usage percentage for online journals and databases. Undergraduate students and ITUM students have reported very low usage percentages for online resources.

According to the survey results, academic members had the lowest number of 'non - users' for online journals and databases. Majority of the problems reported by the users in using online databases do not affect to the academic members in University of Moratuwa. All the reported

problems have influenced to reduce the online database usage of postgraduate students, undergraduate students and ITUM students.

Among the subscribed databases, only ScienceDirect database had the maximum utilization. Both user survey and vendors' statistical reports provided evidence for this. Usage levels of the other databases were not at the anticipated level of the library. Usage percentages of databases according to the survey results and vendors' statistical reports have displayed in Table 3.

Table 3: Usage percentages of databases

Databases	Usage Percentages (User Survey)	Percentages of Full Text Articles Downloaded (Vendors' Statistical Reports)
ScienceDirect	79%	41.16%
Blackwell Synergy	69%	31.61%
Emerald Insight	39%	10.63%
IEEE	41%	7.09%
ACM Digital Library	38%	6.67%
EbscoHost	39%	2.73%
Architecture Research Quarterly	19%	0.06%
IEE	22%	0.05%

In this study, it was clear that computer literacy was an important factor in searching online databases for the user groups. Experience of the Internet had a correlation with the use of online resources. Respondents,

who had less experience with the Internet, had fewer tendencies to access online databases.

Experience of the participants in conducting academic research also had a relationship with the usage of online databases. Conducting academic research had a direct correlation with user category and age category. Academic members had the highest preference in conducting academic research compared to the other user groups. The respondents who had vast experience in conducting academic research have identified the importance of full text and other kind of articles available in online journals and databases. Therefore they always considered these online databases as one of their main information sources. Undergraduate students and ITUM students have not still realized the importance of online resources due to their lack of experience in conducting academic research.

Users' traditional attachment with print materials may have influenced in reducing the usage level of online resources. This situation could be further explained with the analysis of preferred document format of the users. Still majority of the respondents preferred both print and online journals.

Awareness and convenience were major factors in the selection of online materials. Majority of the users have used limited number of resources. They have tended to select limited number of journals or databases due to unaware of the available resources other than those they use regularly or lack of knowledge regarding the scope of the databases. Therefore one major complaint of the users was unavailability of relevant databases

for each user category. These attitudes might be a result of ineffective channels of communication of the library regarding the online databases.

Findings of this study highlighted that library guides and leaflets, library web site, library staff, different alerts services of the library and library instructional tours have highly supported in promoting and popularizing online resources provided by Library, University of Moratuwa. According to the survey results most of respondents have satisfied with the awareness programmes conducted by the library in popularizing online databases.

More organized training programmes were needed to familiarize the users with the electronic resources. Librarians should take steps to make sure that the users are aware of online resources. The scope and the purpose of each resource must be the base of instructional programmes. Hands on experience must be a part of these training programmes. The results of this study have demonstrated that a considerable number of participants were not satisfied with the training programmes conducted by the library in relation to online databases. All three students groups other than academic members have mentioned lack of knowledge in proper searching techniques of online resources. Library instruction programmes should be redesigned according to the needs of the users. As DeGroote and Dorsch (2003) suggested, web based instructions, online point of user guides, virtual library tours, self – paced tutorials and online access to reference services should become part of the library instructional programmes to support users at their desks.

Majority of the respondents have indicated that they prefer to read electronic materials after taking a print out instead of reading them directly from screen. This was similar to each user category. Therefore

promotion, education and organization will not be enough in making the maximum utilization of online resources. As providing sufficient computers for online database searching, librarians must consider other IT facilities such as printers for enhancing the usage of online journals and databases.

Many respondents have indicated that lack of proper IT infrastructure as a major issue to reduce the usage level of online resources of user categories. Unavailability of proper Internet facility and computer facility were critical problems for most of the respondents for not using online journals and databases. Those problems directly affected only to the students because all the academic staff members have been provided separate computers, Internet facility and other required IT facilities by the University of Moratuwa. Many students have reported that library has not provided sufficient computer facilities for its users to access online resources. With the limited IT budget allocated for the libraries, it would be a great challenge for library management to provide sufficient number of computers and other IT facilities to a large number of students. Except the library, University of Moratuwa has established many computer centres with the Internet facilities for the students. Therefore students had many opportunities for accessing online resources at various places of University of Moratuwa.

Lack of proper IT infrastructure has become a critical issue for the ITUM students. Most of the ITUM students have obtained their Internet needs from the library and only 12% of them accessed the Internet from computer centres of the University. Most of these computer centres were located in a particular departments of the University (e.g.: Department of Computer Science) or a faculty of the University (e.g.: IT faculty)

providing the Internet access opportunity mainly for the undergraduates. Institute of Technology, University of Moratuwa has not provided separate IT facilities for their students other than the common IT facilities provided by the University. This situation has raised many difficulties to ITUM students in accessing online databases. Therefore lack of sufficient IT facilities has a direct correlation with the low usage of online databases of ITUM students.

Inability of accessing online databases from out side the university was a major complaint raised by many respondents. Most of academic members and postgraduate students have mentioned this problem. Most of the subscribed databases cannot access from out side of the university premises because vendors have provided IP based access for those databases. Due to this situation, most of the postgraduate students had difficulties in accessing online databases because most of them were employed in different locations of the country. Also academic members had difficulties in accessing online databases from their home. Therefore library should find a suitable mechanism to allow remote access to the users as a solution for this problem.

Recommendations

Most of the users (postgraduate students, undergraduate students and ITUM students) have found difficulties in using online journals and databases due to lack of access points. It is recommended to provide more access points to the users at their respective departments or at the library. Library should provide more facilities such as computers, fast and broad Internet connections, printing facilities etc.

Librarians should suggest a mechanism after discussing with the vendors to provide the remote access facility of online databases to the users. This will reduce the difficulties of the users reaching the university premises for accessing online journals and databases. Changing of use patterns have to be examined continuously by the librarians to establish collection development policies, instructional programmes and reference services to meet the information needs in the online environment.

More organized training programmes should be adopted to enhance the awareness of the online databases. Web based instructions, online point of user guides, self paced tutorials and real time online access to reference services of the library could be added as further developments of online database training. Library staff should be more supportive to the users of the online journals and databases. Librarians should take necessary actions to enhance the knowledge of the library staff regarding the online resources. Also the staff should be trained continuously to make a user-friendly environment to the users of the library.

References

BIAD. (1998). Literature and Information Searching. The Research Training Initiative. http://www.biad.uce.ac.uk/research/rti/rtrc/pdfArchive/literatureSearch.pdf [accessed September 10, 2005].

Chu, Samuel Kai-Wah and Law, Nancy. (2005). Development of information search expertise: research students' knowledge of database. *Online Information Review* 29, no.6: 621-642. http://www.emeraldinsight.com/10.1108/14684520510638070 [accessed September 11, 2005].

De Groote, S. L. and Dorsch, J. L. (2003). Measuring Use Patterns of Online Journals and Databases. *Journal of the Medical Library Association* 91, no. 2: 231-240. http://www.pubmedcentral.gov/ picrender. fcgi?action=stream andblobtype=pdfandartid=153164 [accessed September 11, 2005].

Ibrahim, A. E. (2004). Use and user perception of electronic resources in the United Arab Emirates University (UAEU). *Libri* 54, no.1: 18-29.http://72.14.203.104/search?q=cache:zFFvhRUAgeQJ: :www.librijournal.org/pdf/2004-1pp18-29.pdf+Ahmed+Elhafiz+Ibrahimandhl=en [accessed September 12, 2005].

ICOLC. (2001). International Coalition of Library Consortia (ICOLC): Statement of Current Perspective and Preferred Practices for the Selection and Purchase of Electronic Information. *Serials Review* 29, no.1: http://www.ingentaconnect.com/els/00987913/2003/00000029/00000001/art00269 [accessed September 10, 2005].

Krejcie, R.V. and Morgan, D.W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement* 30, no. 5: 607- 610.

Lancaster, F.W. (1995). The evolution of electronic publishing. *Library Trends* 43, no. 4: 518 – 27.

Liew, C. L., Foo, S.and Chennupati, K. R. (2000). A study of graduate student end-users' use and perception of electronic journals. *Online Information Review* 24, no.4: 302-315. http://islab.sas.ntu.edu.sg:8000/user/schubert/publications/2001/00oir_fmt.PDF [accessed September 15, 2005].

McKnight, C. (1997). Electronics Journals: What do users think of them?. In: *ISDL' 97.* Proceedings of International Symposium on Research, Development and Practice in Digital Libraries. 18 - 21 November, 1997. Tsukuba: University of Library and Information Science. http://www.dl.ulis.ac.jp/ISDL97/ proceedings/mcknight.html [accessed September 12, 2005].

Othman, R. and Halim, N. S. (2004). Retrieval features for online databases: common, unique and expected. *Online Information Review* 28, no. 3: 200 – 210. www.emeraldinsight.com/1468-4527.htm [accessed February 10, 2006].

Tenopir C. (1999). Factors That Influence Database Use. In: *ACRL 9th National Conference.* Proceedings of the Annual Meeting of the Association of Research Libraries. April 1999. Chicago: American Library Association, 68-75.

http://www.ala.org/ala/acrl/acrlevents/acrl/acrlevents/tenopir99.pdf [accessed December 12, 2005].

Tenopir, C. and King, D. W. (2000). Towards Electronic Journals: Realities for Scientists, Librarians, and Publishers. *Psycoloquy* 11. no. 4. http://psycprints.ecs.soton.ac.uk/archive/00000084/ [accessed September 10, 2005].

Troll, D.A. (2001). How and why are Libraries Changing? White Paper. Digital Library Federation. http://www.diglib.org/use/whitepaper.htm [accessed September 10, 2005].