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CONTENTS

Application of Information and Communication Technology in Computer Science Faculty : A Study

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Abstract

This study explores the modes of communication of the member of faculty of computer science within scientific inquiry. Situated in a socially constructed research practice, the findings provide a focused view of the collective use of two sets of communication mechanisms-electronic information mechanisms and inter personal communication channels-within a technology-intensive field. These results are theoretically and pragmatically interesting for the professionals of scholarly communication research and library and information. They suggest that understanding scholarly communication, exploring social cues embedded in the real world practice will yield valuable information, while the detailed examination of research practice provides a resource for the general design of systems to support collaborative scientific work.

Keywords: *Computer Mediated Communications, ICT, Interpersonal Networks*

1. INTRODUCTION

The Internet and the World Wide Web have grown rapidly since a couple of decades and have come to play a major role in supporting knowledge sharing in scientific communities. Computer Science as a discipline is unique for the current research topic because it involves both the research on Information Technology and the use of such technology for supporting research. In this field, researchers are more interested and involved in technology that spills over into their professional endeavours. Computer Scientists' knowledge-sharing skills are expected to be highly sensitive to technological advances. The study of scholarly communication in this high-resource discipline could offer suggestions for other disciplines about how to take advantage of new electronic communication technologies to ease or improve research techniques and to gain rich information resources.

2. INFORMATION TECHNOLOGY AND SCHOLARLY COMMUNICATION

Electronic media have created new opportunities for researchers to share resources such as data sets, expensive scientific instruments, ideas and human attention to intellectual pursuits [2,7]. The growing availability and the use of such services have even given rise to a new type of scientific enterprise, "the collaboratory" [4], which refers to research centers where scientists can work together across geographic distance and share resources via computer networks.

Scholarly Communication Forums (SCF), either through digital mechanism or physical devices or both, include a broad family of communication forums such as face-to-face meetings, paper journals, linked websites, central server-based repositories and so on. The role of SCF in Computer Science is the current topic of interest. Previous studies examined the disciplinary features and found that computer scientists usually expressed a sense of urgency in terms of creating, finding and utilizing materials in a timely manner [1]. Scholarly communication for Computer Science involves efficient and dense information transformation and consumption. The use of different information channels in this field constitutes the current research topic.

3. METHODOLOGY

The expectations described in the preceding section were tested in the context of the use of different information channels for research inquiry by faculty in the Department of Computer Sciences at the Periyar

University, Salem in June 2009. All participants were interviewed in the campus to allow for easy access to supporting materials as examples to describe work practice. After explaining the identity, the purpose of the research and assuring the confidentiality of the interview, the researcher asked initial questions in a relatively structured way to get the basic understanding of the general research practice and resources used.

Table 1 Key Themes and Conveyances

Electronic Reference Sources	Conferences	Computer Mediated Communications	Interpersonal Networks
World Wide Web and public access catalogs are used for online literature research to capture existing scientific work: ▪ identify and locate materials; ▪ track citations; ▪ obtain materials electronically.	Physical gathering and interpersonal communication in conferences have three major functions: ▪ facilitate socialization, friendship formation, and the creation of group identity; ▪provide the opportunities for getting involved in the current research discourse, learning latest research issues and practice, getting immediate feedback, and generating new ideas; ▪ enrich learning experience among scholars through meeting people within and across field boundaries.	E-mail as a major tool for computer mediated communications facilitates and extends: ▪ scientific conversation; ▪ scientific collaboration. But easy and spontaneous email communication reduces the sense and appearance of control, thus: ▪ increase the ambiguity of received information; ▪produce information Overflow; ▪ lower the quality of information content.	The physical and the interpersonal communication and interaction are the major practices during scholarly collaboration: ▪ By providing social and physical background, they facilitate coordination behaviors situated in social context; ▪ By permitting interactive exchanges between researchers, they facilitate active knowledge sharing process, in which scholars can solicit input for decisions, ask for advice on research, provide ideas, and share knowledge and skills.

3. ANALYSIS AND INTERPRETATION

3.1 Research Practice in Computer Science

An interview with a senior faculty based on the e-mail communication from the manager of the department reveals some contextual information about the life of Computer Science faculty at the Periyar University, Salem, a large research university. At this site, the faculty member is judged on three major contributions: research, teaching and service, within which research being the most important consideration and the other two being equally weighed. Research has three components: publications, grants and the letters of recommendation from other senior scholars in similar areas, the latter is given more weight, as to understand what the outside perception is on the faculty member research contributions to their areas because they go through a peer-reviewed process.

Publications in the conference are generally considered more prestigious than journal publications in Computer Science. Faculty members need to have several publications and especially have papers accepted at the top conferences in their areas by the time for tenure consideration.

In terms of scholarly collaboration, collaborating with the same person, especially with a particular senior colleague, is discouraged by tenure committees, but collaboration is viewed positively, if the scholar has done a number of collaborations. Based on the understanding of general research practice in Computer Science, the following sections elaborate the identified themes and major findings in this study.

Table 2 Online Information Search

Respondent	Comment
1	"If I look for papers, the first thing I do is to get on the Web."
2	"Often, if I know specific people who work in the area, I'll go to their websites because most people in Computer Science post their publications on personal websites."
3	"To access stuff, I find the two most useful things are the online Mathematical Reviews called MathSciNet and the online citation index."
4	"I think one advantage of electronic (resources) is in these indexes and abstracts. You can do phrase searching on abstracts. I do it a lot."
5	"One thing I find useful is these online archives, like JSTOR, which stands for Journal Storage. It has articles from the back issues of various journals. I use it if I know about a specific article and want to make a copy of it."

The respondents reported that electronic sources helped identify and locate materials, as well as obtain materials. The respondents reported using the World Wide Web as a reference source of first resort, for example, Google, personal websites or JSTOR. On-line public access catalogs, such as MathSciNet and Citeseer, are used greatly and are highly valued. The major aim of search for literature is to obtain and browse abstracts in the hope of finding relevant papers, which then are used as a basis for obtaining references and downloading full-text documents. Table 2 illustrates the evidence from the responses. Tracking citations is another essential factor in the acquisition of information for existing research work.

4. CONFERENCES

Table 3 Conference Participation

Respondent	Comment
1	"I usually attend two or three conferences each year. I tend to publish much more in conferences than in journals. In the Computer Sciences, I think that's normal. The turnout time is much faster. You have an opportunity to go and present the paper in front of people and get feedback. The whole process is intellectually stimulating."
2	"In conferences, you can get ideas for new projects as well as get feedback on old projects. I do both. If I give a talk, people will come. If I don't, I'll sit down during lunch with someone and say here is what I am doing, then I get responses. Or they tell me what they are working on, so I can generate some ideas."
3	"One source to know the latest results is going to conferences, seeing the titles of published papers and finding interesting ones. Sometimes, I contact the author asking for the paper."
4	"The important part of it is you see people from other institutions and learn about what they are doing To get this information through websites is harder. You have to spend forever to look through each person's website. Probably, it won't be so much fun."
5	"A conference is a very important source for getting some varieties. Going to conferences is an opportunity to interact with people in the same area but all over the world, which I couldn't interact with very easily otherwise."

Table 3 illustrates the relevant evidence from the responses. Edney (1976) [3] points out that physical propinquity and interpersonal interaction promote friendship formation and bonding processes. He indicates that bonding is facilitated by the contacts likely to occur between people occupying the same place and it is aided by the cognitive sense of unity and sharing a group identity. The primary positive effect indicated among the

respondents appears to relate to "being in the loop and being connected to a network of scientists and scientific activities"[5]. For example, one respondent commented on the importance of attending conferences, "the important part of it is you actually see people from other institutions and talk to them face-to-face about what they are doing and what they know about.

5. COMPUTER MEDIATED COMMUNICATIONS

The next theme in the scholarly community of practice is computer-mediated communication while bridges the temporal, spatial, and functional divides among scholars and facilitates scientific conversation and coordination. Electronic mail is one such technique that extends the established practice of face-to-face discussion and private correspondence in academic communication. The respondents perceived the use of e-mail as efficient, spontaneous, and having led to increased contact with other scholars. Such responses are illustrated in Table4. One major result inherent from the use of e-mail is much more various scientific collaborations.

Table 4 E-mail Use

Respondent	Comment
1	"It seems to me that the main advantage of technology is e-mail, fast communication."
2	"I use e-mail all the time, in terms of research, to communicate with my student assistants."
3	"With the advent of e-mail, the messages are usually much more spontaneous. That means really change. The media change the way things are written. Because it's so easy, you just type and say, I have the following ideas… and five minutes later, you send another e-mail with a new idea. You can send three emails a day to the same person with the same topic. That just wouldn't happen with the post, with which you think through what you want to say and maybe finally make a decision not to say at all."
4	"I have a colleague in Japan. We have been extremely efficient in communicating by e-mail. As he works at night and I work at daytime, we just type on the computer for nearly real-time conversation.

6. INTERPERSONAL NETWORKS

Interpersonal communication is an active knowledge sharing process. All the respondents reported that they had frequent face-to-face communications with other scholars. Through such interaction, they solicited input for decisions, asked for advice on research, provided ideas and shared knowledge and skills. Interpersonal conversations and group meetings also secure immediate information exchange. They provide people's feedback quickly without the distraction of other events and the space for delay, as otherwise in e-mail transactions.

Table 5 Interpersonal Communication

Respondent	Comment
1	"I think it's important to know people, talk to people, and get to know their ideas."
2	Colleague's everyday, I talk to people next door, hi, here is an idea I have, here are some problems I work on, and here is something I just did… That's useful for getting feedback immediately. Sometimes, you can encourage people to cooperate in your project."
3	"Sometimes, people do a project with a pretty big scope. It needs a lot of hands to accomplish… I consult someone who knows about certain pieces of information. I think no one person has enough knowledge to solve any problem. So, sometimes you want to work together with other people."
4	"…Person-to-person conversation is really something not to be replaced. I don't think that is a point."

7. CONCLUSION

The computer scientists in the current study developed their communication practice by getting to know other scholars in the research community through four major sources of information. Firstly, conferences and workshops provide the best opportunities for people to meet the others working in similar areas and keep up with the most recent development. Secondly, journals and conference proceedings contain the recent works that have been published by their authors. This would give the clue of whom to contact. Thirdly, a peer-reviewed conference has program committee composed of 8–20 people. Those committee members read all the submissions and usually meet together in one place for several days to discuss the works. Serving on those committees would help the scholars find out who are doing what, and meeting and discussing with colleagues in their interested fields. Lastly, on the Web, the scholars can easily search on keywords relevant to their research and find out who else are working in the same areas. All these information channels foster the social networking among the scholars in their communities of practice. The computer scientists in the current study developed their research practice by synthesizing information and knowledge from a variety of channels, including electronic media and interpersonal channels. The empirical results supporting the research expectation that the usage of electronic and face-to-face interpersonal communications is complementary for scientific inquiry in Computer Science. It furthers understanding of the underlying relationships among the different information channels and actual research practice.

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Scientometric Analaysis of Literature Output on Ascidians (1999-2008)

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Abstract

This article focuses on the research output and growth of research on ascidians literature during 1999-2008. The data have been downloaded from the Online PubMed database in the MEDLINE bibliographic format. The findings conclude that collaborative performance of authors competes single contribution and English language as the utmost medium for publication. The United States' contribution is higher when compared to other countries' contribution and the maximum outputs are articles published in journals. The growth pattern determines the need for further research on ascidians.

Keywords: *Ascidians, Ascidiacea, Sea squirts, Ascidians publication productivity, Ascidians literature sources, Ascidians research output, CDS/ISIS, Fangorn, Scientometrics, PubMed database*

1. INTRODUCTION

The key component of any research and development activity is based on evaluation [1]. The scientometric analysis has great impact because of the growth of literature of science. The developmental pattern and other characteristics may be highlighted because of scientometric studies [2]. This article presents the literature growth of ascidians (Ascidiacea) for a period of 10 years (1999 to 2008). Studies like this will determine various nature of research and provide data for further research.

2. ASCIDIANS (ASCIDIACEA)

Ascidians are also known as tunicates or sea squirts. They make out a significant component of fauna on the rocky shores. Ascidians belong to the Phylum Chordate. They appear to be leathery bags of water with two funnel-like external openings which they close when disturbed. They are fixed firmly to the substrate of rock, shell or sand by a coat made up of tunicis, whose molecular structure is similar to the cell walls of plants. The basic body structure is that of a hollow sack through which water is filtered"[3]". Ascidians are found all over the world, usually in shallow water with salinities over 2.5%. Sea squirts are sessile animals: they remain firmly attached to substratum such as rocks and shells. There are:

i 2,300 species of ascidians;
ii Three major types: solitary ascidians, social ascidians, and compound ascidians.

3. USES OF ASCIDIANS

i. Ascidians are called Lonely Planet as tasting like 'rubber dipped in ammonia' when they are consumed raw. The sea pineapples (alocynthia roretzi, hoya, maboya in Japan and Meongge in Korea are cultivated.
ii. Microcosmus sabatieri and several similar species from the Mediterranean Sea are eaten in France (figue de mer, violet), Italy (limone di mare, uova di mare) and Chile (piure), consumed ingredients in seafood stews like bouillabaisse.
iii. Pyura stolonifera is known as cunjevoi in Australia. This was once used as a food source by Aboriginal people, living around Botany Bay, but is now used mainly for fishing bait.
iv. In India, researches are being done to convert ascidians into food consumables especially in the form of pickles.
v. Ascidians still do get eaten by some creatures such as flatworms or nudibranch.
vi. Studying about ascidians helps us better understand the ancestry of vertebrates and our own biology [4].
vii. After being used for over a century as a model for embryological studies, ascidians became, in the past decade, an increasingly popular organism for

studying gene regulation. Part of the renewed appeal of this system is the use of electroporation to introduce transgenic DNAs into developing embryos [5].

viii. The Smith lab uses the ascidians notochord as a model for how cell signaling pathways, cyto skeletal components and the extra cellular matrix interact in chordate morphogenesis [6].

4. OBJECTIVES OF STUDY

i. To evaluate the authorship pattern of the ascidians literature
ii. To identify the growth as per the language
iii. To determine the countries of origin of the publications
iv. To study the forms/type of publications of the ascidians literature
v. To determine the major sources of publications and
vi. To analyze the research growth pattern

5. RESEARCH METHODOLOGY

Database for analysis: PUBMED a free source of information database, developed and maintained at the U.S. National Library of Medicine (NLM) located at National Institute of Health.

PERIOD of study : 1999 to 2008
KEYWORD used : ascidians

The field tags considered for study are AU, DP, LA, PL, PT, SO, PMID. 1545 records were downloaded in text format. Using FANGORN (microcomputer program for the conversion of databases to ISO-2709 format) the data converted into ISO format. For analysis the data were retrieved using CDS/ISIS (Computer Documentation System/ Integrated Set of Information System) and MS-OFFICE Excel.

6. DATA ANALYSIS AND INTERPRETATION

6.1 Authorship Pattern

The phenomenon on any literature research is confined to basically to authorship pattern characteristic apart from publishing pattern. From Table 1, it is inferred that three authorship collaborative contributions dominate the contributions of the solo author. The authorship pattern exceeds 29 author contributions and is pictorially represented in Figure 1.

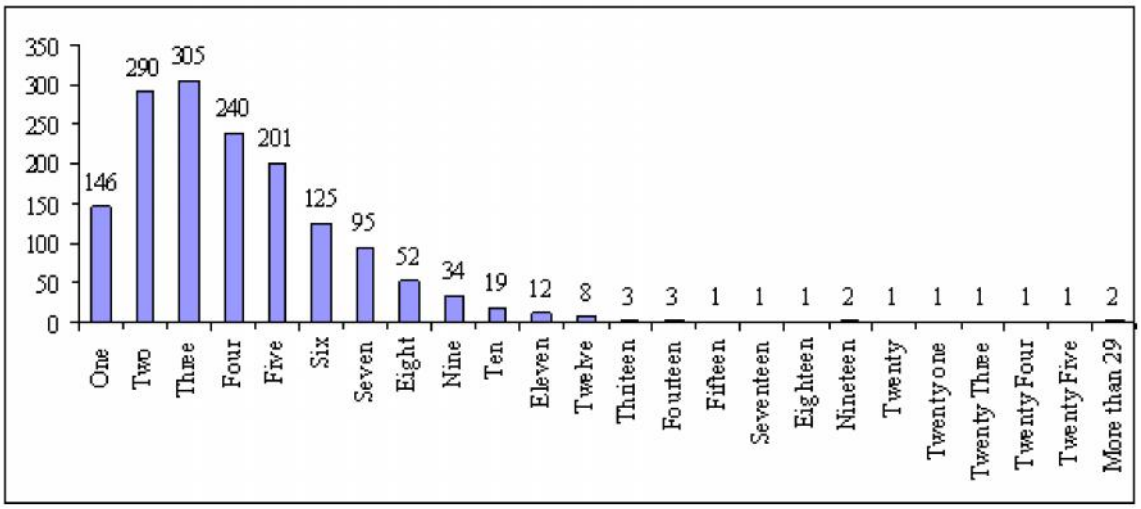

Fig. 1 Authorship pattern distribution (1999-2008)

Table 1 Authorship Pattern Distribution (1999-2008)

Year	One	Two	Three	Four	Five	Six	Seven	Eight	Nine	Ten	Eleven	Twelve	Thirteen	Fourteen	Fifteen	Seventeen	Eighteen	Nineteen	Twenty	Twenty one	Twenty three	Twenty four	Twenty five	More than 29	Total
2008	10	28	33	20	27	13	13	9	11	2	3	1				1				1	1				173
2007	10	37	34	29	22	14	11	8	4	3	2	1	1	1											177
2006	19	29	26	26	20	21	9	6	3	1	1														161
2005	20	20	35	22	19	16	9	4	1	2	2	1	1				1	1							154
2004	21	40	30	25	22	10	8	8	5	4		2							1					1	177
2003	14	30	39	36	24	21	15	8	4	5	1		1	1				1							200
2002	24	36	33	21	20	10	12	3	3	1	1			1	1									1	167
2001	12	27	26	24	19	5	7	1		1	2	2										1	1		128
2000	6	24	28	19	13	9	6	1	2																108
1999	10	19	21	18	15	6	5	4	1			1													100
1998	4	19	21	19	10	9		1	1		1														85
1997	9	15	16	18	12	8		3		2															83
1996	9	7	13	11	7	3		1	2					1											54
1995	6	14	13	11	2	2	2	1		1															52
1994	6	14	12	12	3	5			1																53
1993	5	10	15	11	7	4				1															53
1992	6	10	11	7	2	4	2																		42
1991	8	13	13	2	2	2	1	2																	43
1990	3	19	9	6	5			1																	43
1989	4	9	3	7	2	1	1	1		1															29
1988	4	12	7	6	2	2				1															34
1987	3	12	8	6	1																				30
1986	6	11	5	4	3	1			1																31
1985	8	7	6	4					1																26
1984	8	19	7		3			1																	38
1983	4	11	6	4	1	3	1																		30
1982	12	10	8	5	5																				40
1981	8	14	2	3					1																28
1980	11	10	4	1	1		1																		28
1979	12	11	6	5	2																				36
1978	6	12	4	2		1																			25
1977	10	11	10	1	1	1																			34
1976	4	6	6	2																					18
1975	15	9	1	2																					27
1974	10	8	7	2	2																				29
1973	5	9	1	2		1	1																		19
1972	5	9	1																						15
1971	1	2																							3
1969	1	1																							2
1968	1																								1
1967	2																								2
1966	2																								2
1965	1																								1
1963	1	1																							2
1962		1																							1
1960		1																							1
1959	1																								1
1954		1																							1
1950	1																								1
1948	2																								2
Total	350	608	520	393	274	172	104	63	41	25	13	8	3	4	1	1	1	2	1	1	1	1	1	2	2590

6.2 Language-wise Distribution of Publication Pattern

Table 2 represents the language wise distribution of publication pattern. From Fig.2, it is evident that English is the predominant language for researchers on ascidians to publish their findings. 97.54% publications are predominantly published in English while only 2.46% in other languages. Japanese language follows English language in this study. The contributions are only in 6 languages.

6.3 Country-wise Distribution Pattern

The country-wise distribution pattern represents the development of research in a particular field by a country. From Table 3 and Figure 3, it is obvious that United States contribute more (725 out of 1545) which is about 46.9% followed by England (349). Although there are 257 countries in the world, 23 countries have been pursuing research on ascidians, resulting in 8.95% contribution.

6.4 Publication Type Distribution Pattern

The characteristics of any literature study involve publishing pattern as the basic analysis. Table.4 manifests that the researchers publish their investigations mainly as journal articles (96.7%). The other forms of publishing pattern reflect only 3.3%. From Figure 4, the other 9 forms of publishing patterns are represented graphically.

Table 2 Language-wise Distribution of Publication Pattern (1999-2008)

Year	English	Japanese	Russian	French	Spanish	Chinese	Total
2008	172	-	-	1	-	-	173
2007	170	1	2	2	2	-	177
2006	157	1	2	-	-	1	161
2005	151	3	-	-	-	-	154
2004	173	2		2	-	-	177
2003	194	4	-	1	-	1	200
2002	166	-	1	-	-	-	167
2001	124	2	1	1	-	-	128
2000	102	2	2	1	1	-	108
1999	98	2	-	-	-	-	100
Total	1507	17	8	8	3	2	1545

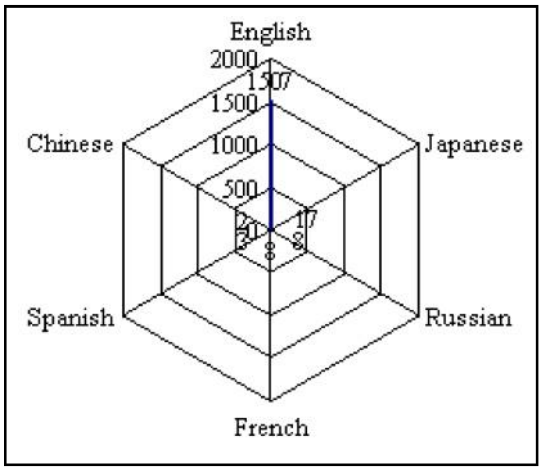

Fig. 2 Language-wise distribution of publication pattern (1999-2008)

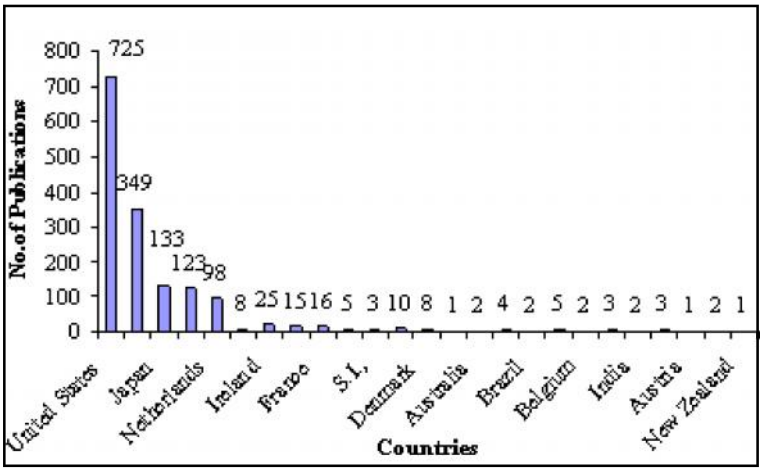

Fig. 3 Country-wise publication pattern (1999-2008)

Table 3 Country-wise Publication Pattern (1999-2008)

Year	United States	England	Japan	Germany	Netherlands	Italy	Ireland	Switzerland	France	Spain	S.L.	Russia	Denmark	Scotland	Australia	China	Brazil	Korea (South)	Belgium	Hungary	India	Costa Rica	Austria	Unknown	New Zealand	Total
2008	92	31	13	14	12	0	2	1	1	2	1							1		2	1					173
2007	83	48	12	11	14	0	1	1	2	0		2						1				2				177
2006	77	41	12	10	6	0	0	3	1	1		2		1	2	3	1								1	161
2005	81	38	17	6	7	1	0	0	2	0								2								154
2004	92	40	13	8	9	2	1	3	4	0			4					1								177
2003	82	39	24	20	21	1	4	4	2	0			1			1										199
2002	71	35	15	26	9	1	6	0		0		2					1							1		167
2001	59	30	10	8	6	1	4	2		1	1	1	2						1		1		1	1		129
2000	48	23	4	13	6	2	3	1	3	0		3								1		1				108
1999	40	24	13	7	8	0	4	0	1	1	1		1													100
Total	725	349	133	123	98	8	25	15	16	5	3	10	8	1	2	4	2	5	1	3	2	3	1	2	1	1545

Table 4 Publication Type Distribution Pattern (1999-2008)

Year	Journal Article	Comment	Letter	News	Biography	Congresses	Evaluation Studies	Clinical Trail	Historical Article	Interview	Total
2008	171	-	-	-	-	-	-	1	-	1	173
2007	172	2	1	2	-	-	-	-	-	-	177
2006	148	6	1	3	2	1	-	-	-	-	161
2005	151	2	-	1	-	-	-	-	-	-	154
2004	174	1	1	-	1	-	-	-	-	-	177
2003	194	1	1	1	-	-	3	-	-	-	200
2002	159	1	-	2	-	3	1	1	-	-	167
2001	122	1	1	1	1	-	1	-	1	-	128
2000	105	1	1	-	-	1	-	-	-	-	108
1999	98	1	-	-	1	-	-	-	-	-	100
Total	1494	16	6	10	5	5	5	2	1	1	1545

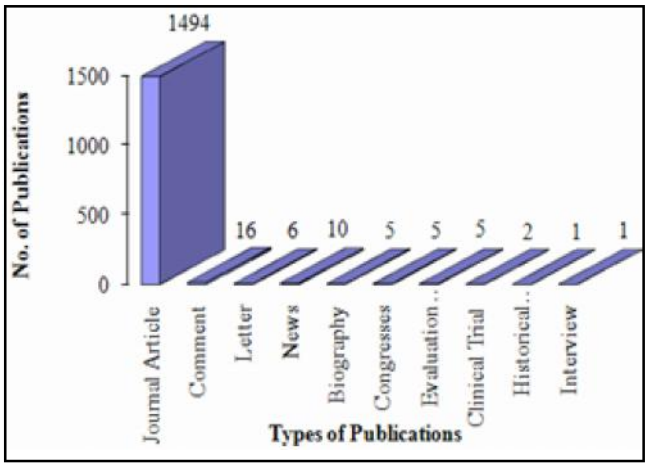

Fig. 4 Forms of publication distribution (1999-2008)

6.5 Sources of Literature

The sources of literature highlight the preference of researchers to publish their investigation results and the sources of publication project the most referred and preferred journals by the research community on a particular subject for further research. From Table.5, it is apparent that the research publications on ascidians are distributed widely over 337 journals and the Dev. Cell. (91 articles) stands first followed by Dev Genes Evol (64) and Development (60).

6.6 Research Output on Ascidians

Table 6 represents the growth of literature output on ascidians. The research reached its peak in the year 2003 with a maximum publication of 200 articles. From Figure 5, it was obvious that there was gradual increase in the number of publications from the year 1999 to 2003, and declination was there after the year 2003.

Table 5 Source of Publication Pattern (1999-2008)

Sl.No.	Journal Name	No. of Publications
1	Dev Cell	91
2	Dev Genes Evol	64
3	Development	60
4	Zoolog Sci	57
5	J Nat Prod	51
6	Proc Natl Acad Sci U S A	44
7	Dev Dyn	41
8	Dev Growth Differ	41
9	Gene	32
10	Org Lett	27
11	Biol Bull	23
12	Biochim Biophys Acta	21
13	J Biol Chem	21
14	Dev Comp Immunol	19
15	Science	19
16	J Org Chem	18
17	Nature	18
18	Comp Biochem Physiol B Biochem Mol Biol	17
19	Mol Biol Evol	17
20	J Comp Neurol	15
21	Mech Dev	15
22	Curr Biol	14
23	Genesis	14
24	J Am Chem Soc	13
25	J Exp Biol	13
26	Nat Prod Rep	13
27	BMC Evol Biol	12
28	Evol Dev	12
29	J Mol Evol	12
30	Bioessays	10
31	Biol Cell	10
32	Genome Res	10

33	Biochem Biophys Res Commun	9
34	Cell Tissue Res	9
35	Genome Biol	9
36	Mol Reprod Dev	9
37	Tanpakushitsu Kakusan Koso	9
38	Comp Biochem Physiol A Mol Integr Physiol	8
39	Differentiation	8
40	FEBS Lett	8
41	Genes Dev	8
42	Immunogenetics	8
43	J Cell Sci	8
44	J Exp Zool B Mol Dev Evol	8
45	Mar Biotechnol (NY)	8
46	PLos One	8
47	J Exp Zool	7
48	J Immunol	7
49	Mol Phylogenet Evol	7
50	Proc Biol Sci	7
51	Biofouling	6
52	Bioorg Med Chem	6
53	BMC Genomics	6
54	Eur J Biochem	6
55	Gene Expr Patterns	6
56	Glycobiology	6
57	J Med Chem	6
58	Mar Pollut Bull	6
59	Nat Prod Res	6
60	Nucleic Acids Res	6
61	Photochem Photobiol	6
62	Semin Cell Dev Boil	6
63	Appl Environ Microbial	5
64	Bioorg Med Chem. Lett	5
65	Cell Motil Cytoskeleton	5
66	Comp Biochem Physiol C Toxicol Pharmacol	5
67	Endocrinology	5
68	Gen Comp Endocrinol	5
69	Immunol Rev	5
70	Int J Dev Bio	5
71	J Inverteber Pathol	5
72	Med Sci (Paris)	5
73	Methods Mol Bio	5
74	Mol Ecol	5
75	Seikagaku	5
76	Adv Exp Med Bio	4
77	Angew Chem. Int Ed Engl	4
78	Biomacromolecules	4
79	Brain Res Bull	4
80	Cell	4
81	Chem. Pharm Bull (Tokyo)	4
82	Curr Opin Genet Dev	4
83	Dna Res	4
84	Int J Syst Evol Microbio	4
85	J Biochem	4
86	J Inorg Biochem	4
87	J Physiol	4
88	Lipids	4
89	Methods Cell Bio	4
90	Mol Immunol	4
91	Prog Mol Subcell Bio	4
92	Syst Parasitol	4
93	Trends Genet	4
94	Zygote	4
95	Acta Bio Hung	3
96	Aquat Toxicol	3
97	Biochem J	3
98	Biochemistry	3
99	Bio Pharm Bull	3
100	Brain Behave Evol	3
101	Cell Mol Life Sci	3
102	Chemosphere	3
103	Environ Microbio	3
104	Eur J Neurosci	3
105	FASEB J	3
106	J Agric Food Chem.	3
107	Microsc Res Tech	3
108	Mol Cell Bio	3
109	Nat Chem. Bio	3
110	Neurosci Lett	3
111	Oecologia	3
112	Philos Trans R Soc Lond B Bio Sci	3
113	Plos Bio	3
114	Rev Bio Trop	3
115	Riv Bio	3
116	Anticancer Agents Med Chem.	2
117	Anticancer Drugs	2
118	Arch Environ Contam Toxicol	2
119	Biomol Eng	2
120	Bioorg Khim	2
121	BMC Cell Bio	2
122	Cancer Lett	2
123	Cancer Res	2
124	Chem. Commun (Camb)	2
125	Chem. Rev	2
126	Chemistry	2
127	Chromosome Res	2
128	Curr Med Chem. Anticancer Agenets	2
129	Dis Aquat Organ	2
130	Ecology	2
131	Eur J Cell Bio	2

132	Exp Parasitol	2
133	Farmaco	2
134	Genomics	2
135	Heredity	2
136	Immunity	2
137	Inrog Chem.	2
138	Int J Biochem Cell Bio	2
139	Int J Boil Sci	2
140	Int Rev Cytol	2
141	J Biochem Mol Bio	2
142	J Biotechnol	2
143	J Chem. Ecol	2
144	J Comp Physiol B	2
145	J Environ Bio	2
146	J Evol Bio	2
147	J Exp Zool A Com Exp Bio	2
148	J Lipid Res	2
149	J Mol Bio	2
150	J Morphol	2
151	J Oleo Sci	2
152	J Submucrosc Cytol Pathol	2
153	J Theor Bio	2
154	Lancet Oncol	2
155	Mar Environ Res	2
156	Matrix Bio	2
157	Med Res Rev	2
158	Micron	2
159	Mol Bio Cell	2
160	Mol Genet Genomics	2
161	Nat Med	2
162	Nat Rev Genet	2
163	Nahrwissenschaften	2
164	Ontogenez	2
165	Org Biomol Chem.	2
166	Peptides	2
167	Pharm Res	2
168	Physiol Genomics	2
169	Plos Comput Bio	2
170	Syst Bio	2
171	Water Res	2
172	Z Naturforsch C	2
173	Zh Evol Biokhim Fiziol	2
174	Acc Chem. Res	1
175	Acta Crystallogr C	1
176	Adv Biochem Eng Biotechnol	1
177	Am J Physiol Reul Integr Comp Physiol	1
178	An Acad Bras Cienc	1
179	Anal Biochem	1
180	Ann N Y Acad Sci	1
181	Antimicrob Agemts	1
182	Antimicrob Agents Chemother	1
183	Antonie Van Leeuwenhoek	1
184	Apoprosis	1
185	Appl Microbio Biotechnol	1
186	Arch Pharm Res	1
187	Biochem Pharmacol	1
188	Bioconjug Chem.	1
189	Biofactors	1
190	Bioinformatics	1
191	Bio Lett	1
192	Bio Rev Camb Philos Soc	1
193	BMC Bio	1
194	BMC Dev Bio	1
195	Braz J Med Bio Res	1
196	Breast Dis	1
197	C R Acad Sci Iii	1
198	C R Bio	1
199	Cancer Invest	1
200	Carbohydr Res	1
201	Cell Bio Int	1
202	Cell Cycle	1
203	Cell Death Differ	1
204	Cell Mol Bio (Noisy-Le-Grand)	1
205	Cell Stem Cell	1
206	Cell Stress Chaperones	1
207	Cehm Bio Interact	1
208	Clin Cancer Res	1
209	Clin Dev Immunol	1
210	Comp Biochem Physiol C Pharmacol Toxicol Endocr	1
211	Xonf Proc Ieee Eng Med Bio Soc	1
212	Connect Tissue Res	1
213	Curr Med Chem.	1
214	Curr Opin Biotechnol	1
215	Curr Opin Immunol	1
216	Curr Pharma Des	1
217	Curr Top Dev Bio	1
218	Curr Top Med Chem.	1
219	Dold Biochem Biophys	1
220	Dold Bio Sci	1
221	Drugs R D	1
222	Eco Appl	1
223	Ecotoxic Environ Saf	1
224	Ecotoxicology	1
225	Elctronphoresis	1
226	Eur J Histochem	1
227	Eur J Protistol	1
228	Evolution	1
229	Exp Clin Immunogenet	1
230	Expert Opin Investing Drugs	1
231	Febs J	1
232	FEMS Microbio Ecol	1

233	FEMS Microbio Lett	1
234	Fish Shelfish Immunol	1
235	Fly (Austin)	1
236	Gan To Kagaku Ryoho	1
237	Genes Genet Syst	1
238	Genetica	1
239	Genetics	1
240	Genome Dyn	1
241	Genome Inform	1
242	Gig Sanit	1
243	Glycoconi J	1
244	Hear Res	1
245	Hum Genomics	1
246	IEEE/ACM Trans Comput Bio Bioinform	1
247	Immunobiology	1
248	Immunopharmacology	1
249	Int J Radiat Bio	1
250	IUBMB Life	1
251	J Am Soc Mass Spectrum	1
252	J Anat	1
253	J Appl Microbio	1
254	J Bio Inorg Chem.	1
255	J Biomed Mter Res B Appl Biomater	1
256	J Biomol NMR	1
257	J Cell Biochem	1
258	J Chromatogr B Analyt Technol Biomed Life	1
259	J Environ Radioact	1
260	J Environ Sci Health B	1
261	J Ethnopharmacol	1
262	J Exp Mar Bio Ecol	1
263	J Exp Med	1
264	J Gen Appl Microbio	1
265	J Ind Microbial Biotechnol	1
266	J Mass Spectrum	1
267	J Microbio Biotechnol	1
268	J Neurobio	1
269	Neurochem	1
270	J Neurophysiol	1
271	J Neurosci	1
272	J Neurosci Methods	1
273	J Pept Res	1
274	J Pharm Biomed Anal	1
275	J Soc Bio	1
276	J Steroid Biochem Mol Bio	1
277	J Struct Bio	1
278	J Thromb Haemost	1
279	J Zhejiang Univ Sci B	1
280	Langmuir	1
281	Lung Cancer	1
282	Magn Reson Chem.	1
283	Mar Drugs	1

Table 6 Growth of Ascidians Literature (1999-2008)

Year	Total	Cum.Total	%	Cum.Total %
2008	172	1545	11.20	11.20
2007	177	1372	11.46	22.65
2006	161	1195	10.42	33.07
2005	154	1034	9.97	43.04
2004	177	880	11.46	54.50
2003	200	703	12.94	67.44
2002	167	503	10.81	78.25
2001	128	336	8.28	86.54
2000	108	208	6.99	93.53
1999	100	100	6.47	100
Total	1545	-	100	-

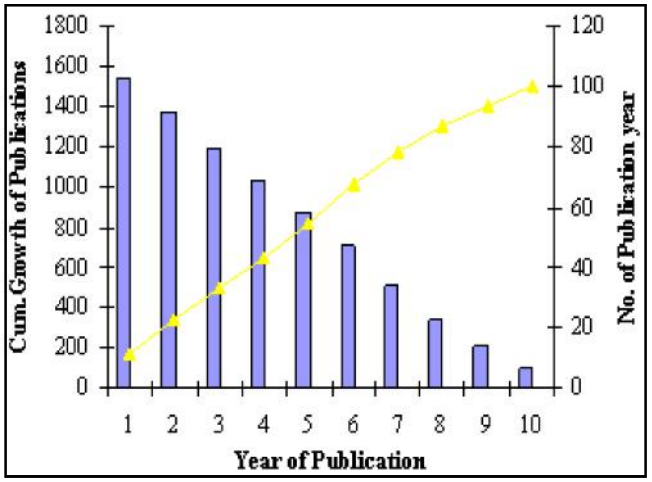

Fig. 6 Growth of ascidians literature (1999-2008)

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Automation of Veterinary College Libraries in India: Problem and Prospectus

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Abstract

This paper attempts to discuss the concept of automation status of Veterinary College Libraries in India. The study has also discussed the veterinary colleges, their objectives, status of automation, problems and prospectus. Attempt has been made to analyze various factors that directly or indirectly affect the progress of library automation such as management issues, ICT infrastructure,skills of staff. It concludes that in this competitive environment and to meet the various needs of users, there is a need for adoption of library automation and extend ICT based services to the users in Veterinary College Libraries.

Keywords: *Library Automation, Veterinary College Libraries*

1. INTRODUCTION

We live in an information age and libraries are expected to use Information and Communication Technologies (ICT) to provide information more expeditiously and exhaustively than before to veterinary scientists. Computerization of library "housekeeping" operations is an important activity in this context. "Automation," when used in a library or similar environment, refers to the computerization or mechanization of activities (Kumar, 1987)

Library automation which started in late 70s in few special libraries has now reached most of the universities and college libraries. It is yet to take off in college libraries in India owing to various problems. Now, we talk about digital libraries and e-journals. We have come a long way. But we are a country where bullock carts and cars are seen on the same road. So blocking the fast moving traffic and those bullock carts restrict the speed of the cars to its own speed. To overcome this problem, there are only two ways. First, replace the bullock cart with a car, and second, bypass the bullock cart and leave it behind. The state of library automation in our university libraries is more or less the same. We have libraries like IVRI, NDRI, ICAR, TANVAS, Chennai which are highly automated and through which the research process developing at a tremendous pace. On the other hand , old manual libraries are really restricting the speed of academic and research in the country.

This paper tries to identify the barriers, analyze the convenient steps in automating the veterinary college library and the technology available.

2. SIGNIFICANCE OF THE STUDY

In the developing country like India, animal husbandry plays a vital role in rural economy. It supplements household income especially for the landless, small and marginal farmers. It also provides subsidiary occupation in semiurban areas and for people living in hilly, tribal and draught-prone areas where crop output may not sustain the family. India is endowed with the largest livestock population in the world. As per livestock Census (2003), the country has about 18.5 crore cattle and 9.8 crore buffaloes which account for 14% of the cattle population and 57% of the world's buffalo population. The contribution of livestock to total GDP has remained steady between 4.8 and 6.2% since the last two decades; and its contribution to agriculture GDP has gone up from 13.8% in 1981 to 23.8% in 2002-2003 (www. livestock census, 2003).

Veterinary education is the most potential instrument for the social change and development. India stands number one in milk production and fourth in poultry production in the global market. Animal husbandry as compared to other agricultural products has several advantages such as relative stability in yield and price, regular cash flow throughout the year, utilization of family labour, use of crop residues, as cattle feed has helped in

laying a stable foundation for rural development. The Indian animal husbandry industry has acquired substantial growth from the Eighth Plan achieving annual output of over 100.9. India ranks first in the world in milk production which accounts for 15 percent of the world's total milk production. Country's milk output has not only placed the dairy industry first in the world, but also represented sustained growth in the availability of milk and milk products. Milk is now the largest contributor to the National GDP contributing about 5.3% to India's agricultural GDP even larger than rice and wheat combined. The value of output from milk at current prices during 2006-07 was over Rs. 144386 crore and contributes to nearly 70% of total livestock sector output. As many as 120 million rural families are engaged in animal husbandry (Pawar and Amrutkar, 2009).

3. VETERINARY EDUCATION: HISTORICAL PERSPECTIVE

Formal veterinary education began in the Western world in the 1760s in Lyon and Alfort in France with the establishment of first western veterinary colleges. The French colleges had high standards for producing well educated veterinarians who quickly addressed important animal health problems of the day and the new profession flourished. The first Anglophone College was established in London in 1791. The first successful colleges in North America were private institutions modeled after British Veterinary colleges. The New York Veterinary College was established in 1857 and the Ontario Veterinary College in 1862.

3.1 Pre-Independence Period

In Indian subcontinent, Veterinary education is as old as human civilization. Salihotra from the vedic period was considered as the "Father of Veterinary Science", an expertise in treating diseases of horse, elephant and cow. He wrote "Asvayueveda Sidhayoga Samgraha (Haya Ayurveda)" which was considered a standard equine therapy book. This is the reason, in earlier times the veterinarian was called as Salutri. Sushrut son of Salihotra was also a renowned surgeon and hundreds of surgical instrument suggested by him are still used in modern surgery. Palakapya a contemporary of Salhotra wrote "Hasthy ayurveda" a book on elephant treatment. Among Pandavas, Nakula wrote "Asva Chikitsa" (Horse treatmaent) and "Vaidyaka Sarvasva" (Medicine) and Sahadeva wrote "Gosastra" on cattle.

These activities lead to the establishment of an army veterinary department in India in 1827. A beginning in the formal education in veterinary science was made in the country in 1862, when a veterinary school was opened in Poona (Pune) mainly to train persons for the army veterinary department. Soon it was realized that attention should be paid to cattle population also since the diseases of cattle were spreading fast. This resulted in the appointment of Cattle Plague Commission in 1869. Some more veterinary schools came up subsequently, viz. at Hapur in 1879, Ajmer in 1881 and Simla in 1888. Another veterinary school was set up in Bombay in 1886. Following frequent recurrence of famine and outbreaks of diseases, several commissions were set up towards the end of the 19th century to go in to the question of cattle plague, and preservation and maintenance of health of bullocks. With the expansion of the civil veterinary departments, necessity for more veterinary colleges arose. The Bengal Veterinary College was opened in 1892 and the Madras Veterinary College in 1902. A fourth institution was opened in Patna in 1930. Primary objective of the education programme was to create a cadre of veterinarians to look after the health problems of domestic animals, and to manage the dairy herds maintained by the military and Government farms.

3.2 Post-Independence Period

When the country attained independence in 1947, there were 6 colleges with an intake capacity of about 300 students. As a result of partition of the country, Lahore Veterinary College was transferred to Pakistan and in order to accommodate the displaced students, the Punjab Government started the Hisar Veterinary College in 1948.

During 1955-56, there were 14 colleges with an intake capacity of about 1,300 students. By 1960, number of colleges increased to 17, including the newly established Veterinary College at Pantagar, under the UP Agricultural University, the first of its kind in the country. There are now 43 veterinary colleges in India offering composite programs in veterinary science and animal husbandry. The total intake of students in each college is around 60-70. Of the 42 colleges and one deemed university, 24 functions under Agricultural Universities; and 18 veterinary colleges functioning under the Universities of

Veterinary Sciences in different parts of the states in India.

The Agriculture Universities were mostly headed by Vice-Chancellors who were agriculture graduates, and because of a lack of vision they never devoted the necessary attention to developing veterinary sciences and fisheries. Financial support to these universities by the state governments was reduced and budget allotted by the authorities to veterinary and fisheries faculties remains both meager and disproportionate to the gross national product contributed by these sectors. The deterioration of veterinary and fisheries education under an agricultural university set-up led to the establishment of separate universities for veterinary and animal sciences, including fisheries in Chennai in Tamil Nadu in 1989, in Calcutta in West Bengal in 1995, in Nagpur in Maharashtra in 2001, in Bidar in Karnataka in 2004, at Tirupathi in the Andhra Pradesh states in 2005; and most recently in Punjab at Ludhiana in 2006. More veterinary universities are in the offering in the near future in many other states (Arvindan, 2002).

4. OBJECTIVES OF THE STUDY

The objectives of the study are

i. To find out how many libraries have undertaken automation
ii. To find out which areas are automated
iii. To find out whether sufficient staff is available to carry out automation
iv. To find out the barriers to automation faced by libraries

5. METHODOLOGY

Survey method has been employed to elicit information from the Veterinary College Libraries in India which has been imparting veterinary and animal science education. The libraries attached to their colleges cater to the information needs of the undergraduates, postgraduates, scientists and faculty members in the field of veterinary and animal husbandry.

The questionnaire and interview schedule has been pre-tested by conducting a pilot study at Madras Veterinary College, Chennai and based on their feedback and valuable input, i.e. questionnaire and interview schedule have been finalized. The population of the study consists of Veterinary College Libraries in India. There are 43 veterinary colleges in the country. Out of 43 Veterinary Colleges, 39 Veterinary Colleges located in different states of India responded with a response rate of 90.6%.

6. STATUS OF LIBRARY AUTOMATION IN VETERINARY COLLEGE LIBRARIES

This is an age of information and there is an increasing awareness about the importance of information. At this juncture, the researchers and the scientists find it difficult to keep pace with the growing information. They look forward to assisting the library staff to locate and retrieval of information. The library staff, on the other hand, find it impossible to organize the information manually. This crisis has resulted in the advent of technology in the libraries. The libraries of modern days are going in for computerization through which information can be handled efficiently.

The advent of microcomputers and availability of wide range of technological gadgets in library applications has opened up many possibilities for libraries to deliver information in ways that were not possible before, through effective development of exchange of databases. This development in Information Technology that includes computers, Communication Technology etc., provides significant opportunity for library and information centers to provide both domestic and international connectivities between itself and its users. Exploitation of this opportunity would help the librarians in providing online access to the most recent information available in the world. Thus, strong IT infrastructure is desirable in order to extend effective and efficient information services to the users in the veterinary science field.

6.1 Availability of Computer Facilities

Computer is one of the most powerful tools ever designed by man to solve problems that involve computing and processing of data. It can manipulate and transform all kinds of data at a tremendous pace. Due to information explosion, Computers have become essential for libraries to provide a master key to information repository and access to knowledge.

Table 1 Computer Systems Available in Veterinary College Libraries

No. of Computers	No. of Libraries	%
Less than 10 Systems	19	48.72
10 to 20 Systems	10	25.64
Above 20 to 30	10	25.64
Total	**39**	**100**

The present survey reveals that out of 39 libraries, 48.72% of libraries have less than 10 systems and 25.64% of libraries possess computers between 10 and 20 and 20 and 30. Computers are the basic IT infrastructure required not only for the LIS professionals to automate in-house activities and services, but also for the users for accessing OPAC and Internet facility. Viewed in this direction, the results are not encouraging as adequacy of computer systems is concerned. Therefore, efforts have to be made to procure more number of computer systems in Veterinary College Libraries in India.

6.2 Library Automation

The advent of computers has simplified most of the library operations. Computers can be effectively used for automating various in-house activities of the library. Mechanization of library and housekeeping operations performed predominantly by computers is known as library automation. Thus, automating library in-house activities and services occupy significant role in extending improved services to the users. In this context, to elicit the status of library automation among Veterinary College Libraries, Table-1a is presented.

Table 2 Status of Library Automation

Status of Automation	No. of Libraries	%
Totally Automated	03	7.7
Partially Automated	20	51.28
Manual System	16	41.03
Total	**39**	**100**

Out of 39 Libraries, very meager i.e., 7.7% of libraries are fully automated. However, 51.28% of Veterinary College Libraries are in the process of automating their operations i.e. from manual to computers. About 41.03% of libraries are still continuing with manual methods. Thus, present survey reveals that automation activities are not being used extensively in the veterinary college libraries in India. Although more than half of the Veterinary College Libraries indicated use of Library software, most of them are semi-automated and this is substantiated from Table1. Thus the result warrants for effective use of Library software and proper implementation to achieve total automation activities in the Veterinary College Libraries in India.

7. AREAS OF LIBRARY AUTOMATION

Activities related to acquisition of books, classification, cataloguing, books circulation, serial control, stock verification and book maintenance are traditionally called as house-keeping operations. The computers with significant capabilities are being used in the following areas of the library automation. The following are the areas where computers are being used at present.

Table 3 Areas of Library Automation

Sl. No.	Modules	No. of Libraries	%
1	Acquisition	8	20.52
2	Technical Processing (Cataloguing)	8	20.52
3	Circulation	8	20.52
4	Serials Control	7	17.94
5	On-line Catalogue (OPAC)	8	20.52
6	LAN facility in campus	13	33.33

The above Table reveals that out of 39 libraries, only 20.52% of libraries are using computers for in-house activities i.e. acquisition, cataloguing and circulation, where as 17.94% of libraries have computerized serial control activities and extending computerized (OPAC) catalogue services to their user communities. This is

followed by 33.33 percentage of libraries having LAN facility in the campus for accessing the off-line and on-line information.

7.1 Digitization of Documents

Today, the advent of information technology has paved the way for reducing the size of the libraries. In fact, modern libraries are moving towards smaller size but with rich potential information, because the virtual information systems are getting more popular these days in comparison to text based information systems. Therefore, digital libraries are today gaining more and more popularity amongst the library and their users.

In view of these advantages, many of the veterinary college libraries in India are digitizing their repositories for the easy accessibility by the user communities. Details of digitization in Veterinary College Libraries are shown in Table 27.

Table 4 Digitization Activities in Veterinary College Libraries

Digitization	No of Libraries	%
Rare Books	3	7.70
Theses	13	33.33
Back Volumes of Journals	3	7.70
Not Yet Planned	27	69.24

It is seen from table that 33.33% of the veterinary college libraries have digitized their theses collection for the easy accessibility, whereas 7.7 % of libraries have digitized rare books and a similar percentage of libraries has also been converting back volumes of the journals into digital format for ready reference by its users. However, the remaining 69.24% of libraries have not yet planned to digitize their documents. Thus, the concept of digitization activities among Veterinary College Libraries is at preliminary stage and needs to be enhanced.

7.2 Internet Connectivity

Internet has brought a new academic and research culture of understanding and co-operation providing a great boon to the Library and Information Centers in meeting the timely information by click of a mouse. The Internet is the biggest boon to have emerged in the past few years and is an indispensable tool for people in pursuit of knowledge and information. It is packed with both primary and secondary sources of information to track and one has to develop the ability to shift through millions of search engine hits. Most of the information products -data, reports and research papers are increasingly created in digital form and distributed universally through the various internet services such as WWW, E-Mail, FTP etc. In view of the significance of internet technology among academic and research community in meeting their nascent information needs, efforts have been made to know the status of internet connectivity available in the Veterinary College Libraries in India.

It is observed from table 28 that majority of the veterinary college libraries (87.1%) are extending internet facility to the users to support their curriculum and research needs. However, remaining 5 (12.9%) libraries have no internet facility.

Table 5 Internet Connectivity in Veterinary College Libraries

Internet Facility	No of Libraries	%
Yes	34	87.1
No	5	12.9
Total	39	100

The data of the present table need to be analyzed in the context of the data in Table 4. As found in Table 23, the computer availability in Veterinary College Libraries is encouraging. Therefore, the results state that majority of Veterinary College Libraries are extending Internet facility. Internet service with sufficient computer terminals is very essential, if the users have to access the internet. Thus, it is necessary for the colleges to provide more Internet nodes to the users.

8. PROBLEMS FACED BY THE LIBRARY

Problems to automation are tabulated in the below mentioned table.

Table 5 Barriers of Automation

Sl. No	Problems	No. of Libraries
1	Insufficient Funds	25
2	Inadequate Staff Training	18
3	Lack of Staff	28
4	Lack of User IT Knowledge	26
5	Problems from Higher Authorities	16
6	Lack of Space	14

Traditional barriers like insufficient funds, lack of space, and lack of training are the problems faced by many veterinary college libraries in India.

9. SUMMARY OF FINDINGS

i. More than one third of libraries (35.9%) do not have full time professional staff and are headed by non library professionals and only 10.3% of libraries are headed by a full time professional librarian.

ii. Professional qualification i.e. M.L.I.Sc is possessed by more than half of the number of librarians working in Veterinary College Libraries (51.2%). However, the percent of professional staff possessing M.L.I.Sc, M.Phil (12.82%) or M.L.I.Sc, Ph.D (10.26%) has been found to be very less.

iii. More than half of the library staff have participated and attended seminars, conferences and symposia in the field of Library and Information Science (58.97 %), Workshops (53.84%) and Refresher courses /Orientation Courses (56.41 %).

iv. All the Veterinary College Libraries are conducting user orientation programs to their users and about 89.75% of the libraries organize these user orientation programs every year.

v. Nearly half of the Veterinary College Libraries (48.72 %) have less than 10 computers in their libraries to manage and extend ICT based services to the users. While only 25.64 % of libraries possess computers between 10 and 20 and 20 and 30 computers.

vi. Only 7.7% of Veterinary College Libraries have fully automated their library systems and still 41.03% of libraries are still continuing with manual methods for all the in-house activities and services to the users. Among them, LIBSYS (20.52 %) and SOUL (33.33%) are the popular library software used for automating the activities of the libraries.

vii. One fifth of Veterinary College Libraries in India (20.52%) have been using the automated modules of the library i.e. Acquisition, Technical Processing (Cataloguing), Circulation and On-line Public Catalogue (OPAC).

viii. About 33.33% of Veterinary College Libraries are have LAN facility in the campus for accessing the off-line and on-line information.

ix. 33.33 % of the Veterinary College Libraries have been digitizing the theses collections.

x. Majority of Veterinary College Libraries are extending Internet facility to the users accounting to 87.1%.

xi. Majority of the Veterinary College Libraries (74.36%) subscribe to CeRA consortium (Consortium for e-Resources in Agriculture) accessing online journals and electronic databases available in the field of veterinary and animal sciences. About 30.76% of libraries are getting articles in the soft copies as a means of resource sharing among veterinary college libraries in India.

10. SUGGESTIONS

i. The results of the study have found that majority of the Veterinary College Libraries in India are adopting manual method or have partially automated their in-house library activities and services. About, only one fourth of Veterinary College Libraries are using cataloguing module for database creation, automation of acquisition, serials control and circulation module. Further, half of the Veterinary College Libraries in India have less than ten computer systems in their respective libraries, which reveal the weak status of ICT computing facilities.

ii. Network facilities have not been very encouraging especially among Veterinary College Libraries in India. On the contrary, majority of the Veterinary College Libraries in India (87.1%) offer internet facility, which questions the spirit of internet facility as the availability of computer systems is very meager in these Veterinary College Libraries in India. Sufficient number of internet nodes are essential to invoke and optimize the information resources available on the internet in addition to the national consortium e-resources. Having the internet

connectivity without better bandwidth and one-to-one facility is of hardly any use.

iii. CeRA (Consortium for e-Resources in Agriculture) is a consortium of e-journals in the field of Agriculture and Veterinary Science developed by Indian Council of Agricultural Research (ICAR), New Delhi, which provides access to major on-line Portals and Bouquet of Journals from Publishers with full text articles with a mission to develop the existing R & D information resource base of ICAR institutes/universities, etc., comparable to existing in leading institutions/organizations and create an e-access culture among Veterinarian Scientists/ Teachers in ICAR institutes/agricultural universities. Majority of the Veterinary College Libraries (74.36%) subscribe to CeRA consortium accessing online journals and electronic databases in the field of veterinary and animal sciences, but without sound ICT infrastructure such as computers systems, client-server architecture, network facilities and bandwidth is also a serious handicap.

iv. Staff of the library should be deputed for training courses to upgrade their IT Skills.

11. CONCLUSION

Having discussed the problems and areas of applications let us think of future prospects. Now all the University authorities realize that there is no way to escape automation among all veterinary college libraries. They find various ways to finance their library automation projects. Librarians also realize that they cannot remain indifferent to the change; otherwise, they will be labeled outdated. One area of concern is the library science graduates being produced by our library schools. It is surprising that ICAR/UGC is giving responsibility of refresher courses of library science to the library science school. Even though wide range of technology/products is available, it is necessary for librarians to keep an eye on the developments and to choose appropriate technology depending on the needs. Also, it is very important for librarians to interact with computer professionals as the library automation at all levels needs good co-ordination between these professionals.

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Application of Information Technology in Engineering College Libraries of Karnataka: A Survey

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Abstract

The paper presents that library professionals today need to acquire knowledge and skills in information and communication technology as the services of more and more libraries are now centering on information technology (IT), especially in educational institutions. Application of IT in academic environment in India has increased gradually in the recent decades, more particularly in Karnataka state. This paper is designed to measure the use of IT in the engineering libraries of Karnataka with an ulterior objective to establish some co-relation between quality in libraries and use of IT. The paper highlights the use of hardware and software facilities in engineering libraries. It also highlights the access of networks, information services and problems in IT applications. This article is based on part of a questionnaire survey conducted for the doctoral studies at University of Mysore, Mysore. The analysis of the data represents the extent and the level of IT application applied by the librarians of these engineering colleges under the study.

Keywords: *Engineering colleges, Information technology, IT application, Karnataka, Librarians, Libraries.*

1. INTRODUCTION

It is widely accepted that technological advances always bring revolution in all disciplines and convert our dreams in to reality. Similarly, advances in information communication technology are full with solutions for day to day problems of academic libraries [1]. Now, all the jobs involved in information processing can be done more effectively, efficiently and economically within less possible time with the help of computers and user friendly software [2]. Besides this compact discs or electronic media is an excellent solution for storage or space problems of libraries which can solve not only the space or storage problem but also capable to make information accessible anywhere and anytime [3]. Further, maximum utilization of available information or library collection is now possible due to IT application.

Development and use of information technology (IT) enable the libraries not only to offer their clientele the appropriate information available within their libraries but also provide access to information of other libraries, both local and outstations [4]. In this age, there is a greater responsibility on the part of the library and information centers to provide the latest and timely information to their users to facilitate improvement in the quality of education in the country and this cannot be done without each institution having an IT application on their library services [6]. To meet the current requirements, library professionals must be able to perform various tasks coping up with the changes in technological environment.

2. NEED FOR THE STUDY

Today's academic libraries are confronted with challenges on several fronts. They are information availability, rising costs, mega bookstores, online information providers, multimedia products, document delivery services, and other competitive sources of information that are apparently threatening their role and even their very survival. With evolving technological innovations and the variety and abundance of information that is available to information users, competitive pressures will continue to intensify academic libraries. The products / services introduced in library should match the requirements of intended users. This the present study highlights upon the application of IT in engineering college libraries in Karnataka.

3. OBJECTIVES OF THE STUDY

The primary objective of this study is to understand the nature of IT-supported resources, facilities and services provided in engineering college libraries in Karnataka. The main objectives of the study were conducted:

i. To survey the engineering colleges in Karnataka with regard to the background information about the library infrastructure and librarians
ii. To know the status of information technology (IT) based resources, facilities and services provided by the engineering college libraries in Karnataka
iii. to identify the types of IT based service possessed by the librarians under study and
iv. To know the impact of IT on library functions as perceived by library professionals and users

4. METHODOLOGY

This article is based on part of a questionnaire survey conducted for the doctoral studies at University of Mysore, Mysore. The opinions of librarians regarding IT application were elicited using a structured questionnaire, followed by interview. Opinions on different issues pertaining to the library house keeping operations were sought from the respondent libraries. The questionnaires were mailed to 128 engineering college librarians in the state, which of these 102 (79.69%) were received duly filled with all the relevant information requested in the questionnaire. However, geographically the scope of the study is limited to colleges located in the state of Karnataka only. The following Table 1 gives the list of all engineering colleges taken for the proposed study [5].

Table 1 List of Engineering Colleges Under the Study

1	Acharya Institute of Technology
2	Atria Institute of Technology
3	Acharya Patasala Col. Of Engineering
4	Alpha College of Engineering
5	AMC Engineering College
6	Amritha School of Engineering
7	B M S College of Engineering
8	B M S Institute of Technology
9	B N M Institute of Technology
10	B T L Institute of Technology
11	Bangalore Institute Technology
12	Basava Academy of Engineering
13	C M R Institute of Technology
14	City Engg. College
15	Dayanada Sagar College of Engineering
16	Don Bosco Institute of Technology
17	Dr. Ambedkar Institute of Technology
18	East Point College of Engineering
19	East-West Institute of Technology
20	Global Academy of Technology
21	Golden Valley Institute of Technology
22	H K B K College of Engineering
23	H M S Institute of Technology
24	Impact College of Engg. & Applied Science
25	JSS Academy of Technical Education
26	K N S Institute of Technology
27	K S Institite of Technology
28	Kalpataru Institute of Technology
29	M S Engineering College
30	M S Ramaiah Inst. of Technology
31	M V J College of Engineering
32	Nagarjuna College of Engg. & Technology
33	New Horizon College of Engineering
34	Nitte Meenakshi Institute of Technology
35	P E S Institute of Technology
36	P E S School of Engineering
37	R L J Institute of Technology
38	R N S Institute of Technology
39	R V College of Engineering
40	Rajeev Gandhi Institute of Technology
41	Reva Inst. Of Engg & Technology
42	Revana Sidd. Inst. of Technology
43	S B Mahaveer Jain College of Engineering
44	S J B Institute of Technology
45	S J C Institute of Technology
46	Sambhrama Institute of Technology
47	Saptagiri College of Engineering
48	Siddaganga Institute of Technology
49	Sir M V Institute of Technology
50	Sri Channabasveswara Ins. of Technology
51	Sri Krishna Institute of Technology
52	Sri Siddhartha Institute of Technology
53	Sri Venkateshwara College of Engineering
54	Sridevi Institute of Engg. & Technology
55	The Oxford College of Engineering
56	U.V.College of Engineering
57	Vemana Institute of Technology
58	Vivekananda Institute of Technology
59	Yellamma Dasappa Institute of Technology
60	Anjuman Engg. College for Men
61	BLDEA's College of Engg. & Technology
61	BVB College of Engg. & Technology
63	Gogte Institute of Technology
64	Hirasugar Institute of Technology
65	K.L.E.Society's College of Engineering

66	K.Law Society's V.D.Rural Int. of Technology
67	SDM College of Engg. & Technology
68	SECAB Institute of Engineering & Technology
69	Smt. K.S.V.M. Agadi Coll. of Engg & Tech.
70	Sri Tontadarya College of Engineering
71	Sri. B.V.V. S's Basaveshwar Engg. College
72	PDA College of Engineering
73	Appa Institute of Engg. & Technology
74	Basava Kalyan Engg. College
75	Bellary Engineering College
76	Guru Nanak Dev Engineering College
77	KBN College of Engineering
78	KCT Engineering College
79	Proudadevaraya Institute of Technology
80	Rural Engineering College
81	National Institute of Engineering
82	Adichunchanagiri Institute of Technology
83	Bahubali College of Engineering
84	Bapuji Institute of Engg. & Technology
85	BGS Institute of Techology
86	Coorg Institute of Technology
87	G S S S Inst. of Engg. & Tech. for Women
88	G.M.Institute of Technology
89	J N N College of Engineering
90	K V G College of Engineering
91	Malnad College of Engineering
92	Manipal Institute of Technology
93	Moodalkatte Institute of Technology
94	N M A M Institute of Technology
95	P A College of Engineering
96	P E S College of Engineering
97	S J College of Engineering
98	St. Joseph Engineering College
99	U.B.D.T. College of Engineering
100	Vidya Vikas Institute of Technology
101	Vidyavardhaka Collegeof Engineering
102	Vivekananada College of Engg. & Technology

5. ANALYSIS OF DATA AND DISCUSSION

5.1 Details of Questionnaires Distributed to Librarians and Responses Received

The current study received 102 completed responses from librarians of engineering college libraries in Karnataka, which constitute primary data for analysis and interpretation of 128 mailed questionnaires. The researcher received 102 responses resulting in (79.69%) response rate. The distribution of responses is shown in Table 2.

Table 2 shows that 78 out of 102 are from private colleges and 11 from minority institution, 9 from private aided colleges and 4 from university constituent colleges. They represent 76.47%, 10.79%, 3.92% and 8.82% of the total respondents. It may be observed that a large majority are private (unaided) colleges.

Table 2 Details of Questionnaires Distributed to Librarians and Responses Received

Sl.No.	Types of College	No. of Questionnaires Distributed	No. of Questionnaires Received	% of Responses
1	Government Colleges	2	-	0.00
2	Private Aided Colleges	11	9	8.82
3	Private Unaided Colleges	97	78	76.47
4	University Constituent Colleges	5	4	3.92
5	Minority Institution	13	11	10.79
Total		**128**	**102**	**100**

5.2 Distribution of Librarians According to their Experience

Table 3 shows that 28 (27.45%) librarians belong to the range of 6-10 years experience. 22 (21.57%) librarians are in the experience ranging between 21-25 years, 14 (13.73%) respondents are in the experience range between 16-20 years and more than 26 years. Similarly 12 (11.76%) have experience less than 5 years and it is the same for the range between 11-15 years.

Table 3 Distribution of Librarians According to their Experience

Sl. No.	Experience	No of Staff	%
1	< 5	12	11.76
2	6 to 10	28	27.45
3	11 to 15	12	11.76
4	16 to 20	14	13.73
5	21 to 25	22	21.57
6	26 and above	14	13.73
Total		**102**	**100**

5.3 Information Resource Collection: Print and Digital

Print and electronic documents are broadly considered for interpretations. The documents available in respondent libraries are summarized below in Table 4.

Table 4 Information Resource Collection: Print and Digital

Print Collection			
Sl. No.	No. of Documents	No. of Libraries	%
1	< 10000	20	19.61
2	10001 to 20000	37	36.27
3	20001 to 30000	15	14.71
4	30001 to 40000	3	2.94
5	40001 to 50000	15	14.71
6	50001 and above	12	11.76
Total		**102**	**100**

Electronic Digital Collection		
No. of Documents	No. of Libraries	%
< 1000	68	66.67
1001 to 2000	21	20.59
2001 to 3000	3	2.94
3001 to 4000	3	2.94
4001 to 5000	2	1.96
5001 and above	5	4.9
Total	**102**	**100**

Table 4 shows that 37 (36.27%) libraries have a collection that ranges from 10001-20000 books. Similarly 20 (19.61%) libraries have less than 10000 books. 15 (14.71%) libraries possess a collection that normally ranges from 20001-30000 and 40001-50000 books. However, 12 (11.76%) libraries have a collection ranging more than 50001 books, while only 3 (2.94%) libraries' collection range was from 30001-40000 books.

It is also observed from the above table that the collection of electronic documents is 68 (66.67%) libraries is less than 1000. Similarly, 21 (20.59%) libraries have collection ranging from 1001-2000 electronic documents. However, in each of the 3 (2.94%) libraries, collection range is from 2001-3000 and 3001-4000 electronic documents respectively, while in 5 (4.90%) libraries the collection ranges from 5000 electronic documents. Only 2 (1.96%) libraries have a collection range from 4001-5000 electronic documents.

5.4 Availability of Electronic Gadgets and Other Accessories in Libraries

The various service implications in libraries that depend on both hardware and software are essential along with some basic component without which it can not function smoothly. Keeping in mind the first objective of this paper, the researcher wants to know the infrastructural facilities available for automation. Here, the investigator has made an attempt to find out the electronic gadgets and other accessories available at the different libraries under the study and these are presented in Table 5.

Table 5 Availability of Electronic Gadgets and other Accessories in Libraries

Sl. No.	Description	No. of College Libraries	Percentage n=102
I Computers			
1	Pentium-IV	78	76.47
2	Pentium-III	24	23.53
3	Pentium-II	10	9.81
II Printers			
4	Inkjet Printer	43	42.16
5	DeskJet Printer	33	32.35
6	Dot matrix Printer	29	28.43
7	Laser Printer	17	16.67
III Barcode Reader / Printers			
8	Barcode Reader	80	78.43
9	Barcode Printer	53	51.96
IV Scanners			
10	Document Scanner	52	50.98
11	Scanner (OCR)	49	48.04
V Others			
12	CD NET (CD-ROM Tower)	79	77.45
13	CD-ROM/ DVD Drives	79	77.45
14	UPS (online/Offline)	88	86.27

Note: Total percentage will not be hundred because responses are more than one

Computers and Printers in Table 5 indicate that 78 (76.47%) libraries are using P-IV systems. Similarly 24 (23.53%) libraries are using P-III systems and only 10 (9.81%) libraries are using P-II systems. While seeing the collection of different kind of printers in the respondent libraries, there are 43 (42.16%) libraries using Inkjet printers, 33 (32.35%) DeskJet printers, 29 (28.43) Dot matrix printers and only 17 (16.67) Laser printers. Barcodereader/ scanner / printers: among the respondent libraries, 80 (78.43%) are using Barcode readers and 53 (51.96%) libraries are using Barcode printers. There are 52 (50.98%) libraries using document scanners and only 49 (48.04%) libraries are using OCR scanners. There are 79 (77.45%) libraries using CD-NET (CD-ROM Tower) and CD-ROM/ DVD Drives and 88 (86.27%) libraries have UPS facility available in the respondent libraries.

5.5 Software Facilities Available in Libraries

There are many utility software which are normally used in any system. They are DOS, Windows and Linux etc. Here, the investigator has made an attempt to collect the data relating to the utility and library software packages used by the librarians under this study. The data so collected is analyzed and presented in Table 6.

Table 6 Software Facilities Available in Libraries

Sl. No.	Description	No. of college libraries	Percentage n=102
I Operating System			
1	Windows 2000/Professional	46	45.10
2	Windows XP	22	21.57
3	Windows 2003	15	14.71
4	Windows 98	7	6.86
5	Linux	7	6.86
6	Other Operating System	12	11.76
II LM Software Packages			
1	Libsoft	32	31.37
2	EasyLib	20	19.61
3	In-house	8	7.84
4	Netlib	5	4.90
5	Smart Campus	5	4.90
6	LiMS	3	2.94
7	ie-Lib	2	1.96
8	E-Granthalaya	2	1.96
9	SOUL	2	1.96
10	Libsuite	1	0.98
11	SLIM ++	1	0.98
12	Chancellor	1	0.98
13	Pal Pup	1	0.98
14	NewGenLib	1	0.98
15	Libsys	1	0.98
16	YLAS	1	0.98
17	IOZEN	1	0.98
18	Lib-Manager	1	0.98

Note: Total percentage will not be hundred because responses are more than one

Operating System: Among the total respondents, 46 (45.10%) libraries are using Windows 2000/Professional, 22 (21.57%) libraries are using Windows XP, 15 (14.71%) libraries are using Windows 2003, whereas only 7 (6.86%) libraries are using Windows 98 and Linux operating systems, but 12 libraries are using other operating system.

LM Software Packages: Table 4 shows that majority of respondents are (32; 31.37%) using Libsoft, 20 libraries are using EasyLib. It is interestingly observed that 8 libraries are using in-house software, 5 libraries are using Netlib and 5 libraries are using Smart Campus. Similarly, 3 libraries are using LiMs software, followed by ie-Lib, E-Granthalaya, SOUL software packages are used by 2 libraries. Single installations software like the Libsuite, SLIM++, Chancellor, Pal Pup, NewGenLib, Libsys, YLAS, IOZEN and Lib-Manager are used in the remaining libraries.

5.6 Technology Based Infrastructure and Services

The various service implications in libraries that depend on both hardware and software are essential along with some basic component without which it cannot function smoothly. Network Table 7 shows that 88 (86.27%) libraries are networked and 14 (13.73%) libraries are not networked. Types of network: out of 88, there are 67 (76.14%) libraries in Local Area Network (LAN) facility and 21 (23.86%) libraries have Wide Area Network (WAN) facility.

Table 7 IT -Based Equipment and Facilities

Networking Status		Types of Networking		Status of Consortia		Status of Automation		Types of Library Consortia					
								DELNET		INDEST		Both	
Yes	No	LAN	WAN	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
88 (86.27)	14 (13.73)	21 (20.59)	67 (65.69)	88 (86.27)	14 (13.73)	88 (86.27)	14 (13.73)	81 (86.27)	21 (13.73)	43 (42.16)	59 (57.84)	43 (42.16)	59 (57.84)
102 (100.00)		102 (100.00)		102 (100.00)		102 (100.00)		102 (100)		102 (100)		102 (100)	

Consortia: Table 7 exhibits that 88 (86.27%) libraries were under consortia and 14 (13.73%) libraries were not under consortia.

Types of Consortia: 86.27% of libraries have joined the DELNET consortia. Similarly, 42.16% of libraries are INDEST members.

Automation: Out of 102 respondent libraries of which 88 (86.27%) libraries are automated and remaining 14 libraries are not automated their house keeping operations.

5.7 Services Provided at Libraries

The engineering college libraries are considered as the service agencies to academic and research community as well as to the users.

Table 8 Services Provided at Libraries

Sl. No.	Descriptions	No. of Libraries	%
I Manual			
1	Reference Service	75	73.53
2	Landing Service	14	13.73
3	CAS/SDI	-	0.00
4	Indexing Service	-	0.00
5	Abstraction Service	-	0.00
6	Bibliographic Service	18	17.65
7	Inter-Library Lone Service	75	73.53
8	Reprographic Service	102	100.00
9	Press Clipping Service	88	86.27
10	Translation Service	-	0.00
11	Consultancy Service	18	17.65
12	Orientation Of Users	88	86.27
II Mechanized			
13	Photocopying Service	102	100.00
14	Microfilming	-	0.00
15	Microfilm Reader	03	2.94
16	Audio–Video Service	45	44.12
III Computerized			
17	Lending Service	88	86.27
18	CAS/SDI	42	41.18
19	Automated Translating	-	0.00
20	Multi-Media Service	88	86.27
21	E-Mail	88	86.27
22	Teleconferencing	-	0.00
23	Hypermedia	12	11.76
24	Online Searching	42	41.18
25	CD-ROM Searching	88	86.27
26	Technical Communication	-	0.00

The faculty, scholars and the students have been served with different services in their libraries through manual and computerized retrieval system.

Table 8 depicts the library and information services provided by engineering college libraries in all manners, i.e. manual, mechanized and computerized. 75 libraries provide reference and interlibrary loan services manually. 88 libraries provide orientation service and 18 libraries provide consultancy service, bibliographic service and 14 libraries lending service manually-no library provides CAS/SDI, indexing and translation services. All the libraries provide mechanized photocopy service. Three libraries provide mechanized microfilm reader service to its users; whereas 45 libraries are providing audio, video service and 42 libraries are providing computerized CAS/SDI service and online service. Multimedia service and CD-ROM search service are being provided by 88 libraries, respectively. No library provides automated translation service and technical communication service.

5.8 Status of Computerized House Keeping Operations in Libraries

Library automation means not only entering and reading the data on the computer, but the different functional areas of a library which should also be automated. Hence, the investigator made an attempt to collect data from automating the functional areas of the library. The information obtained is summarized and presented in Table 9.

Table 9 Status of Computerized House Keeping Operations in Libraries

Sl. No.	Modules	No. of Libraries	%
			n=102
1	Administrative Module	88	86.27
2	Catalogue	88	86.27
3	Circulation	88	86.27
4	OPAC	80	78.43
5	Web OPAC	23	22.55
6	Acquisition	22	21.57
7	Serials Control	19	18.63
8	Stock Verification	80	78.43

Note: Total percentage will not be hundred because responses are more than one

Table 9 exhibits that the administrative module, the cataloguing and the circulation module are functioning 86.27% in respondent libraries, 80 libraries are using OPAC module functions and stock verification, respectively. 23 libraries are using WEB OPAC module functions. The other automated module functions that is 22 (25%) libraries data acquisition are used, while 19 (21.59%) libraries employ serials control module. The reasons could be attributed to different practices followed by respondent libraries.

5.9 Impact of IT Application

Table 10 presents the respondents' view on the impact of IT application on different engineering college libraries. 9 variables were identified and librarians were asked to rank them in ascending order on these variables. 88 libraries rated improved access to library collection as number one. The 2nd ranked variable was unanimously allotted to improving the speed of technical processing and making a document available faster to the end users by all the engineering college libraries. The 3rd rank was given to offering improved resource sharing among member library, followed by improving co-operation to participate and utilize national and international database through computer networks/internet and so on.

6. CONCLUSION

The significance of IT lies in its role as a catalytic agent. Today there is no area which has not been influenced by information technology. IT mainly helps to provide timely information and facilitates real-time access to remote databases. The importance of information lies in its accessibility and utilization by users for productivity and decision-making. Technology remains one of the primary drivers of change in the ways that people work, seek information, communicate and entertain themselves. In an academic environment, no unit has been transformed by technology than library. The libraries need to reorganize their physical space to make technology-enabled resources both more readily available and widely used. Library and information professionals should add new IT skills to their current capabilities in order to help users overcoming their anxieties about the new world of networked and digitized information and assist them to navigate through it. In this regard engineering college librarians have to be

Table 10 Impact of IT Application in Engineering College Libraries

Sl. No.	Impact of IT Application	No. of Librarians	% N=102	Rank
1	Improves access to library collection	88	86.27	I
2	Improves the speed of technical processing and make a documents available faster to the end users	87	85.29	II
3	Helps to offer improved resource sharing among member libraries	86	84.31	III
4	Improves co-operation to participate and utilize national and international database through computer networks/Internet	85	83.33	IV
5	Improves the prestige and visibility power of library	80	78.43	V
6	Improve the quality of existing library services	79	77.45	Vi
7	Provides update and comprehensive information to the library and users	68	66.67	VI
8	Reduces house keeping work of the library	60	58.82	VIII
9	Reduces the number of library professionals/ non professionals staff required	42	41.18	IX

serious in developing their own proficiency as well as finding out how to develop the professional competency in general. Since the users are more prone to on-line and electronically delivered services, the growing role of the librarian in engineering colleges would lie in information counseling, training, advising users on services and information products appropriate to their needs and how best to use them. This is the time that necessitates innovative ways of thinking about services, collections, information access and also our roles as academic librarians. Being prepared to manage changes can furnish us with the ability to flourish.

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Web-based Reporting About Health Information: A Study

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Abstract

In this paper, the author says that today's world information holds so much importance to a person's living that it's a integral part of everyday life like food, air and shelter. The author has prepared this technical survey after going through newsgroups on the web, regarding the Health Information news groups retrieved specific to the Asia. He holds that the leading dailies contain more than five to ten percent health news and suggest their subscription to all health science libraries. The paper, among other things also suggests to have at least an yearly cumulative health news bulletin news stories in form of e-information or content page services which would be very helpful to the health researchers, health administrators and others concerned with Health Information.

Keywords: *Health Information, Web-based Report*

1. INTRODUCTION

The internet has today reached the stage where it cannot be ignored anymore as a communication medium. Today, in most of the countries anyone can gain access to the internet and express his/her thoughts through different services like E-mail, WWW, Newsgroups, Discussion forums, Internet Relay Chat, etc. There is no systematic attempt made to study the behaviour of this interactive media, which has led the investigator to examine the reactions to "Health Information" based on the messages posted in various Usenet newsgroups with emphasis on volumes and distribution.

Health information is required to all the human beings. Therefore, keeping in view the investigator has searched the data related (HI) especially from June 22nd to July 22, 2010, great coverage to issues related to Health Information. Therefore, it decides to examine the public interest to host about the health information on the web. The impact in poor countries is likely to be greatest, due to limited health care resources and poor health and nutritional status of the population. Clearly, the most important immediate intervention is to contain as rapidly as possible the current health information, emergency, thereby reducing the likelihood of the emergence and spread of a new health information on Diseases, Health Care Development, Food and Nutrition and Environmental Health. Implementing measures for the containment of the spread of HI and reducing its burden on the population will require time and a major coordinated global effort. During the initial phase of the top stories and Science/Health outbreak with pandemic potential, efficient surveillance focused and timely public health measures may slow down the national and international spread of the HI, thereby buying precious time for global pandemic response measures to be implemented.

The number of newsgroups is huge (AltaVista.com). Some of them are local and propagated only to a few sites, others are much more widespread and are sometimes even called "World" newsgroups (mainly those name starts with Top stories, Science/Health, Business and Sports etc.). The purpose of this study is to examine the applicability of internet information techniques to this means of "Publication and Communication - Usenet newsgroups. Research usually carried out on refereed, scientific literature, a very different setting from the un-moderated nature of the newsgroups. The growth function of scientific literature indicates changes in the attitude and the interest of the participants in the issue. One expects that the number of messages is greatly influenced by developments or turning points in the issue that the interest "dies down" as it loses its nascence.

In order to gain a deeper understanding of the nature of news items, their contents should be analyzed. Here an attempt has been made to study the growth of the accumulated messages on the net by identifying a core of newsgroups dealing with the subject and examined several other characteristics of the messages.

2. OBJECTIVES

The objectives of the study are:

i. To understand the reactions of users on the Internet towards messages posted on Top stories and Science/ Health
ii. To examine the daily growth of messages in the various newsgroups using AltaVista
iii. To analyze the messages scattered in various sub-newsgroups like Diseases, Health Care Development, Environmental Health, Food Nutrition and Yoga and physical fitness

3. METHODOLOGY

Large number of search engines are available on the World Wide Web (WWW) containing newsgroups. For the study, the most popular search engine AltaVista has been selected because of its search abilities and its appealing display of the search results. The searches were carried out for a month from June 22nd to July, 22 2010s [1] Top Stories and [2] Science/Health region have covered only to the Asia specific. The Disease crisis reached its peak on the both newsgroups. AltaVista newsgroups search which allows to limit the search by the date of creation of the news items. The newsgroups selected for searching phrases are Diseases, Health Care Development, Environmental Health, Food and Nutrition and Yoga and physical fitness. These an shown in Figure 1and 2.

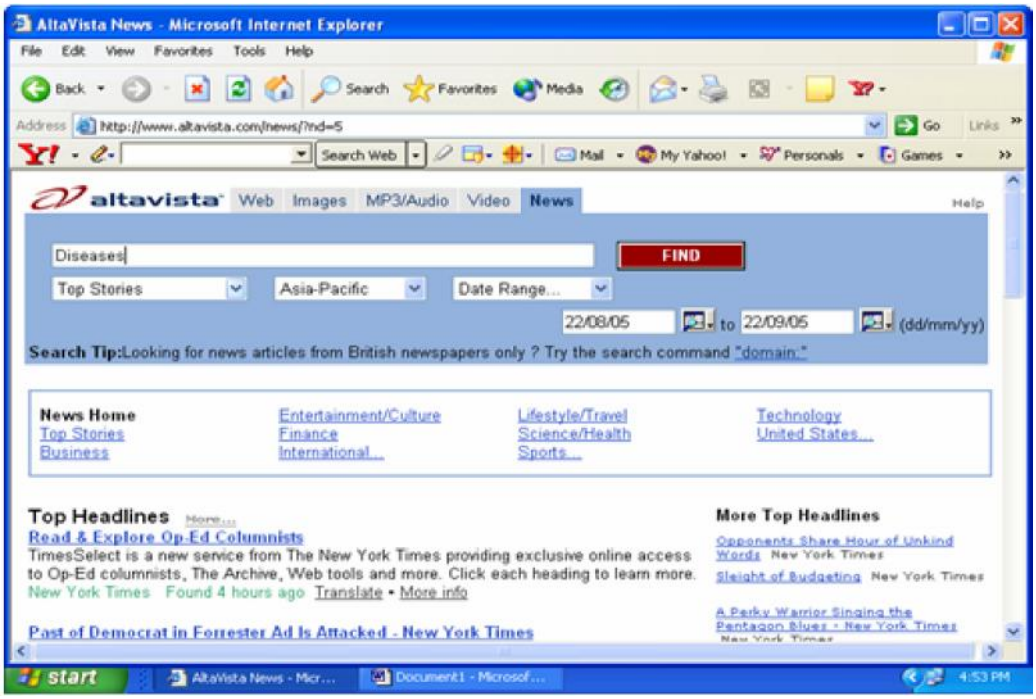


Fig. 1 Results of a AltaVista search

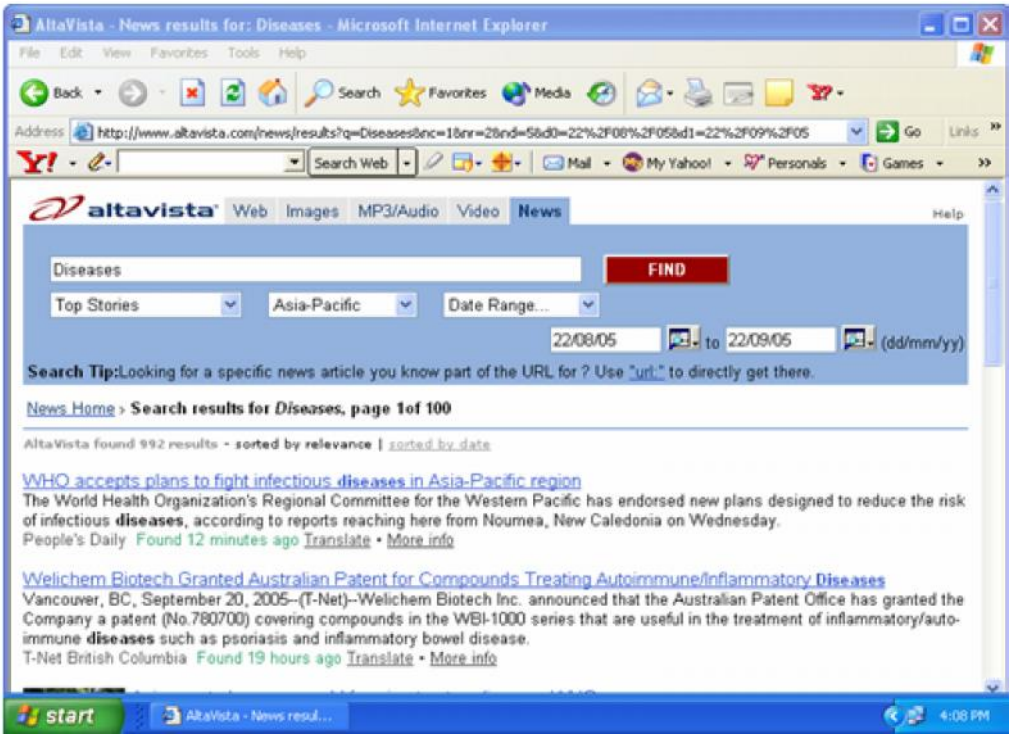


Fig. 2 Results of a AltaVista search

The information gathered from the internet has been processed before it could be analyzed. The total number of monthly news items was calculated and total number of monthly messages per search phrases was recorded. The resulting file is fed in to Microsoft Excel 5.0 for statistical analysis. This process has been carried out for each search phrase separately.

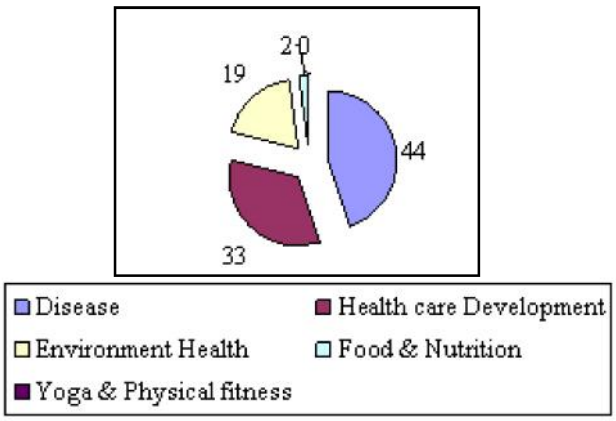
4. RESULTS

The following are the salient results of the Table 1 that show the coverage of the subject in different news groups as well as the sub areas covered by them.

Among the newsgroups, it is seen that top stories (Asia specific) of the newsgroup carries more health information pertaining to the 'Diseases' about (44%) followed by 'Health Care Development' which also carries good percentage about (33%).

Table 1 Top Stories (Asia Specific), Subject Analysis of Health Information (June 22nd to July 22, 2010)

Sl. No.	News Groups – Top Stories	June 22nd to July 22, 2010	% of News Groups
1	Disease	987	44
2	Health care Development	750	33
3	Environment Health	432	19
4	Food & Nutrition	48	02
5	Yoga & Physical fitness	5	00

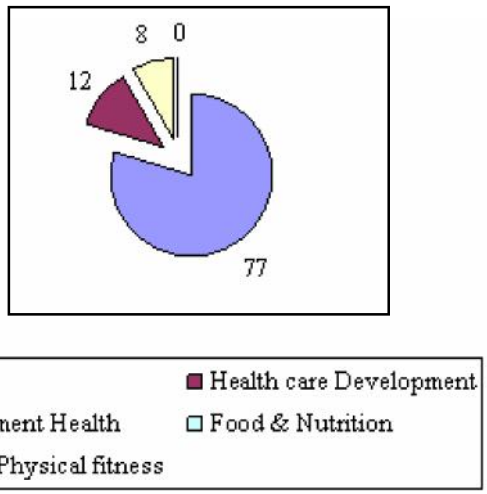


The following are the salient results of the Table 2 that shows the coverage of the subject in different news groups as well as the sub areas covered by them.

Among the newsgroups, it is seen that Science/ Health (Asia specific) of the newsgroup carries more health information pertaining to the 'Diseases' about (77%) comparing to the Table 1 followed with 'Health care Development' carries very less percentage about (12%).

Table 2 Science/Health(Asia specific)

Sl. No.	News Groups – Science/Health	June 22nd to July 22, 2010	% of News Groups
1	Disease	366	77
2	Health care Development	61	12
3	Environment Health	40	8
4	Food & Nutrition	4	-
5	Yoga & Physical Fitness	1	-



5. CONCLUSION

One can provide a news article to the specific domain which may be stored in the server to help the scholars in near future. The growth of "literature" can be explained reasonably well by the logistic growth function by applying the newsgroups to some extent and identified "Core Newsgroups". There are much large number of items pertaining to "Diseases" when compared to Health Care Development, Environmental Health Food and Nutrition and Yoga &and physical fitness, as Disease is the popular name of the illness used by the public in general. Even, the monthly messages on an average for each search term i.e. Disease and Health Care Development are resulted more comparing to the other newsgroups during the period from June 22nd to July, 22nd 2010, the messages on 'Diseases' seem to be dominated.

The web newsgroup service of health information plays a vital role for the dissemination of current information on health and related areas. All the health science libraries and other special libraries may produce newssgroup services to the users along with the other services. Thus it may form part of integrated improvement of information activities.

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A Study of Use Behaviour of Library Users with Special Reference in Kongunadu Arts and Science College, Coimbatore-641 029, Tamil Nadu

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Abstract

Periodicals are the main source for updation of current knowledge in general and subject area for the college students and staff. The journals are very important to provide the latest research news. The magazines and the newspapers are the main source to update general knowledge. In this paper, the reading habit of periodicals of the college library user is discussed by using the filled questionnaires collected from the library users of Kongunadu Arts & Science College.

Keywords: *Print Periodical, Special Reference, Users.*

1. INTRODUCTION

Periodicals always bring in the latest knowledge to the users reading. Periodicals is a very good habit of all the staff and students belonging to the higher education. The journals always carry an authenticated information and news and it is very much useful for the readers to update their subject knowledge and the new inventions from time to time [1].

Mostly, the magazines delivering the latest general news and a lot of other information. Most of the magazines are dealing with the general issues. Some magazines may deal with some specific subject, but they also concentrates on some outline points and news of the subject issues. There is no authenticity for the articles published in magazines [2]. The newspapers are mostly daily in periodicity nature and they bring a lot of information about the politics, cinema, entertainment, regional, state, national and international news. Internet and periodicals refresh the human mind. In this paper, the which reading periodicals as it was in original is discussed.

2. OBJECTIVE

The main objective is to assess the college library user's reading behaviour of periodicals.

3. DATA COLLECTION

The primary data was collected by using the questionnaires. The questionnaires were circulated to "50" users of the library and information centre of Kongunadu Arts & science College.

4. SAMPLING TECHNIQUE

Simple random sample technique is used for data collection.

5. ANALYSIS AND DISCUSSION

Table 1 Respondents Gender

Gender	No. of Respondents	%
Male	21	42%
Female	29	58%
Total	50	100%

Table 1 represents the gender details of the respondents.

'21' respondents are male i.e. 42% and '29' respondents are female i.e. 58%. Majority of the respondents belong to the female category.

Table 2 Classification of Respondents Profession

Profession of the Respondents	No. of Frequencies	%
Staff (Teaching)	14	28%
Students	36	72%
Total	50	100

Table 2 represents the profession of the respondents. '14' (28%) respondents are teaching staff and '36' (72%) respondents belong to student category.

Table 3 Respondents Age Group Details

Age Group	No. of Respondents
19-24	31
25-30	9
31-36	9
37-42	1
Total	**50**

Table 3 represents the age group details of the respondents. '31' respondents are in the age group between 19-24, '9' respondents belong to the age group of 25-30, another '9' respondents belong to the age group of 31-36, '1' respondent is from 37-42.

Table 4 Frequency of Periodicals Reading Behaviour by the Respondents

Frequency of Reading Periodicals	No. of Respondents	%
Daily Once	27	54%
Twice in a day	2	4%
Thrice in a day	3	6%
Once in a week	7	14%
Thrice in a week	2	4%
Occasionally	9	18%
Total	**50**	**100**

From the Table 4, the following are the results derived '27' respondents (i.e. 54%) read the periodicals atleast once a day. '2' respondents (i.e. 4%) read the periodicals twice a day. '3' respondents (i.e. 6%) read the periodicals thrice a day. '7' respondents (i.e. 14%) read the periodicals atleast once a week. '2' respondents (i.e. 4%) read the periodicals atleast thrice a week and '9' respondents (i.e. 18%) read the periodicals occasionally.

Table 5 Time Spending for Periodical Reading in a Day by the Respondents

Time Spending by the Respondents in a Day	No. of Frequencies	%
Below one hour	19	38%
1-2 hours	30	60%
Above '2' hours	1	2%
Total	**50**	**100**

Table 5 represents 38% of the respondents use the periodicals less than one hour a day (reading day), 60% of the respondents use the periodicals 1-2 hours a day and 2% of the respondents reading the periodicals for more than "2" hours a day.

Table 6 Rank of the Respondents Preference of Periodicals Type

Periodicals	1st Rank	2nd Rank	3rd Rank
Journals	5	21	24
Magazines	7	26	17
Newspaper	38	3	9

Table 6 represents that '38' respondents out of '50' give the rank 1 for newspaper reading.

'5' respondents give the rank 1 for journal reading, '7' respondents give the 1st rank for reading magazine and '38' respondents give the 1st rank for newspaper reading. '21' respondents give the 2nd rank for magazines reading, '26' respondents give 2nd rank for the magazine reading, and only '3' respondents give 2nd rank for newspapers. '24' respondents out of '50' give 3rd rank for reading journals, '17' respondents put 3rd rank for reading magazines and '9' respondents give 3rd rank for newspaper reading.

Table 7 Respondents Reading Preference of Different Types of Journals

Types of Journals	No. of Respondents
CSIR Journals	15
Indian Academy of Science Journals	21
Foreign Journals	13
Computer Journals	9
Other Journals	29

From the Table 7, the following observations are made. '15' respondents using CSIR journals. '21' respondents using Indian Academy of science journals. '13' respondents reading foreign journals frequently. '9' respondents reading computer journals and '29' respondents reading other than these type of journals.

Table 8 Respondents Reading Preferences of Magazines

Types of Magazines	No. of Respondents
General Magazines	33
Competitive Exam & G.K Magazines	8
Computer & IT Magazines	9
Women Related Magazines	13
Other Magazines	17

From the Table 8 the following results are derived. '33' respondents read general magazines. '8' respondents use the competitive exam and G.K magazines. '9' respondents read computer and IT magazines. '13' respondents read women related magazines. '17' respondents read other than these magazines. From these results, it is known that most of the respondents are using the general magazines.

Table 9 Opinion about the Periodical Reading

Opinion of the Respondents	No. of Frequencies	%
Useful	12	24%
Very much useful	38	76%
Not useful	-	-
No opinion	-	-
Total	**50**	**100**

From the Table 9 represents '12' respondents i.e. 24% says that the periodicals reading is useful. '38" respondents i.e. 76% says that the periodicals reading is very much useful. No one says, that it is not useful or no opinion. So, the opinion of the respondents about reading the periodicals is always useful .

6. CONCLUSION

From the analysis, '27' respondents are reading the periodicals daily. So, more than 50% of the respondents use the periodicals atleast once a day. '30' respondents use the periodicals '1-2' hours a day that they are use the periodicals. '33' respondents use the general magazines. '38' respondents say that reading periodicals reading is very much useful. The periodicals are really very much useful to the staff and students of higher education in collegiate education. It helps them to update their knowledge periodically.

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A Critical Study of Information Access Pattern of Users in Special Libraries in Tamil Nadu

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Abstract

This study describes a survey on the effective use of the library resources, internet and electronic resources by the users of selected special libraries in Tamil Nadu. It also examines the library facilities, time spent, utilization, purpose, internet search engine and problems based on retrieving information by scientist.

Keyword: *Central Electro Chemical Research Institute, Information Seeking Behaviour, Special Libraries, Sugarcane Breeding Institute, User Study,*

1. INTRODUCTION

The rapid growth of information explosion along with technological developments particularly internet and World Wide Web, has brought about drastic changes to the function and service of libraries. The libraries all over the world have shifted from their traditional role as storehouses of information to dynamic disseminators of information.

The essential components in a library and information system are documents, users and librarians. IT has often complained that the information scientists have neglected the user and theis information needs whose to one of the main goals of any information system is to provide pin-pointed, exhaustive and expeditious information service to users. In order to achieve this goal, various pieces of recorded information are gathered in information centres and qualified personnel are recruited to establish purposive contact between the information embodied in variety of documents. The problem of satisfying the information needs of users is becoming complicated because of various factors that are given below:

i. Increasing amount and complexity of literature which makes it uneconomical to acquire every thing.
ii. Scattering of literature.
iii. Language barriers.
iv. Access to information.

2. CONCEPT OF INFORMATION SEEKING BEHAVIOUR

Information seeking behaviour is a human behaviour with respect to searching various sources, channels including the use of information. The terms, 'Information Seeking Behaviour' and 'Information Using Behaviour' are synonymous terms. It denotes all activities comprising of information seeking, information gathering and information accessing and communicating. Information seeking precedes information gathering.

According to Krilelas, information seeking behaviour refers to "any activity of an individual that is undertaken to identify a message that satisfies a perceived need. Taylor [1] defines information behaviour as the product of certain elements of the information user environment. The elements are:

i. The assumption formally learned or not, made by a defined set of people concerning the nature of their work.
ii. The kinds and structure of the problems are very important and typical by this set of people.
iii. The constraints and opportunities of typical environments within which any group or subgroup of this set of people operates and works.
iv. The conscious, and perhaps unconscious, assumptions made as to what constitutes a solution or better said,

a resolution of problems and what makes information useful and valuable in their contexts.

Based on the definition, Taylor believes that the information behaviour of different groups of people is also different.

Wilson [2] defines the "Information behaviour" as "those activities a person may be engaged in which identify his / her own needs for information, search for such information in any way, and use or transfer that information"

In this context, information is viewed as any stimulus that reduces uncertainty. Need is defined as recognition of the existence of this uncertainty in the personal or work related, life of an individual. The approaches follow Atkin's [3] work in which information need is defined as "a function of extrinsic uncertainty produced by a perceived discrepancy between the individual's current level of certainty about important environmental objects and criteria he seeks to achieve. In other words, information seeking begins when some one perceives that the current state of possessed knowledge is less than that needed to deal with some issue (or problem). The process ends when that perception no longer exists". From the above definitions, the following references are drawn:

i. Information Seeking Behaviour is mainly concerned with who needs what kind of information.
ii. It is an activity of an individual in pursuit of information.
iii. It is closely related to the personal characteristics and traits of the users.

3. REVIEW OF RELATED LITERATURE

The information seeking skills of Physicians and Biomedical Scientists in India have been studied by Schwartz [4] through focussed group sessions conducted at All India Institute of Medical Sciences, New Delhi and the Tata Memorial Cancer Centre / Cancer Research Institute, Mumbai.

In the study of information seeking habits of medical and engineering personnel at different levels such as Students, Teaching Staff members, Practitioners and Research workers, Lalitha [5] found that both formal and informal approaches were adopted for collecting their information.

Manorama Tripathi and Prasad [6] analysed the information seeking behaviour of scientists in physical science and social sciences.

4. CONCEPTS OF SPECIAL LIBRARIES

4.1 CECRI: Karaikudi

Central Electro Chemical Research Institute known as CECRI7 was established in 1953 at Karaikudi. This institute is one of the largest electro chemical laboratories in the world. It has got four extension centres located at Chennai, Cochin, Mandapam Camp, and Tuticorin where work related to the main R & D of the head quarters is carried out. The total strength of scientific, technical and administrative staff is about 700 presides 150 young boys and girls work as JRF, SRF, Research Associates, and project assistants.

4.2 SBI: Coimbatore

Sugarcane Breeding Institute known as SBI, Coimbatore, has continued to conduct research related aspects with evolution of sugarcane varieties suitable for the different agro climatic regions of the country since its inception in 1912. The institute has so far developed around 2800 'CO' releases and sent them for evaluation at different sugarcane research stations covering various agro-climatic regions of the country. CO canes bred at Coimbatore along with the varieties selected from the fluff of Coimbatore occupy more than 95% of the area under sugarcane in the country. Many CO canes have become successful in a number of other countries either as commercial varieties or as very useful parents for developing location specific varieties, sugarcane breeding institute function at one of the two world repositories of sugarcane germless.

5 OBJECTIVES

In order to pursue this study, following objectives are framed in accordance with the scope of this investigation.

i. To analyse the respondents' duration and quantum of time utilization in search of information in the libraries of selected institution

ii. To examine the nature and type of information, required by scientists in research institutions of Tamilnadu
iii. To identify the extent of motivation among the scientist of research institutions in collection of library information for various research purpose
iv. To know the extent of dependence of scientists of research institutions on various sources of information for getting the relevant required information
v. To analyse the extent of use of library facilities and services made by libraries of research institution.
vi. To find out the respondents' views on the advantages of utilizing the library of their own institution
vii. To access the extent of information sharing behaviours among the scientists of selected institution
viii. To examine the scientists' views on utility of attending conference, seminars, etc.,
ix. To know the extent of respondents' satisfaction with information sources available in their own institutional libraries for research purpose
x. To suggest some rational measures for effective dissemination of information by the library management according to the information needs of the scientist

6. METHODOLOGY

This study attempts to examine the information needs and information seeking behaviours of scientists by making an experiment of research institutions in Tamilnadu and it traces out the information seeking behaviours and information needs of scientists in terms of exploratory approach. It is primarily a fact finding venture. The identified facts are cross-tabulated with the institutional background.

6.1 Sampling

In order to study the information seeking behaviours of scientists in research institutions, researcher has chosen two special libraries in Tamilnadu. They belong to Sugarcane Breeding Institutes (SBI) Central Electro Chemical Research Institute (CECRI).

6.2 Data Collection

The researcher has employed a well structured questionnaire for collecting the data from respondents of two premier research institutions in Tamilnadu. The researcher has distributed the questionnaires to all scientists who work at research institution. The questionnaires were designed to elicit background information of the scientists duration and quantum of library use, nature and type of information required, motivation to seek and collect information, extent of utility of library services and facilities information, sharing behaviours, professional activities and achievements, database use, and satisfaction of library services and facilities.

The questionnaires were prepared in such a way that they could be easily understood by the respondents. The questionnaires were distributed to the respondents by post.

7. Data Analysis

The collected data are classified and tabulated according to the objectives and hypotheses stated. First, the data are recorded on data sheets and then fed to the computer personally.

Table 1 Institution-wise Respondents Duration of Library Visit

Sl. No	Library Visit	CECRI	SBI	Grand Total
1	More than Once a Week	76 (38.38%)	14 (7.07 %)	90 (45.45 %)
2	Once in a Week	42 (21.21 %)	12 (6.06 %)	54 (27.27 %)
3	Once in a Fortnight	21 (10.61 %)	8 (4.04 %)	29 (14.65 %)
4	Once in a Month	13 (6.57 %)	12 (6.06 %)	25 (12.63 %)
Total		152 (76.77 %)	46 (23.23%)	198 (100.00 %)

Table 1 indicates the institution-wise respondents' duration of library visit. It could be noted that out of the 198 respondents, 45.45 % of them make library visit more than once a week. The majority of the respondents who 38.38% visit the library more than once a week are from CECRI.

Out of 152 respondents from CECRI, 21.21 % of them visit the library once a week 10.61% of them visit the library once a fortnight and 6.77% of them visit the library once a month.

Out of 46 respondents from SBI, 7.07 % of them visit the library more than once a week, 6.06% of them visit the library once a month.

It could be seen clearly from the above discussion that the majority of the respondents visit the library more than once a week.

Table 2 Institution-wise Respondents Quantum of Time Utilization Pattern in Library

Sl. No	Time Spent	CECRI	SBI	Grant Total
1	16-20 Hours Per Week	33 (16.67 %)	7 (3.54 %)	40 (20.20%)
2	7-10 Hours Per Week	82 (41.41 %)	24 (12.12 %)	106 (53.54%)
3	4-6 Hours Per Week	16 (8.08 %)	9 (4.55 %)	25 (12.63 %)
4	Less Than 4 Hours Per Week	21 (10. 61 %)	6 (3.03 %)	27 (13.6)4 %
Total		152 (76.77 %)	46 (23.23 %)	198 (100.00 %)

Table 2 indicates the institution -wise respondents' quantum of time utilization in their libraries. It could be noted that out of 198 respondents, 53.54% of them spend 7-10 hours per week in search of library information. The majority of the respondents from CECRI (41.41%) of them spend 7-10 hours per week in search of library information.

Out of 152 respondents from CECRI, (16.67%) of them spend 16.20 hours per week; 8.08% of them spend 4-6 hours per week, 10.61% of them spend less than 4 hours per week in search of library information.

Out of 46 respondents from SBI, 12.12% of them spend 7-10 hours per week; 4.55% of them spend 4-6 hours per week in search of library information.

It could be seen clearly from the above discussion that the majority of the respondents spend 7 - 10 hours per week in search of library information.

Table 3 Institution-wise Respondents Ways in Getting Relevant Bibliographical Reference Requirements

Sl. No	Bibliographical Reference Requirements	CECRI	SBI	Total
1	Library Catalogue	10 (5.05)	7 (3.54 %)	17 (8.59 %)
2	Indexing Abstracting & Periodicals	39 (19.70)	8 (4.04 %)	47 (23.74 %)
3	Content Lists	14 (7.07)	9 (4.55 %)	23 (11.62 %)
4	Consulting Specialist, Colleagues etc	11 (5.56)	5 (2.53 %)	16 8.08 %)
5	Browsing in Internet	78 (39.39)	17 (8.53 %)	95 (47.98 %)
Total		152 (76.77 %)	46 (23.23 %)	198 (100.00 %)

Table 3 indicates the institution-wise respondents' sources of getting relevant bibliographical reference requirements. It could be noted that out of 198 respondents, 47.98% of them acquire bibliographical reference by browsing internet. The majority respondents of CECRI (39.39%) acquire the bibliographical reference by browsing internet.

Out of 152 respondents from CECRI, 19.70% of them acquire bibliographical reference by abstracting and indexing periodical and journals, 7.07% of them acquire bibliographical reference from content lists, 5.56% of them acquire bibliographical reference by consulting with colleagues and library staff, 5.05% of them acquire bibliographical reference from library catalogue.

Out of 46 respondents from SBI 8.53% of them acquire the bibliographical reference by browsing internet.

It could be clearly seen from the above discussion that the majority of the respondents acquire bibliographical reference by browsing internet.

Table 4 Institution-wise Respondents Advantage of Utilizing the Library of their Own Institutions

Sl. No	Available Facility	CECRI	SBI	Grand Total
1	Convenient to Work Place and Availability (Or) Required Information	52 (26.26 %)	21 (10.61 %)	73 (36.87 %)
2	Friendly Nature of Staff Members and Their Helping Tendency	74 (37.37 %)	12 (26.09 %)	86 (43.43 %)
3	Accessibility of Internet and E-Mail Facilities	12 (6.06 %)	6 (13.04 %)	18 (9.09 %)
4	No. Other Way	6 (3.03 %)	7 (15.22 %)	21 (10.61 %)
Total		152 (76.77 %)	46 (23.23 %)	198 (100.00 %)

Table 4 presents data on institution-wise respondents' utilization of libraries in their own institutions. It could note that out of 198 respondents, 43.43% of them realize the advantage of their own library in terms of friendly nature of staff members and their helping tendency. The majority of respondents of CECRI (37.37%) and SBI (26.09%) realize the advantages of their own library in terms of friendly nature of staff members and their helping tendency.

It could be clearly seen from the above discussion that the majority of the respondents realize the friendly nature of staff members and their helping tendency.

Table 5 Institution-wise Respondents Source of Information Dependence

Sl. No	Sources of Information	CECRI	SBI	Grand Total
1	Formal Source Only	52 (26.26%)	15 (7.58%)	67 (33.84 %)
2	More on Formal Sources than Informal Sources	70 (35.35%)	4 (2.02%)	74 (37.37 %)
3	Equally on Both Formal and Informal	25 (12.63)	21 (10.61 %)	46 (23.23%)
4	More on Informal Source Than Formal Source	5 (2.53)	6 (3.03%)	11 (5.56 %)
Total		152 (76.77%)	46 (23.23%)	198 (100.00 %)

Table 5 indicates the institution-wise respondent's dependence on various sources of information. It could be noted that out of 198 respondents, 37.37% of them depend more on formal sources than informal sources of information. The majority of the respondents of CECRI 35.35% of them exclusively depend more on formal sources than informal sources and SBI 10.61%of them depend equally on both formal and informal sources.

Out of 152 respondents from CECRI, 26.26% of them depend on formal sources only 12.63% of them depend equally on both formal and informal sources. Out of 46 respondents from SBI 7.58% of them depend on formal source only. It could be clearly seen from the above discussion that majority of the respondents depend more on formal sources than informal sources of information.

Table 6 illustrates the usage of search engine for information retrieving purpose in the internet. It is noticed that out of 198 respondents, 47.47% of them used Google in searching information. The majority of the respondents from CECRI that is (37.37%) and SBI (10.10%) of them exclusively depends on Google search engine.

Table 6 Usages of Search Engines

Sl. No	Usage of Search Engines	CECRI	SBI	Total
1	Google	74 (37.37%)	20 (10.10%)	94 (47.47%)
2	Yahoo	23 (11.62%)	9 (4.55%)	32 (16.16%)
3	AltaVista	35 (17.68%)	10 (5.05%)	45 (22.73%)
4	MSN	10 (5.05%)	3 (1.52%)	13 (6.57%)
5	Alltheweb	8 (4.04%)	2 (1.01%)	10 (5.05%)
6	Excite	2 (1.01%)	2 (1.01%)	4 (2.02%)
Total		152 (76.77%)	46 (23.23%)	198 (100.00%)

Out of 152 respondents from CECRI, 17.26% of them depend on Altavista only, 11.62% of them depend on Yahoo. Out of 46 respondents from SBI, 7.58% of them depend on Altavista search engine. It could be clearly seen from the above discussion that majority of the respondents used Google search engine for retrieving the information.

Table 7 Searching Techniques Used

Sl. No	Search Techniques	CECRI	SBI	Total
1	Keyword	45 (22.73%)	17 (8.59%)	62 (31.31%)
2	Author	40 (20.20%)	10 (5.05%)	50 (25.25%)
3	Title	29 (14.65%	12 (6.06%)	41(20.71%)
4	Source	25 (12.63%	5 (2.53%)	30 (15.15%)
5	Publication Date	4 (2.02%)	0 (0.00)	4 (2.02 %)
6	Boolean Operators	9 (4.55%)	2 (1.01%)	11 (5.56)
Total		152 (76.77%)	46 (23.23%)	198 (100.00%)

Table 7 present the data on institution-wise respondents' Searching Techniques used in the search engine for seeking information. It could be noted that out of 198 respondents, 31.31% of them used keyword searching, 25.25% of them used author-wise searching and 20.71 % of them used title-wise searching.

The majority of respondents of CECRI (22.73%) and SBI (8.59%) were using the author-wise searching techniques.

Table 8 Problems based on the Retrieving Information in Internet

Sl. No	The Problems	CECRI	SBI	Total
1	Minimum Precision Rate	39 (19.70%)	14 (7.07%)	53 (26.77%)
2	Unavailability of Materials	27 (13.64 %)	9 (4.55%)	36 (18.18%)
3	Full Text Not Enough	20 (10.10%)	5 (2.53%)	25 (12.63 %)
4	Information Scattered In Too Many Sources	25 (12.63%)	5 (2.53%)	30 (15.15%)
5	Outdated Information	14 (7.07%)	3 (1.52%)	17 (8.59%)
6	Lack of Time	8 (4.04%)	4 (2.02%)	12 (6.06%
7	Irrelevant Information	19 (9.60%)	6 (3.03%)	25 (12.63%)
Total		152 (76.77%)	46 (23.23%)	198 (100%)

Table 7 presents data on institution-wise respondents' Problems based on the Retrieving Information in internet for seeking information. It is noticed that out of 198 respondents, 26.77% of them face "Minimum Precision Rate". At the time of retrieving information from internet, 18.18% of them face "Unavailability of Materials" and 12.63 % of them face "Full Text Not Enough" at the time of retrieving information. The majority of respondents of CECRI (19.70%) and SBI (7.07%) of them face the problems of "Minimum Precision Rate".

8. FINDINGS SUGGESTIONS AND CONCLUSION

The finding of duration of library visit reveals the following facts.

i The majority of the respondents visit the library more than once a week.

ii The majority of the respondents spend 7-10 hours per week in search of library information.

iii The majority of the respondents acquire bibliographical reference by browsing internet.

iv It is found from the Table 4 that most of the respondents responded "Friendly Nature of Staff Members and their Helping Tendency" in their own institution's library.

v It is observed from the Table 5 that most of the researcher responded "more on formal sources than on informal sources".

vi It is found from the Table 6 that most of the research scientists used Google search engine for retrieving information.

vii Among various searching techniques, 62 (31.31%) respondents used key word searching.

viii Most of the respondents faced the problem on Minimum Precision Rate through retrieving information from the internet.

It is suggested that library facilities should be made aware to all the scientists with periodic interactions and orientations so that they will be aware of the newly arrived libraries.

It is suggested that infrastructure should be extended as per climatic conditions. Air-Conditioner facility may be extended at least in the reference section. The electronic media articles can be stored and transported in a very compact way than the print resources.

The study has been based on Information Seeking Behaviour of Users in Special Libraries in Tamil Nadu. Users should be encouraged to seek the information needs by themselves and enrich their capacity to have the positive and fruitful approaches towards their requirements, so that the optimum utilization of library resources can achieve the goals of library. The present study may pave the path for further investigation in the ensuring future academician and social scientist of our state. In certain cases, basic background materials may be printed for future investigation.

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Bibliometric Law Validation on Hemophilia Disease

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Abstract

The study aims to present a bibliometric analysis of research output of the hemophilia disease; it brings out an overview of research activity in this field and characterizes its most important aspects. A total of 316 articles were collected from Pub Med. The searches were restricted to published articles and contain the terms hemophilia disease, Author's collaboration analyzed through Subramanian's formula and it expressed C= Nm/Nm+Ns. Lotka's law and bradford's law of scattering were applied to count the author productivity and core journals in this specific subject. Lotka's law is n=2 and Bradford's law scattering 1: n: n2. These have been analysed in this study.

***Keywords**: Bibliometric, Hemophilia disease, Pub Med.*

1. INTRODUCTION

Hemophilia, genetic disease in which the clotting ability of the blood is impaired and excessive bleeding results. The disease is transmitted through females but almost invariably affects male offspring only. A male born to a carrier mother has a 50% chance of having the disease. A hemophiliac cannot pass the disease to his sons, but all his daughters will be carriers (Hemophilia, 2010). There are two diseases usually classified as hemophilia: hemophilia a (classical hemophilia or Factor VIII deficiency) and hemophilia B.

Small wounds and punctures are usually not a problem for hemophiliacs and can be treated as in a no hemophiliac. Uncontrolled internal bleeding, however, can result in pain and swelling and permanent damage, especially to joints and muscles. The symptoms often first appear in toddlers as their joints begin to bear weight. This year, the World Federation of Hemophilia's (WFH's) has expanded its mission to step up awareness of various types of bleeding disorders, reflected in its theme "The Many Faces of Bleeding Disorders – United to Achieve Treatment for all ". The WFH has gone the extra mile to encourage awareness campaigns in cities, organize events and walkathons on this day in order to improve diagnosis, management and care for bleeding disorders.

Bleeding Disorders are also called clotting disorders. In simple terms, when one gets injured, it begins to bleed. The body mechanism starts the clotting process, which forms a blood clot to arrest bleeding. The clotting mechanism in the body is facilitated by 13 different blood components or proteins called factors and by cells called platelets. A bleeding disorder arises when there are insufficient amount of platelets or clotting factors in the body or they are not functioning properly. This study was taken up to quantity and world research out put in the hemophilia, the aim being to offer an overview of research activity and to characteristic its most important aspects and their evolution over the years.

2. OBJECTIVES

The specific objective of the present study has the following aspects:

i. To observe the year-wise distribution of hemophilia research output
ii. To apply Subramaniam's formula for authors collaboration co-efficiency
iii. To examine the author's productivity through the application of Lotka's Law
iv. To analyze the different core journals with their rank and the application of Bradford's law
v. To find out hemophilia research productivity from various institutions

3. METHODOLOGY

The source of data for the study has been colleted from Pub Med database of the National Library of Medicine for the period 2002- 2009. Keeping in view of the features of the Pub Med search and the database was downloaded from the net with all probabilities and bibliographical details obtained from this source. Having applied above restrictions a total of 316 data were tabulated for further analysis. Although a broad-based range of issues about authorship is identified, the content in this paper is restricted by the dimensions of indexing available in Pub Med .

4. DATA ANALYSIS

The analysis of the present study focused mainly on frequencies and percentages of publications. However, the productivity of authors and journals was using Subramaniam's formula, Lotka's law and Bradford's law of scattering respectively. The degree of collaboration was measured by using the formula of Subramanian who pointed out that the degree of collaboration varies from one discipline to another (Subramaniam).

Lotka's law (Lotka, 1926) states that the number of authors making contributions is about 1/n2 of those making one contribution, where n is often nearly 2. The approximation is: the number of authors each contributing n articles is proportional to 1/n2. if 100 authors produce one article each in given period, 25 authors produce two articles each, 11 produce three each etc. This law is often termed" as the inverse square law of scientific productivity''.

As an indicator of the dispersion of scientific output, (Bradford, 1934, 1948) proposed a model of concentric productivity zones with a decreasing information density. In other words, each zone or core contains a similar number of articles, but the number of journals in which these are published and increased from one zone to the next according to the expression 1,n,n2…, In this way, a group of journals dedicated more specifically to the subject of interest can be distinguished.

4.1 Year of Publication

During the period 2002-2009, a total of 316 articles were published on the subject. Starting with 11 articles in the year 2002 is shown in Table 1. The publications output was found to be steadily increased. The year 2009 yielded highest articles 75 (23.73%) followed by the year 2007 with 68 (21.51%) and 55 (17.40 %) articles were published in 2008. The overall growth for the year 2009, 2008 and 2007 was found to decline from the previous year. The average growth rate per year is 35.44 articles.

Table 1 Year-wise Distribution of Articles

Year	No. of Articles	%	CF*
2002	11	3.48	11
2003	14	4.47	25
2004	18	5.69	43
2005	32	10.12	75
2006	43	13.60	118
2007	68	21.51	186
2008	55	17.40	241
2009	75	23.73	316
Total	316	100	-

*Cumulative frequency

4.2 Authorship Degree of Collaboration

Table 2 shows, the pattern of collaboration in the field. The degree of collaboration was measured by using the formula of Subramaniam. The formula can be expressed as C= Nm/Nm+Ns where, C is the degree of collaboration. Nm is the number of multi authored research paper in the particular discipline published in a year. Ns is the number of single author research papers in the same discipline published during the same year. The degree of collaboration over the period of study was 0.71, which tells that the team research is predominant.

Table 2 Degree of Collaboration

Year	No. of Articles	N_m	Ns	C= $N_m/(N_m+N_s)$
2002	11	8	3	0.72
2003	14	11	3	0.78
2004	18	12	6	0.66
2005	32	21	11	0.65
2006	43	34	9	0.79
2007	68	49	19	0.72
2008	55	37	18	0.67
2009	75	54	21	0.72
Total	316	226	90	C=0.71

5.3 Author Productivity

A total of 618 authors contributed to the articles analysed. Table 3 shows the distribution of the number have been of articles published by each one of the authors and reveals that some have contributed to as many as twenty four articles whereas others only contributed to one. From Table 3, it shows some authors have been contributed to one article, those contributing to more than one. Therefore, being much fewer in number. Only three authors there published 10 or more studies.

Table 3 Author Productivity

Number of Articles	Number of Authors	Observed (%)
1	483	78.15
2	174	28.15
3	64	10.35
4	34	5.50
5	9	1.45
6	9	1.45
7	7	1.13
8	5	0.80
9	4	0.64
10	4	0.64
11	3	0.48
13	2	0.32
15	1	0.61
19	1	0.61
21	1	0.61

Lotka's law has been applied to calculate the number of expected authors for given number of published studies. Considering the fact, 483 authors have produced only one article each, the vale n can easily be derived. Putting the vale of ''n'' as 2, the following results (Table 4) have been derived.

5.4 Core Journals in the Subject

The present study is analyzed for 316 articles which were published in 132 journals for different fields. The most productivity journals on hemophilia disease are shown in Table 5. The Journals that have published the most articles on hemophilia are the American Journal of Human genetics, Blood, Journal of Clinical Investigation and Transfusion and Aphaeresis for 6.64, 5.69, 5.37 and 5.06% of the total number of publications respectively.

Table 4 Number of Expected Authors

Number of Articles	Number of Authors (Observed)	Number of Authors (Expected)
1	483	483
2	174	121
3	64	54
4	34	30
5	9	19
6	9	13
7	7	10
8	5	8
9	4	6
10	4	5
11	3	4
13	2	3
15	1	2
19	1	1
21	1	1

It has been observed that out of 316 articles published in 132 journals, 115 (36.39) articles were published in 7 journals that may be considered as core journals in the subject hemophilia.

5.5 Bradford's Distribution

Applying Bradford's law of scattering with respect to the journal, 3 zones were defined. The core or zone 1 contained 106 (33.54%) articles that were published in 10 journals. The zone 2 contained 121 (38.29%) articles that was published in a total of 35 journals, finally, zone 3 consisted of 89 (28.16%) articles in 87 journals.

According to Bradford's law, the number of journals following successively in the 3 zones should be in the ration 1: n: n2, while the ratio in each zone of the present is 10:31:91, which is nearly in accordance with the Bradford's distribution. The zone-wise distribution of articles in different journals is shown in Table 6.

Table 5 Ranking of the Journals by Output

S.No	Name of the Journal	Rank	No. of Articles
1	American Journal of Human Genetics	1	12
2	Blood	1	12
3	Journal of Clinical Investigation	1	12
4	Transfusion and Aphaeresis	2	11
5	The Journal of Pediatrics	2	11
6	Hemophilia	2	11
7	British Medical Journal	2	11
8	Canadian Medical Association Journal	3	9
9	International Orthopedics	3	9
10	New England Journal of Medicine	4	8
11	Western Journal of Medicines	4	8
12	Thrombosis Research	4	8
13	BMC Medical Ethics	5	7
14	Journal of Surgical Research	5	7
15	Trans. American Clinical and Climatological Association	5	7
16	Journal of European Society of Heamapheresis	5	7
17	World Journal of Gastroenterology	6	6
18	Vascular Health And Risk Management	6	6
19	Virology Journal	6	6
20	Therapeutics and Clinical Risk Management	6	6
21	Current Gene Therapy	7	5
22	Genome Research	7	5
23	Anesthesia and Analgesia	7	5
24	British Journal of Clinical Pharmacology	8	4
25	British Journal of Hematology	8	4
26	Archives of Disease in Childhood Fetal and Neonatal	8	4
27	Human Gene Therapy	8	4
28	Blood Transfusion	9	3
29	Nucleic Acid Research	9	3
30	Molecular Therapy	9	3
31	PLOS Genetics	9	3
32	Texas Heart Institute Journal	9	3
33	Canadian Journal Of Plastic Surgery	10	2
34	Journal Of Biological	10	2

Table 6 Bradford's Distributions of Articles in Different Journals

Zone	Number of Journals	Number of Articles
First	10	106
Second	31	121
Third	91	89
Total	**132**	**316**

5.6 Research Productivity on Hemophilia Disease by the Institutions

The hemophilia analysis of the article under the study revealed that the various authors come from a wide range of institutions, including research institute, hospitals, colleges etc. However, the majority are attached to universities; Table 7 shows the organizations, which have published many articles on the subject of hemophilia.

The organizations with the highest productivity are the college of Medicine, New York, institutions involved in a total of 17 (5.37%) and Einstein College of Medicine, New york, New College of Wisconsin, Wisconsin and Pennsylvania State University College of Medicine. These institutions equally contributed 16 (5.06%) articles, whose output ranges from 5 to 10 articles and accounts for 22.46% of the total number of publications.

Table 7 Most Productivity Institutions

Sl. No.	Institutions	Rank	Number of Articles	%
1	College of Medicine, New York,	1	17	5.37
2	Einstein College of Medicine, New York,	2	16	5.06
3	New College of Wisconsin, Wisconsin	2	16	5.06
4	Pennsylvania State University College of Medicine, Hershey	2	16	-
5	King's College, London	3	15	5.06
6	Royal Free and University College School of Medicine, London	4	13	4.74
7	University College of London, London	5	11	4.11
8	University of Vermont, College of Medicine, Burlington	6	10	3.48
9	University of Minnesota Medical School, Minneapolis	7	9	3.16
10	University of Pennsylvania Medical Centre, Pennsylvania	7	9	2.84
11	University of Washington, Seattle	8	8	2.84
12	University of Buffalo, Buffalo	9	7	2.53
13	University of Western Ontario, Londo	9	7	2.21
14	Johns Hopkins University School of Medicine, New York	10	6	2.21
15	Albert Einstein College of Medicine , New York	11	5	1.89
16	University of Piemont, Navarro	12	5	1.58
17	Children's Hospital of Philadelphia, Philadelphia	13	5	1.58
18	Chinese University of Hong Kong, Hong Kong.	14	4	1.58
19	Prince Wales Hospital, Hong Kong	14	4	1.26
20	University of Saskatchewan, Saskatoon	14	4	1.26
21	Dalhousie University, Nova Scotia.	15	3	1.26

6. CONCLUSION

An analysis of research output of hemophilia disease has been carried out in terms of frequencies and publications. Author collaboration has been analyzed with Subramaniam's formula of C= Nm/Nm+Ns and degree of collaboration is 0.71 from the study period. Lotka's law has been applied to count the productivity of authors with a value of n=2, indicating that few highly productive authors have contributed in hemophilia research activities. Applying the Bradford's laws of scattering the 132 journals obtained was distributed in to 3 zones, it reflects in to 10:31:91 journals of 106:121:89 articles published carrying the disease. The most productivity institution is College of Medicine, New York, being identified which is considered as top level of total output of 17(5.37%) articles in hemophilia research.

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Scientometric Mapping of Bioinformation Journals: An Initiative

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Abstract

This paper discusses the scientometric analysis of two major journals belonging to Bioinformatics viz. BMC Genomics and BMC Biology during the period 2004-2008 which present a clear picture on the growth and development pattern of journals such as authorship pattern, citation pattern, page-wise distribution, country-wise distribution and distribution of depth subjects. This is very much essential for the students as well as researchers to update their knowledge on the development of Bioinformatics journals in different spheres.

Keywords: *BMC Biology, BMC Genomics,Bioinformatics,Scientometrics.*

1. INTRODUCTION

Scientometric studies characterize the disciplines using the growth patterns and other attributes of the research publications. These studies have potentials particularly in accessing the emerging disciplines. Thus, scientometric study of research performance of bioinformatics in this paper has enabled users to get an understanding of its structure. Bioinformatics is the convergence of life sciences, Mathematics and Information technology and has transformed biological research in to analytical information science as well [1]. In general bioinformatics is all about generation, collection, organization, storage, retrieval and analysis of biological database [2]. It is the science of using information to understand biology; it is the tool that can help us in answering unsolved questions of biological importance. Strictly speaking bioinformatics is a vast subject of computational biology, the application of quantitative analytical techniques in modeling biological systems [3]. Currently the number of biological journals specifically computational biology journals has out numbered other disciplines. This may be because of the fact that, database design and virtual library concepts are the burning issues of communication world wide. Several researchers have hypothesized the importance of biological bibliometric studies relating to open access scientific journals and their impact on the knowledge community. There is a need to know the literature growth pattern, detailed subject coverage, authority and citation pattern for characterization of recent trend of scientific presentations in biology based journals.

In this present study 2 journals are considered namely BioMed Central Biology and BioMed Central Genomics. These 2 journals are peer reviewed open accessed journals. BioMed Central is committed for high standards through full and stringent peer reviewed and permanently accessible online immediately upon publication. The journal management system incorporates online tools for manuscript submission, peer reviewing and editorial decision making. BioMed Central recognizes the important role played by impact factor and other citations based metrics in governing scientist's decisions. These two journals have worked hard to ensure effective citation tracking. Being open accessed, these two journals provide viable alternative that better suits the needs of scientific community.

2. OBJECTIVES OF THE STUDY

Following are the major objectives of the present study:

i. To know the year wise distribution of papers from the 2 journals BMC Genomics and BMC Biology which are being considered for this study
ii. To find out the average length of papers
iii. To know about the number of citations used in the papers in both the journals under study

iv. To find out those countries in which maximum number of papers published in the two journals under study
v. To find out the subject-wise distribution of papers under study

3.METHODOLOGY

Data were collected from the web resources which are being used for analysis and interpretation. Information pertaining to the scientometric analysis of Bioinformatics journals were collected from the 2 major journals in the field of Bioinformatics namely BMC Genomics (1728 articles) and BMC Biology (206 articles), which in total 1934 articles published during 2004 - 2008 which constituted the major database for analysis and interpretation.

4. LITERATURE REVIEW

The investigation conducted by Molatudi, Molotja and Pouris[4] on the bibliometric study of bioinformatics research in South Africa reports on the practices of bioinformatics research in South Africa using bibliometric techniques. The investigation concentrates on the development and application of tools and methodologies in biological computation; and related subjects in genomics and structural bioinformatics. The study also indicates that the South African literature in bioinformatics has grown by 66.5% between 2001 and 2006. However, its share of world production is not on par with comparator countries, Brazil, India and Australia. The study of Robert Braam[5] unfolds the bibliometric aspects of genomic research that helps in enhancing the interplay of research dynamics and research policy. Besides calculating research indicators, the study proposed a model of research dynamics and timing of research management which could serve as tools for policy makers and research management to follow the dynamics of research over time and to better discuss options timing and matching of steering interventions in relation to the dynamics of scientific research. A study conducted by C. Baskaran, M. Palaniappan and R. Jeyshankar [6] on " A Scientometric Study of Publication on Oncology" reveals that, the highest growth rate (41%) of publication was found during 1991-1997 with 370 articles and it has been observed that total by 22 journal output was widely published in Tumor xenograft and Myocardial infraction. The Oncology scientists prefer their published articles in Medical Journals especially in reference to cancer. A survey made by M. Nagarjun, M Aravinthan and K. Maheswaram [7] on "A Bibliometric Analysis of Indian Journal of Entomology" reveals that the average number contribution per volume is 86 articles, among 431 contributions of articles, maximum 141 (32.71%) articles were contributed by four and more authors. On the whole study period, the single authored contribution is only 12.99% and multi-authored contribution at 87.1%. In this connection it also reveals that state-wise distribution of maximum contribution is from Haryana state and a minimum number contribution is from Manipur state. The maximum number of 131 (30.39%) articles were contributed by central and state Government organisations followed by Research institutions. A study conducted by Dr.M. Sadik Batchat and C. Baskaran[8] on "A Scientometric Analysis of Research Journals on cardiology in G8 countries" by taking the journal "G8 countries on Cardiology" output of USA, UK, Japan, Italy, Germany, France, Canada and Russia. Most of the prolific institutions are located in G8 countries and produced 13028 publications of the journals and productivity was 9726 during 1964 to 2006. This research based on MEDLARS database, which has been published by the National library of Medicine. The highest number of publication was American Journal of Cardiology (8%) and it was found that 167 papers were published in journal with impact factor (> 6.5). The average impact factor of cardiology journal between ($\geq$" 0.000 $\leq$ 2.00) and ($\geq$" 0.02 $\leq$" 4.00) is (76%) and the cardiology journals productivity among leading institution value is (17%) between Massachusetts Medical School and Russia Academy of Medical Science. According to pattern of domestic and international collaboration among G8 countries the USA contributes the highest and was followed by the UK. Patra and Mishra[9] jointly made a bibliometric study of bioinformatics literature which highlighted the bibliometric analysis of bioinformatics literature and analyzed the growth of the scientific literature in this area as available from NCBI PubMed using standard bibliometric techniques.

5. DATA ANALYSIS AND INTERPRETATION

Table 1 indicates the details about the authorship pattern of journal articles in both the journals namely BMC Genomics & BMC Biology. Out of 1728 articles in BMC Genomics, a majority of 228 (13.19%) articles were contributed by 3 authors; followed by 215 (12.44%) article contributed by 4 authors and rest of the articles were contributed in the sequences of more than 10 authors, 5 authors, 6 authors, 2 authors, 7 authors, 8 authors, 9 authors, 10 authors and single authors respectively. Surprisingly, it was observed that a minimum of 34(1.96%) articles were contributed by single author.

Similarly, in BMC Biology, out of 206 articles a majority of 43 (20.87%) articles were contributed by 3 authors followed by 41(19.90%) articles contributed by 4 authors and rest of the articles were contributed by 5 authors, 2 authors, 7 authors, 6 authors, 8 authors, more than 10 authors, 9 authors, single authors and 10 authors. In this journal, also a minimum of 2 (0.97%) articles authored by 10 authors and 6 (2.91%) articles were contributed by single author respectively. It was seen that between 2 journals, a very less number of articles were contributed by single author.

Table 1 Author- wise Distribution of Journal Articles

	BMC Genomics							BMC Biology						
Number of Citations	2004	2005	2006	2007	2008	Total	%	2004	2005	2006	2007	2008	Total	%
Single Author	3	6	7	9	9	34	1.96	1	2	-	3	-	6	2.91
Two Authors	7	25	36	39	55	162	9.37	1	5	6	3	8	23	11.16
Three Authors	16	25	59	63	65	228	13.19	5	4	9	11	14	43	20.87
Four Authors	11	24	33	55	92	215	12.44	6	5	9	13	8	41	19.9
Five Authors	10	21	44	55	80	210	12.15	5	2	4	5	8	24	11.65
Six Authors	14	16	37	49	76	192	11.11	3	3	4	5	2	17	8.25
Seven Authors	8	16	32	48	53	157	9.08	3	3	5	8	2	21	10.19
Eight Authors	7	17	17	42	65	148	8.56	-	2	1	4	4	11	5.33
Nine Authors	3	14	11	35	39	102	5.9	1	-	1	-	6	8	3.88
Ten Authors	2	2	18	24	20	66	3.81	-	-	1	1	-	2	0.97
More than 10 Authors	18	16	36	62	82	214	12 38	-	1	1	1	3	6	2.91
Total	99	182	330	481	636	1728	100	26	27	41	57	55	206	100

Table 2 shows the distribution of citations in journal articles that out of 1728 articles in BMC Genomics a maximum number of 371 (21.46%) articles have 41-50 citations followed by 360 (20.83%) articles have 11-20 citations and a minimum of 22 (1.27%) articles have 0-10 citations found. Other frequency of citations viz.31-40, 51-60, 21-30, 61-70, 71-80, 81-90, more than 100, and 91-100 are lying in the rank 3,4,5,6,7,8,9 and 10 respectively.

Similarly in BMC Biology, out of 206 articles, maximum number of 43 (20.87%) articles have 41-50 citations followed by 34 (16.50%) articles have 51-60 citations and a minimum of 2 (0.97%) articles belongs to the range of citations 0-10. Other frequency of citations viz.31-40, 21-30, 61-70, 71-80, 11-20, 81-90, 91-100 and more than 100 are lying in the rank 3,4,5,6,7,8,9 and 10 respectively. The graphical representation was given below (Figure 2a and 2b).

Table 2 Distribution of Citations in Journal Articles

	BMC Genomics							BMC Biology						
Number of Citations	2004	2005	2006	2007	2008	Total	%	2004	2005	2006	2007	2008	Total	%
0-10	2	5	3	2	10	22	1.27	00	-	-	2	-	02	0.97
11-20	19	13	11	13	304	360	20.83	3	-	1	4	2	10	4.85
21-30	15	35	50	52	51	203	11.74	5	2	6	9	4	26	12.62
31-40	24	47	66	96	100	333	19.27	5	5	5	4	9	28	13.59
41-50	19	35	73	109	135	371	21.46	5	6	10	9	13	43	20.87
51-60	10	20	51	68	102	251	14.52	6	7	6	11	4	34	16.50
61-70	5	6	33	55	79	178	10.3	1	2	5	7	6	21	10.19
71-80	1	8	20	38	58	125	7.23	-	2	4	3	10	19	9.22
81-90	2	5	10	18	30	65	3.76	1	1	1	4	2	09	4.36
91-100	1	3	5	11	16	36	2.08	-	1	2	3	2	08	3.88
More than 100	1	5	8	19	25	58	3.35	-	1	1	1	3	06	2.91
Total	99	182	330	481	636	1728	100	26	27	41	57	55	206	100

Table 3 shows the distribution of pages in journal articles that out of 1728 articles in BMC Genomics, maximum number of 613 (35.47%) articles cover 16-20 pages followed by 432 (25%) articles have 11-15 pages and a minimum of 12 (0.69%) article covered 0-5 pages respectively. Other range of pages viz. 21-25, 6-10, 26-30, 31-35 and more than 35 lying in the rank 3,4,5,6 and 7 respectively.

Similarly in BMC Biology, out of 206 articles, maximum number of 77 (37.37%) article cover 16-20 pages; followed by 46 (22.33%) articles have 21-25 pages and a minimum of 3 (1.45%) article covered more than 35 pages respectively. Other range of pages viz.11-15, 26-30, 6-10, 0-5, 31-35 are lying in the rank 3,4,5,6 and 7 respectively. The graphical representation was given below:

Table 4 shows the distribution of country in journal articles. Out of 1728 articles published in BMC Genomics it was observed that USA published highest number of 566 (32.75%) articles, followed by UK 124 (7.17%) published articles and rest of the articles were contributed in the sequence of Canada, France, Germany, China, Netherlands, Spain, Italy, Japan, Sweden, Australia, India, Norway, Korea, Israel, Taiwan, Switzerland, Finland, Belgium, Brazil and Czrepublic respectively. It was seen that a minimum of 10 (0.57%) articles were contributed by Czrepublic.

Table 3 Distribution of Pages in Journal Articles

	BMC Genomics							BMC Biology						
Number of Pages	2004	2005	2006	2007	2008	Total	%	2004	2005	2006	2007	2008	Total	%
0-5	3	1	1	2	5	12	0.69	-	-	-	3	1	4	1.94
6-10	45	39	13	17	22	136	7.87	2	-	2	2	2	8	3.88
11-15	41	68	91	122	110	432	32	10	5	10	15	5	45	21.84
16-20	8	45	136	175	249	613	35.47	09	12	13	19	24	77	37.37
21-25	2	22	64	105	164	357	20.65	04	6	11	11	14	46	22.33
26-30	-	3	18	46	59	126	7.29	7.29	1	25	3	8	19	9.22
31-35	-	3	4	7	18	32	1.85	-	1	-	3	-	4	1.94
More than 35	-	1	3	7	9	20	1.15	-	1	-	1	1	3	1.45
Total	99	182	330	481	636	1728	100	26	27	41	57	55	206	100

Similarly in BMC Biology, out of 206 articles it was observed that the USA published highest number of 83 (40.29%) articles, followed by the UK which published 34 (16.50%) articles and rest of the articles were contributed in the sequence of Germany, Canada, Australia, Sweden, Spain, France, Japan, Belgium, China, Finland, Israel, Netherlands, Switzerland, Brazil, Italy, Norway respectively. Many countries like Czrepublic, India, Korea, Taiwan did not publish even a single article during the year 2004-2008.

Table 4 Distribution of Countries in Journal Articles

	BMC Genomics							BMC Biology						
Name of the Country	2004	2005	2006	2007	2008	Total	%	2004	2005	2006	2007	2008	Total	%
USA	49	72	105	148	192	566	32.75	13	14	17	20	19	83	40.29
UK	8	14	28	39	35	124	7.17	4	3	7	9	11	34	16.50
Canada	2	14	24	36	41	117	6.77	2	1	4	4	2	13	6.31
France	7	12	21	30	45	115	6.65	1	-	1	-	1	2	0.97
Germany	8	10	21	35	40	114	6.59	2	4	7	7	6	24	11.65
China	-	1	15	21	37	74	4.28	-	-	-	-	3	3	1.45
Netherland	3	11	11	12	24	61	3.53	-	1	-	-	1	2	0.97
Spain	-	2	10	17	22	51	2.95	1	-	-	2	2	5	2.42
Italy	-	2	7	10	29	48	2.77	-	-	-	-	1	1	0.48
Japan	3	3	9	14	17	46	2.66	1	-	-	2	1	4	1.94
Sweden	6	6	6	13	10	41	2.37	1	1	-	4	-	6	2.91
Australia	2	3	5	11	18	39	2.25	-	-	1	3	2	6	2.91
India	1	5	8	7	12	33	1.90	-	-	-	-	-	-	-
Norway	1	4	3	7	13	28	1.62	-	-	1	-	-	1	0.48
Korea	1	-	5	5	11	21	1.21	-	-	-	-	-	-	
Israel	1	2	9	6	2	20	1.15	-	-	-	1	1	2	0.97
Taiwan	1	1	5	8	4	19	1.09	-	-	-	-	-	-	-
Finland	-	3	5	5	5	18	1.04	-	1	-	1	-	2	0.97
Switzerland	1	2	3	6	6	18	1.04	1	-	1	-	-	2	0.97
Belgium	2	2	2	2	7	15	0.86	-	-	1	1	1	3	1.45
Brazil	1	-	2	8	4	14	0.81	-	-	-	1	-	1	0.48
CzRepublic	1	2	-	5	5	10	0.57	-	-	-	-	-	-	-
Others	1	11	26	36	57	131	7.58	-	2	1	2	3	8	3.88
Total	99	182	330	481	636	1728	100	26	27	41	57	55	206	100

Table 5 shows the distribution of depth subject in journal articles that out of 1728 articles in BMC Genomics, the subject Genomics occupies first place with 552 (31.94%) published articles, followed by Computational Genomics with 266 (15.39%) articles and a minimum of 11 (0.63%) articles published in Cytology. Rest of the articles were contributed in the sequence of subjects viz. Biochemical Genetics, Biological Database, Biochemistry, Transcriptonomics, DNA Microarray, Evolutionary Biology, Evolutionary Genomics, Transgenics in the rank 3,4,5,6,7,8,9 and 10 respectively.

Similarly in BMC Biology, out of 206 articles it was observed that Biochemistry occupies the first place having 75 (36.40%) published articles followed by Evolutionary Biology have 52 (25.24%) articles Genomics have 51(24.75%) articles Cytology having 19 (9.22%) articles and a minimum of 09 (4.36%) articles were published in the subject Biological Database respectively. The graphical representation was given as under:

Table 5 Distribution of Depth Subjects in Journal Articles

	BMC Genomics							BMC Biology						
Depth Subject	2004	2005	2006	2007	2008	Total	%	2004	2005	2006	2007	2008	Total	%
Genomics	25	23	87	109	308	552	31.94	8	12	9	9	13	51 7	24.4
Transcript Nomics	7	20	26	55	-	108	6.25	-	-	-	-	-	-	-
Biological Database	13	24	23	42	92	194	11.22	1	1	3	2	2	9	4.36
Computational Genomics	24	44	70	128	-	266	15.39	-	-	-	-	-	-	-
Evolutionary Genomics	3	12	38	27	-	80	4.62	-	-	-	-	-	-	-
DNA Micro Array	17	20	28	32	-	97	5.61	-	-	-	-	-	-	-
Biochemical Genetics	10	39	58	88	-	195	11.28	-	-	-	-	-	-	-
Biochemistry	-	-	-	-	114	114	6.59	11	7	19	23	15	75	36.4 0
Cytology	-	-	-	-	11	11	0.63	2	4	6	3	4	19	9.22
Evolutionary Biology	-	-	-	-	82	82	4.74	4	3	4	20	21	52	25.2 4
Transgenic	-	-	-	-	29	29	1.67	-	-	-	-	-	-	-
Total	99	182	330	481	636	1728	100	26	27	41	57	55	206	100

6. MAJOR FINDINGS OF THE STUDY

Some of the major findings of the study are represented below:

i. In authorship pattern of journal articles in BMC Genomics, a majority of 228(13.19%) articles were contributed by three authors and a minimum of 34 (1.96%) articles were contributed by single author. Similarly, in BMC Biology, out of 206 articles, a majority of 43 (20.87%) articles were contributed by 3 authors and a minimum of 02(0.97%) articles authored by 10 authors and 06 (2.91%) articles were contributed by single author respectively. Hence, it was seen that between the 2 journals maximum articles were published by 3 authors and a very less number of articles were contributed by single author.

ii. In the distribution of citations in journal articles in BMC Genomics, it was found that a maximum number of 371(21.46%) articles have 41-50 citations; followed by 360 (20.83%) articles have 11-20 citations and a minimum of 22 (1.27%) articles have 0-10 citations respectively. Similarly, in BMC Biology, it was seen that a maximum number of 43 (20.87%) articles have 41-50 citations followed by 34 (16.50%) articles have 51-60 citations and a minimum of 02 (0.97%) articles

belong to the range of citations 0-10. Hence, in both the journals, maximum numbers of articles have 40-50 citations.

iii. In the distribution of pages in journal articles, out of 1728 articles in BMC Genomics, a maximum number of 613 (35.47%) articles cover 16-20 pages and a minimum of 12 (0.69%) articles covered 0 to 5 pages respectively. Similarly in BMC Biology, out of 206 articles, maximum number of 77 (37.37%) articles cover 16-20 pages and a minimum of 3 (1.45%) articles covered more than 35 pages respectively. Hence, it was also found that in both the journals, maximum number of articles cover 16-20 pages.

iv. In the distribution of country in journal articles in BMC Genomics, it was observed that the USA published highest number of 566 (32.75%) and in BMC Biology, the USA also published highest number of 83 (40.29% articles.

v. With regard to the depth subject studied in journal articles in BMC Genomics, the subject Genomics occupies first place with 552 (31.94%) published articles and a minimum of 11(0.63%) articles published in Cytology. Similarly, in BMC Biology, it was observed that Biochemistry occupies first place which have 75(36.40%) published articles.

7. CONCLUSION

The present study focuses on the current trend of the journals in the field of Bioinformatics. The result obtained from the study reveals that single authorship trend is decreasing and joint authorship is getting increased. It has been observed that maximum number of journals have good number of citations which indicates the better quality of the journals. It was also revealed that the subject like Genomics and Biochemistry is more popular in the field of Bioinformatics as more number of articles are being published among all the subjects relating to Bioinformatics.

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Librarian As Information Specialist

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Abstract

The purpose of this article is to examine the professional responsibilities of a librarian. The last part of the 20th century saw a dramatic growth of technological development in various fields. Library and library professionals cannot run away from this change. Today the word "Library" itself being replaced by the term information centre and the word "Librarian" is replaced by different terms such as "Information Scientist," "Information Specialist", "Information Enabler" and "Knowledge Creator". This article also highlights the work of library professionals. This article explains the characteristics of the library profession in detail. It also explains the essential qualities of library professionals under various sub-titles such as librarian as educator, updating current technology, relationship with user and continuing education. Librarian as a teacher will require a fundamental shift in the role of professionals. It is essential that library professional continuously acquires new knowledge and skills to ensure that they remain a vital part of information services of the future. There are two significant groups with which library professionals should establish strong collaborative relationships, as they are faculty and technologists. Continuing Education Programme allows library information specialist the opportunity to grow with the profession. The following agencies can play a vital role in continuing education programmes such as ILA, IASLIC, ALA, etc.

Keywords: *Information Specialist, Knowledge Creator, User Education.*

1. INTRODUCTION

Librarianship may be regarded as the one, as old as the book. But, librarianship as a profession is just a little over hundred years old. Earlier, it was only an occupation. The organization of librarianship as a profession started with the establishment of the American Library Association in 1876. The imparting of the specialized knowledge started with the establishment of the first library school in 1887 by Dr. Melvil Dewey. Most of the national library associations have drawn a set of professional ethics. During the last hundred years, it has grown rapidly and established itself as a notable profession. On this note, this article examines the professional responsibilities of a librarian.

2. DRAMATIC GROWTH

In the last century, the librarian's duty was mainly to preserve the library materials in his charge and make available under proper safe guards whenever requested. However, the last part of the 20th century saw dramatic growth of technological development in various fields. The impact is due to the emergence of information technology. This change indicates a pressing need to develop new and improved strategy to cope with this change and to introduce information in the organization. Library and Library professionals cannot run away from this change. Instead, they have to accept the challenge and they face this new millennium. It is absolutely necessary that the skills and professional ethics of the library profession is continuously up-dated. There has to be a mechanism by which quality training can be given to the LIS professionals regularly.

3. LIBRARIANS AS INFORMATION SPECIALIST

In accordance with the above-mentioned emerging scenario, the library and information science professionals' role is also subject to dramatic change. Today the word "Library" itself is being replaced by the term "Information Center" and the word "Librarian" replaced by different terms. A UNESCO guideline identifies these professionals as "Information Scientists". Messrs Guinchat and Menon say that the current term

for the unified profession of librarians, documentalist and information personnel is also called "Information Specialists" (General introduction it's the techniques of information and documentation work, UNESCO 1983) Work of an Information Specialist / Scientist Blaise Cronin in his model has called the librarians as electronic librarians and has suggested a three level model for the library works. The top level is called the strategies and is concerned with planning trend analysis. The middle level is concerned with system design, its implementation, networking user and staff training. The third level is that of operative level which is concerned with database searching, cataloging, organizing and dissemination.

4. INFORMATION ENABLER

Librarian must have a working knowledge of not only the tools to be deployed, but also the technology infrastructure used behind it. Therefore, this requires a basic knowledge of IT and intranet fundamental-ideas such as network security, routing and server-side applications. Along with this, another core competency is fluency in web development languages in order to better integrate these with the existing intranet and to develop patrons to use tools, has its own core competencies. Librarian must be able to train-both in person and video conference. This is a role that other parts of the organisation cannot do, because only the information specialist is a master of the tools. Training can be further broken down into competencies in communication, teaching and e-Learning. E-Learning is gaining momentum due to limited budget, and can be effective if used correctly. Just as a teacher modifies his style for the content and the class, a different web tool can be used depending on the complexity or type of tool that is deployed. In order to efficiently use organisation resources, knowledge of the different technologies is necessary as a core competency. Discussion of the role of information enabler also requires a brief mention of the role of information evangelist. It is also important to ensure that the information resources are widely known and also meet the needs of the patrons, for no technology is worthwhile if there are no users. This shows another key competency: the ability to publicize the availability of information resources and to ensure that they meet customer needs, reactively and proactively.

5. KNOWLEDGE CREATOR

Information is data, but knowledge is the application and integration of information into a context and actionable result. As a knowledge creator, librarian has 3 major opportunities viz; custom alerts, competitive intelligence and improving knowledge sharing methods. The need from custom alerts is a natural outcome of the deluge of information and the impact of globalization on business. The result is a need for more information faster - requiring not only sensitivity to necessary information, but specificity to ensure that the news for intelligence. Again, this is a natural role for librarian, especially in the world of pharma & medical devices, where changing regulations, procedures and products continually reshape the playing field. Since executives must be aware of so many variables in addition to day-to-day operations, the information specialist is in an ideal situation to be able to monitor all the information and create intelligence.

The last role in which librarian is in a unique situation is that of improving knowledge sharing methods. Especially in the medical and pharmaceutical industries, knowledge sharing is typically limited to Excel or Word documents passed or printed in some form. The last core competency of Librarian is the ability to use current technologies to improve information communication.

6. LIBRARIAN AS AN EDUCATOR

In the concept of teaching library and the librarian as a teacher will require a fundamental shift in the role of professionals. The historic role for the library and librarians has largely been collection and building centered with the individuals (faculty or student) coming to the library to seek assistance or to locate material. The new paradigm of the teaching library, librarian as a teacher, is one in which librarians actively find users in a variety of settings to provide instruction about information resources and to assist them in acquiring skills in locating, evaluating and using a variety of methods of information, location and presentation such as interactive networks, multimedia and compiler instructions.

7. USER EDUCATION AND ITS CONTENTS

In library literature, we come across terms, such as User Education, User Orientation, User Assistance and User Sensitization, which are used interchangeably. Brief definitions of the terms on the basis of the objectives of the respective exercises involved are given below.

User Education	User Orientation	User Assistance
1. Development of motivation, prosperity and potential for seeking and using information for problem solving development and self educational purposes. 2. Creating awareness of the availability of information relevant to different needs and situations.	1. Provision of guidance for understanding the features of a specific information system or type of information system in relation to user needs. 2. Provision of guidance on the specific information sources accessible through a specific system	1. Help in understanding the subject coverage, limitation etc of a specific information sources or databases. 2. Help in interpreting the data elements in an entry in a catalogue or display on visual display unit.

8. COMPUTER - ASSISTED PROGRAMS

It is essential that library professional continuously acquires new knowledge and skills to ensure that they remain vital parts of information services of the future. Librarians are learning complex range of electronic resources and systems and are addressing complex issues involving information resource selection and cataloging.

Librarians need to be able to design database for their own use, assist faculty in such efforts and develop computer-assisted instructional programs for staff and users.

Learning and integrate new technologies into service while assisting users in learning is how to apply the same in their work. Beyond acquiring specific knowledge skills, it is necessary for library staff to accept different expectations regarding their work, their working relationships and the environment in which they work. They need to develop strategies that allow them to work comfortably and effectively in the turmoil of the academic and information environments.

9. RELATIONSHIP WITH THE FACULTY

For a librarian to be called a professional must maintain relationships. The direction for this relationship and how he structures these relationships will determine whether he is a professional or not. There are two significant groups with which library professionals should establish strong collaborative relationships, as they are faculty member. Historically librarians have always had a strong link to the faculty member as teachers and researchers but, if professionals are to create a different and more dynamic role for themselves on campus, then the nature of this relationship may need to alter. In order for a real partnership to succeed, librarian needs to see themselves as part of the teaching and research endeavor and participate as an active and integral member of the education team.

A fundamental team of a partnership or collaboration is one of peers working and communicating together. This requires that those involved-librarians and faculty-be equal within the activities and life of the partnership. And this occurs when there is mutual respect for what each person contributes to the relationship.

10. ENHANCING KNOWLEDGE THROUGH CONTINUING EDUCATION

Library and information professionals need continuing education programme (CEP) to prepare themselves in order to perform their duties efficiently and effectively. “continuing education is a process by which library personnel (Single, in groups or in institutional settings) purposefully seek to improve themselves or their

profession by enhancing their knowledge, attitude and skills." Continuing Education programme allows library and information specialists the opportunity to grow with the profession. According to Peter F Drucker "continuing education assumes that school becomes integrated with life where one learns his best as an adult. It also assumes that the more experience in life and work people have, the more eager they will be to learn and more capable they will be of learning.

11. INFORMATION EXPLOSION

Need for continuing education has been felt in almost all the professions including library and information science, because of new developments being takes place rapidly in every profession. There are various reasons which demand library and information professionals to pursue continuing education. Information is published in various types and forms; therefore, library and information professionals need skills and techniques for acquiring, processing and dissemination of information. Computers, now -a- days, are available at reasonable prices. Each library whether big or small tries to procure computers. New development in communication technology such as internet through information can be accessed and retrieved while sitting anywhere in the world. Tools for handling union catalogues indexes, abstracts, thesaurus etc., are now available in printed as well as machine readable form.

12. DEVELOPMENT OF PROFESSION

Research and creation of new ideas can only be possible, if platform for interaction and mutual discussions among working librarians, research workers, teachers and students of library and information science is provided. The librarians should enhance their qualifications and professional knowledge by studying through continuing education.

13. TYPES OF CONTINUING EDUCATION

Continuing education for library and information professionals can be broadly classified into two types:

i Formal methods of continuing education; and
ii Informal methods of continuing education

13.1 Formal Methods

Formal courses, extension courses such as summer schools, short term courses, refresher courses and in service training come under the preview of formal method of imparting continuing education to the library and information professionals. The most important characteristic of this method is the facility of direct contact between the experts and the participants in the course.

13.2 Informal Methods

Seminars and conferences, professional literature, professional meeting, lectures, study circles, workshops, exhibitions etc are some of the informal methods of imparting continuing education programme to the library and information professionals. For keeping track with the new developments in the field is essential for the information professionals to meet periodically.

14. OBJECTIVES OF CONTINUING EDUCATION

i. To help the professionals to keep abreast with the latest development in the profession
ii. To adjust with the changing professional growth
iii. To help the library and information professionals in their personal and professional growth
iv. To disseminate new ideas
v. To provide better information services to the user

15. AGENCIES OFFERING CONTINUING EDUCATION

There are various agencies at national and international levels involved in preparing continuing education programmes. The following agencies can play a vital role in continuing education programme. Library Associations are ILA, IASLIC, ALA, LA, IFLA etc. National and International organizations are INSDOC, INFLIBNET, UGC, SSDC, FID, UNESCO, University Libraries and Individual Professionals.

16. CONCLUSION

In modern era, without the services of library and information, peoples the research and learning cannot provide service to the whole world. The global education

is totally dependent on the shoulders of librarians and information managers. The obligations of a librarian towards his institution are going to compel him to change his role as an information gatherer and information provider, not only of what has been stored in his library but also available anywhere in the world. This brings him closer to the needs of the users and he therefore should have the capacity to evaluate the precise requirements of the users besides having complete access to the world resources. The efficient matching of the two is going to define how effectively he can be as a professional librarian, and as a result he will be fulfilling an obligation to himself and will emerge as a satisfied professional.

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