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USE OF INFORMATION SOURCES VERSUS THE PERSONAL ATTRIBUTES OF BIOLOGICAL SCIENTISTS IN A UNIVERSITY ENVIRONMENT IN INDIA: A CASE STUDY OF KARNATAK UNIVERSITY, DHARWAD

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Studies the relative importance of information sources among the biological scientists and on the basis of statistical tests concludes that the personal attributes of biological scientists such as designation, experience and nature of research in a university environment have bearing on the use of information sources.

INTRODUCTION

Information required by the scientists is available in a variety of information sources. Although, no way of classifying them is found satisfactory and the groups are neither exhaustive nor mutually exclusive but for convenience, they can be grouped into formal sources of information. Even though, a considerable amount of research has been done on the use of information sources among the scientists, engineers and technologists, a large chunk of it is concentrated on the studies relating to the relative importance and the dependence on the formal sources of information. In order to develop the information resources to meet the needs of the users of libraries, the information professionals concerned with the development of collection of information materials must find answers to the following questions: What information sources are required and used by the users? How the use of different sources of information varies with the functional responsibilities of users? What are the factors which decide the choice of a particular source of information? How characteristics affect the use of different sources of information? How user characteristics affect the use of different sources of information?

In the present study, an attempt has been made not only to identify the relative importance of different sources of information used by the scientists but also to test whether the personal attributes of biological scientists have any bearing on the use of information sources or not.

OBJECTIVES

The twin objectives of the present study are to determine the relative use of information sources, and the use of information sources versus the personal attributes of biological scientists in a university environment. Specifically, the objectives of the study are to:

a) determine the relative importance of different sources of information; and

b) to know whether the personal attributes of biological scientists such as designation, qualifications, sex, age, experience, nature of work and nature of research in a university environment have any bearing on the use of information sources or not.

HYPOTHESIS

For the purpose of this study, the following hypothesis has been formulated.

The personal attributes of biological scientists such as designation, qualifications, sex, age, experience, nature of work and nature of research in a university environment have no bearing on the use of information sources.

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METHODOLOGY AND STUDY POPULATION

The sources of information used by scientists can be studied by enquiring from the scientists about it, observation, or by examining their publications. For this study, the first approach is adopted, where in the survey method has been followed for the collection of data required for the study. The questionnaire was designed consisting of two parts. Part-I is concerned with eliciting the information regarding the personal attributes such as designation, subject, qualifications, sex, age, experience (teaching and research), nature of work, nature of research and the number of publications, while the Part-II consisting of twenty six different sources of information was constructed keeping in view the objectives and hypothesis of the study (Appendix-I). The respondents were asked to rate the frequency of use of each one of these sources of information on a five point scale of 0 to 4, where 4 stands for 'most frequently used', 3 for 'frequently used', 2 for 'occasionally used', 1 for 'rarely used', and 0 for 'never used'. The mean use score for each one of the sources has been calculated by multiplying the raw score with the corresponding value of the five point scale and sum of it is divided by N i.e., number of respondents.

The study population consisted of members of faculty and research scholars of the departments of botany, zoology and biochemistry (part of chemistry) of Karnatak University Campus, Dharwad. A total of fifty three scientists were working in these departments and the questionnaire designed for the purpose was distributed to all of them. Out of which, forty eight responded to our request with a response rate of 90.57%. The data collected through the questionaire was further tabulated and statistical tests such as Spearman's rank correlation coefficient (r) and Kendal's Coefficient of Concordance (W) were applied to test the hypothesis and for results and discusion. The Spearman rank-difference method symbolized by r (read as rho) for computing the correlation coefficient between two sets of ranks or between two sets of scores converted into ranks. The formula is:

$$r = 1 - \frac{6\sum D^2}{N(N^2-1)}$$

where r = Spearman's rank correlation coefficient,
D = difference between $rank_1$ and $rank_2$ and;
N = Number of pairs of ranks/scores.

The Kendal's Coefficient of Concordance symbolized by letter W is a measure of correlation between more than two sets of ranks. The equation used for computing W is:

$$W = \frac{S}{1/12\ K^2\ (N^3-N)}$$

Where,

W = Coefficient of Correlation;
S = Sum of Squares deviations from the mean r_j;
K = Sets of rankings; and
N = Number of Sources which have been ranked

When the N > 7 the significance of W is tested by converting its values into Chisquare with the help of the following formula:

$$X^2 = K(N-1)W \text{ and}$$

the degrees of freedom (df) is always equal to (N-1) and Chisquare calculated value is compared with the Chisquare table value at 0.05 level of significance. If the Chisquare calculated value exceeds the table value, then the value of W is significant and the null hypothesis is rejected.

RESULTS AND DISCUSSION

Characteristics of study population

The study population consisted of more number of research scholars (45.83%) than readers (41.67%) and lecturers (12.50%) (Table 1). Majority of the scientists were from the field of botany (41.67%) and the rest from zoology (35.42%) and biochemistry (22.92%) (Table 2). Fifty percent of the scientists were Ph. D holders (Table 3), while more than three-fourth (79.17%) consisted of male population (Table 4). More than half of the scientists belonged to the age group of below 35 years and followed by those more than 46 years (31.25%) and 36-45 years (14.58%)

(Table 5). Teaching and research experience of scientists showed that one-forth of them belonged to the initial phase, while 41.67%, 33.33% respectively belonged to the middle and later phases (Table 6). Half of the scientists were engaged in teaching and research, while one scientist only in teaching (Table 7). Nearly 40% of the scientists studied were conducting basic research, the applied research being carried out by 27.08%, while the remaining 33.33% of the scientists were involved in both types of research (Table 8). Approximately 37.50% of the scientists

Table 1

Designationwise Distribution of Biological Scientists in a University Environment (N=48)

Designation	Number	%
Professors	-	-
Readers	20	41.67
Lecturers	6	12.50
Research Scholars	22	45.83
Total	48	100.00

Table 2

Subjectwise Distribution of Biological Scientists in a University Environment (N=48)

Subject	Number	%
Botany	20	41.87
Zoology	17	35.42
Biochemistry	11	22.92
Total	48	100.00

Table 3

Qualification Distribution of Biological Scientists in a University Environment (N=48)

Qualification	Number	%
Ph.D	24	50.00
Non-Ph.D	24	50.00
Total	48	100.00

Table 4

Sexwise Distribution of Biological Scientists in a University Environment (N=48)

Sex	Number	%
Male	38	79.17
Female	10	20.83
Total	48	100.00

Table 5

Agewise Distribution of Biological Scientists in a University Environment (N=48)

Age (In Years)	Number	%
<35	26	54.17
36-45	7	14.58
46>	15	31.25
Total	48	100.00

Table 6

Teaching and Research Experience of Biological Scientists in a University Environment (N=48)

Experience	Number	%
Initial Phase	12	25.00
Middle Phase	20	41.67
Later Phase	16	33.33
Total	48	100.00

Table 7

Nature of Work Performed by the Biological Scientists in a University Environment (N=48)

Nature of Work	Number	%
Teaching	1	2.08
Research	23	47.92
Both	24	50.00
Total	48	100

Table 8

Research Work Undertaken by Biological Scientists in a University Environment (N=48)

Nature of Research Work	Number	%
Basic Research	19	39.58
Applied Research	13	27.08
Both	16	33.33
Total	48	99.99

Table 9

Publicationwise Distribution of Biological Scientists in a University Environment: With vs Without Publications (N=48)

Number	Journal Articles	Seminar Papers	Review Articles	Books	Book Reviews
Without	18(37.50)	17(35.42)	40(83.33)	44(91.67)	48(100)
With	30(62.50)	31 (64.58)	8(16.66)	4(8.33)	-
	@ = 6.59	@ = 3.28	@ = 1	@ = 0.89	

were not having any journal articles to their credit. Similarly 35.42%, 83.33% and 91.67% of scientists respectively were not having any seminar/conference papers, review articles and books to their credit. Not even one scientists had book review/s to his credit. Among the scientists who were having publications to their credit, 16.67% were having 1-5 journals articles and seminar papers ranging between 1-5 accounted by one fourth of the scientists (Table 9).

Use of Information Sources by the Biological Scientists

The use of different sources of information by the biological scientists in a university environment is shown in Table 10. Reprints/preprints (70.83%), abstracting and Indexing journals (64.58%), primary periodicals (54.17%), research reports (39.58), and subject bibliographies (31.25%), were the sources of information which were most frequently used by the largest majority of the biological scientists. Monographs/Textbooks (45.83%), library catalogs (31.25%) and newspapers (27.08%) were frequently used sources of information, while dictionaries (45.83%), personal contacts (41.67%), conference/seminar papers (37.50%), yearbooks and directories (35.42%), encyclopedias (35.50%), theses and dissertations (31.25%), handbooks and manuals and institutional sources (27.08% each) were the sources of information which were occasionally used by the biological scientists. Yearbooks and directories (35.42%), library personnel (31.25%), government publications (29.17%), were rarely used, while standards (70.83%), patents (66.67%), private files (54.17%), trade catalogs (47.92%), geographical sources (47.93%), audio-visual sources (41.67%), bibliography of bibliographies (37.50%), guides to subject literature (35.42%), and government publications (29.17%) were never used by majority of the biological scientists in a university environment. The mean use score and the ranking of different sources of information used by the biological scientists indicated that the reprints/

Table 10

Use of Information Sources by the Biological Scientists in a University Environment (N=48)

Information Sources	Most Frequently Used	Frequently Used	Occasionally Used	Rarely Used	Never Used	Mean Use Score (Rank)
	4	3	2	1	0	
Primary Journals	26 (54.17)	11 (22.92)	10 (20.83)	-	1 (2.08)	3.27 (3)
Research Reports	19 (39.58)	17 (35.42)	4 (8.33)	6 (12.50)	2 (4.17)	2.94 (4)
Conference/Seminar Papers	10 (20.83)	13 (27.08)	18 (37.50)	6 (12.50)	1 (2.08)	2.52 (6)
Patents	1 (2.08)	2 (4.17)	8 (16.67)	5 (10.42)	32 (66.67)	1.38 (20)
Standards	2 (4.17)	3 (6.25)	8 (16.67)	1 (2.08)	34 (70.83)	0.71 (26)
Trade Catalogues	29 (4.17)	3 (6.25)	9 (18.75)	11 (22.92)	23 (47.92)	0.96 (24)
Theses and Dissertations	7 (14.58)	12 (25.00)	15 (31.25)	8 (16.67)	6 (12.50)	2.13 (10)
Personal Contacts	5 (10.42)	10 (20.83)	20 (41.67)	7 (14.58)	6 (12.50)	2.02 (11)
Private Files	5 (10.42)	3 (6.25)	4 (8.33)	10 (20.83)	26 (54.17)	0.98 (23)
Newspapers	10 (20.83)	13 (27.08)	9 (18.75)	9 (18.75)	7 (14.58)	2.21 (9)
Govt Publications	-	10 (20.83)	10 (20.83)	14 (29.17)	14 (29.17)	1.13 (21)
Reprints/Preprints	34 (70.83)	10 (20.83)	4 (8.33)	-	-	3.63 (1)

contd.

table 10 (contn.)

Information Sources	Most Frequently Used	Frequently Used	Occasionally Used	Rarely Used	Never Used	Mean Use Score (Rank)
	4	3	2	1	0	
Abstracting and Indexing Journals	31 (64.58)	9(18.75)	1 (2.08)	5 (10.42)	2 (4.17)	3.29 (2)
Subject Bibliographies	15 (31.25)	11 (22.92)	9 (18.75)	7 (14.58)	6 (12.50)	2.46 (7)
Monographs/Textbooks	12 (25.00)	22 (45.83)	8 (16.67)	4 (8.33)	2 (4.17)	2.79 (5)
Dictionaries	7 (14.58)	9 (18.75)	22 (45.83)	8 (16.67)	2 (4.17)	2.23 (8)
Encyclopedias	2 (4.17)	14 (29.17)	17 (35.42)	9 (18.75)	6 (12.50)	1.94 (12)
Yearbooks & Directories	3 (6.25)	3 (6.25)	17 (35.42)	17 (35.42)	8 (16.67)	1.50 (19)
Geographical Sources	1 (2.08)	1 (2.08)	10 (20.83)	13 (27.08)	23 (47.92)	0.83 (25)
Handbooks and Manuals	2 (4.17)	12 (25.00)	13 (27.08)	1 (22.92)	10 (20.83)	1.69 (16)
Library Catalogue/s	3 (6.25)	15 (31.25)	10 (20.83)	12 (25.00)	8 (16.67)	1.85 (14)
Bibliography of Bibliographies	1 (2.08)	7 (14.58)	8 (16.67)	14 (29.17)	18 (37.50)	1.67 (17)
Guides to Subject Literature	7 (14.58)	13 (27.08)	6 (12.50)	5 (10.42)	17 (35.42)	1.75 (15)
Institutional Sources	8 (16.67)	7 (14.58)	13 (27.08)	11 (22.92)	9 (18.75)	1.88 (13)
Audio-visual Sources	2 (4.17)	4 (8.33)	7 (14.58)	15 (31.25)	20 (41.67)	1.02 (22)
Library Personnel	4 (8.33)	8 (16.67)	11 (22.92)	15 (31.25)	10 (20.83)	1.60 (18)

preprints were the most useful sources of information and these were followed by abstracting and indexing journals, primary journals, research reports, monographs/textbooks, conference/ seminar papers, dictionaries, newspapers, theses and dissertations, encyclopedias, institutional sources, library catalogues, guides to subject literature, handbooks and manuals, bibliography of bibliographies, library personnel, yearbooks and directories, patents, government publications, audio-visual sources, private files, trade catalogues, geographical sources and standards.

Use of Information Sources vs the Personal Attributes of Biological Scientists

The use of information sources among the biological scientists in a university environment was further examined to determine whether the personal attributes of biological scientists have any bearing on the use of information sources or not.Table 11 shows the mean use score and the rank ordering of sources of information among the biological scientists versus their designation. The Kendal's computed coefficient of concordance ($W=0.538$; $X^2=40.35$; $X_{\alpha}^2=38.8$;$df=26$; $\alpha=0.05$) showed that there was a significant relationship as to the rank ordering of different sources of information used by the biological scientists versus their designation. The mean use score and the rank ordering of the different sources of information used by the biological scientists by their qualifications viz PH.D's and Non-Ph.D's is shown in Table 12. The Spearman's rank order correlation coefficient ($r=0.8723$; $P<P.0001$; $\alpha=0.05$) indicated that there was a significant agreement among the Ph. D's and Non-Ph.D's as far as the use of different sources of information among the biological scientists was concernd. Table 13 shows the mean use score and rank ordering of sources of information among the biological scientists by their sex. The Spearman's rank order correlation coefficient ($r=0.9381$; $P<0.0001$; $\alpha=0.05$) confirmed an extremely significant agreement among the biological scientists as with regard to the use of information sources versus sex. Table 14 shows the mean use score and the rank

Table 11

Use of Information Sources by the Biological Scientists in a University Environment: Designation

Information Sources	Professors(N=0) Mean Use Score(Rank)	Readers(N=20) Mean Use Score(Rank)	Lectures(N=6) Mean Use Score(Rank)	Research Scholars (N=22) Mean Use Score(Rank)
Primary Journals	-	3.45 (2)	3.17 (4)	3.18 (2)
Research Reports	-	2.75 (6)	3.17 (4)	3.00 (4)
Conference/Seminar Papers	-	3.15 (4)	2.00 (10)	2.09 (9)
Patents	-	0.55 (22)	1.17 (13)	0.50 (24)
Standards	-	0.40 (23)	0.83 (15)	1.05 (19)
Trade Catalogues	-	0.9 (20)	1.00 (14)	0.95 (20)
Theses and Dissertations	-	2.1 (8)	2.17 (9)	2.5 (7)
Personal Contacts	-	2.1 (8)	2.83 (6)	1.73 (13)
Private Files	-	0.75 (21)	1.83 (11)	0.86 (21)
Newspapers	-	1.85 (10)	2.67 (7)	2.23 (8)
Govt Publications	-	1.55 (13)	1.5 (12)	1.36 (18)
Reprints/Preprints	-	3.7 (1)	3.83 (1)	3.35 (1)
Abstracting and Indexing Journals	-	3.4 (3)	3.00 (5)	3.14 (3)
Subject Bibliographies	-	2.5 (7)	3.67 (2)	2.00 (10)
Monographs/Textbooks	-	3.0 (5)	3.5 (3)	2.64 (6)
Dictionaries	-	2.1 (8)	3.17 (4)	2.68 (5)
Encyclopedias	-	1.85 (10)	2.67 (7)	1.91 (11)
Yearbooks & Directories	-	1.3 (16)	1.83 (11)	1.45 (17)
Geographical Sources	-	0.95 (19)	0.33 (16)	0.64 (23)
Handbooks and Manuals	-	1.65 (12)	2.67 (7)	1.55 (16)
Library Catalogue/s	-	1.75 (11)	3.17 (4)	1.77 (12)
Bibliography of Bibliographies	-	1.25 (17)	2.67 (7)	0.68 (22)
Guides to Subject Literature	-	1.45 (14)	2.83 (6)	1.73 (13)
Institutional Sources	-	1.95 (9)	2.33 (8)	1.68 (14)
Audio-visual Sources	-	1.2 (18)	0.83 (15)	0.68 (22)
Library Personnel	-	1.4 (15)	2.0 (10)	1.64 (15)

$W = 0.538$; $X^2 = 40.35$; $X_{\alpha}^2 = 38.8$; $df = 26$; $\alpha = 0.05$

Table 12

Use of Information Sources by the Biological Scientists in a University Environment: Ph.D vs Non-Ph.D

Information Sources	Ph.D.(N=24) Mean Use Score (Rank)		Non-Ph.D (N=24) Mean Use Score (Rank)	
Primary Journals	3.45	(2)	3.08	(2)
Research Reports	2.96	(3)	3.00	(4)
Conference/Seminar Papers	2.83	(5)	2.25	(7)
Patents	0.58	(21)	0.63	(21)
Standards	0.33	(22)	1.17	(16)
Trade Catalogues	0.96	(19)	0.83	(18)
Theses and Dissertations	2.04	(9)	2.54	(6)
Personal Contacts	2.33	(6)	1.83	(10)
Private Files	0.91	(20)	0.88	(17)
Newspapers	1.96	(11)	2.25	(7)
Govt Publications	1.17	(17)	1.46	(15)
Reprints/Preprints	3.58	(1)	3.36	(1)
Abstracting and Indexing Journals	3.45	(2)	3.04	(3)
Subject Bibliographies	2.88	(4)	1.96	(9)
Monographs/Textbooks	2.33	(6)	2.67	(5)
Dictionaries	2.29	(7)	2.13	(8)
Encyclopedias	2.00	(10)	1.96	(9)
Yearbooks & Directories	1.33	(15)	1.54	(14)
Geographical Sources	1.25	(16)	0.67	(20)
Handbooks and Manuals	2.08	(8)	1.46	(15)
Library Catalogue/s	2.08	(8)	1.79	(11)
Bibliography of Bibliographies	1.54	(13)	0.79	(19)
Guides to Subject Literature	1.71	(12)	1.79	(11)
Institutional Sources	2.00	(10)	1.75	(12)
Audio-visual Sources	1.08	(18)	0.79	(19)
Library Personnel	1.42	(14)	1.71	(13)

$r = 0.8723$; $P < 0.0001$ (two tailed); P Value Summary = Extremely Significant $\alpha = 0.05$

Table 13

Use of Information Sources by the Biological Scientists in a University Environment : Male vs Female

Information Sources	Male (N=38) Mean Use Score (Rank)	Female (N=10) Mean Use Score (Rank)
Primary Journals	3.34 (3)	3.1 (3)
Research Reports	2.92 (5)	3.2 (2)
Conference/Seminar Papers	2.58 (6)	2.3 (10)
Patents	0.53 (25)	0.90 (17)
Standards	0.71 (24)	0.90 (17)
Trade Catalogues	0.95 (20)	0.90 (17)
Theses and Dissertations	2.26 (8)	3.00 (4)
Personal Contacts	2.03 (10)	2.00 (13)
Private Files	0.92 (21)	0.80 (18)
Newspapers	2.11 (9)	2.6 (7)
Govt Publications	1.39 (17)	1.40 (15)
Reprints/Preprints	3.66 (1)	3.6 (1)
Abstracting and Indexing Journals	3.32 (4)	2.7 (6)
Subject Bibliographies	2.42 (7)	2.4 (9)
Monographs/Textbooks	3.39 (2)	2.9 (5)
Dictionaries	2.11 (9)	2.5 (8)
Encyclopedias	1.87 (11)	2.4 (9)
Yearbooks & Directories	1.29 (18)	2.0 (13)
Geographical Sources	0.79 (23)	0.40 (19)
Handbooks and Manuals	1.66 (15)	2.1 (12)
Library Catalogue/s	1.82 (12)	2.4 (9)
Bibliography of Bibliographies	1.16 (19)	1.2 (16)
Guides to Subject Literature	1.71 (14)	2.2 (11)
Institutional Sources	1.76 (13)	2.2 (11)
Audio-visual Sources	0.89 (22)	0.90 (17)
Library Personnel	1.53 (16)	1.6 (14)

r=0.9381; P< 0.0001 (two tailed); P Value Summary = Extremely Signigicant $\propto = 0.05$

Table 14

Use of Information Sources by the Biological Scientists in a University Environment : Age

Information Sources	<35 (N=26) Mean Use Score(Rank)	36-45 (N=7) Mean Use Score (Rank)	46> (N=15) Mean Use Score(Rank)
Primary Journals	3.19 (2)	3.71 (3)	3.27 (2)
Research Reports	2.96 (4)	3.71 (3)	2.67 (5)
Conference/Seminar Papers	2.07 (9)	3.14 (4)	3.00 (4)
Patents	0.62 (21)	0.86 (16)	0.47 (19)
Standards	1.00 (18)	0.71 (17)	0.33 (20)
Trade Catalogues	1.00 (18)	1.28 (14)	0.60 (18)
Theses and Dissertations	2.46 (6)	2.28 (8)	2.00 (8)
Personal Contacts	1.92 (12)	2.57 (6)	1.93 (9)
Private Files	1.04 (17)	1.00 (15)	0.60 (18)
Newspapers	2.27 (7)	1.86 (10)	2.07 (7)
Govt Publications	1.31 (16)	1.71 (11)	1.40 (15)
Reprints/Preprints	3.62 (1)	3.86 (2)	3.67 (1)
Abstracting and Indexing Journals	3.08 (3)	4.00 (1)	3.20 (3)
Subject Bibliographies	2.23 (8)	2.86 (5)	2.53 (6)
Monographs/Textbooks	2.69 (5)	3.14 (4)	3.00 (4)
Dictionaries	2.23 (8)	2.57 (6)	2.07 (7)
Encyclopedias	1.96 (11)	2.00 (9)	1.8 (10)
Yearbooks & Directories	1.5 (15)	1.57 (12)	1.33 (16)
Geographical Sources	0.54 (22)	1.0 (15)	1.07 (17)
Handbooks and Manuals	1.77 (13)	1.86 (10)	1.67 (11)
Library Catalogue/s	2.04 (10)	2.29 (7)	1.67 (11)
Bibliography of Bibliographies	0.96 (19)	1.00 (15)	1.6 (12)
Guides to Subject Literature	1.96 (11)	1.57 (12)	1.47 (14)
Institutional Sources	1.81 (12)	2.29 (7)	1.8 (10)
Audio-visual Sources	0.69 (20)	1.43 (13)	1.07 (17)
Library Personnel	1.73 (14)	1.00 (15)	1.53 (13)

$W = 0.492$; $X^2 = 34.9$; $X_{\alpha}^2 = 38.88$; $df=26$; $\alpha = 0.05$

Table 15

Use of Information Sources by the Biological Scientists in a University Environment : Experience

Information Sources	Initial Phase (N=12)	Middle Phase (N=20)	Last Phase (N=16)
	Mean Use Score(Rank)	Mean Use Score(Rank)	Mean Use Score(Rank)
Primary Journals	3.25 (2)	3.5 (2)	3.06 (4)
Research Reports	2.83 (3)	3.4 (3)	2.56 (8)
Conference/Seminar Papers	2.00 (10)	2.6 (7)	2.88 (6)
Patents	0.83 (17)	0.6 (21)	0.44 (23)
Standards	1.67 (13)	0.45 (23)	0.50 (22)
Trade Catalogues	1.83 (11)	0.50 (22)	0.81 (20)
Theses and Dissertations	1.83 (11)	2.65 (6)	2.19 (9)
Personal Contacts	2.08 (9)	2.05 (11)	1.94 (12)
Private Files	1.25 (15)	0.95 (19)	0.69 (21)
Newspapers	2.00 (10)	2.00 (12)	2.63 (7)
Govt Publications	1.42 (14)	1.35 (16)	1.69 (16)
Reprints/Preprints	3.67 (1)	3.55 (1)	3.75 (1)
Abstracting and Indexing Journals	2.75 (4)	3.15 (4)	3.69 (2)
Subject Bibliographies	1.83 (11)	2.35 (8)	2.94 (5)
Monographs/Textbooks	2.33 (7)	3.00 (5)	3.19 (3)
Dictionaries	2.42 (6)	2.25 (9)	2.00 (11)
Encyclopedias	2.17 (8)	2.00 (12)	1.81 (14)
Yearbooks & Directories	1.75 (12)	1.3 (17)	1.31 (18)
Geographical Sources	1.00 (16)	0.40 (24)	0.94 (19)
Handbooks and Manuals	1.67 (13)	1.75 (13)	1.75 (15)
Library Catalogue/s	1.83 (11)	2.1 (10)	1.88 (13)
Bibliography of Bibliographies	1.25 (15)	1.00 (18)	1.31 (18)
Guides to Subject Literature	2.58 (5)	0.95 (19)	1.81 (14)
Institutional Sources	2.00 (10)	1.6 (14)	2.13 (10)
Audio-visual Sources	0.75 (8)	0.65 (20)	1.44 (17)
Library Personnel	1.42 (14)	1.45 (15)	1.81 (14)

$W = 0.526$; $X^2 = 39.45$; $X_{\alpha}^2 = 38.8$ $df = 26$; $\alpha = 0.05$

Table 16

Use of Information Sources by the Biological Scientists in a University Environment : Nature of Work

Information Sources	Teaching (N=1)	Research (N=23)	Both (N=24)
	Mean Use Score(Rank)	Mean Use Score(Rank)	Mean Use Score(Rank)
Primary Journals	2.0 (3)	3.21 (2)	3.41 (2)
Research Reports	4.0 (1)	3.04 (4)	2.71 (7)
Conference/Seminar Papers	2.0 (3)	2.13 (8)	2.92 (5)
Patents	2.0 (3)	0.47 (24)	0.67 (21)
Standards	2.0 (3)	1.0 (19)	0.46 (22)
Trade Catalogues	-	0.91 (20)	1.0 (19)
Theses and Dissertations	4.0 (1)	2.48 (6)	2.04 (13)
Personal Contacts	-	1.65 (13)	2.46 (8)
Private Files	-	0.83 (21)	1.0 (19)
Newspapers	4.0 (1)	2.17 (7)	2.25 (10)
Govt Publications	4.0 (1)	1.26 (18)	1.42 (17)
Reprints/Preprints	3.0 (2)	3.52 (1)	3.79 (1)
Abstracting and Indexing Journals	4.0 (1)	3.17 (3)	3.29 (3)
Subject Bibliographies	3.0 (2)	2.04 (9)	2.75 (6)
Monographs/Textbooks	3.0 (2)	2.65 (5)	3.13 (4)
Dictionaries	2.0 (3)	2.04 (9)	2.38 (9)
Encyclopedias	1.0 (4)	1.91 (10)	2.08 (12)
Yearbooks & Directories	1.0 (4)	1.43 (16)	1.46 (16)
Geographical Sources	-	0.56 (23)	0.88 (20)
Handbooks and Manuals	-	1.48 (15)	2.04 (13)
Library Catalogue/s	2.0 (3)	1.78 (11)	2.08 (12)
Bibliography of Bibliographies	2.0 (3)	0.65 (22)	1.63 (15)
Guides to Subject Literature	2.0 (3)	1.74 (12)	1.83 (14)
Institutional Sources	2.0 (3)	1.61 (14)	2.13 (11)
Audio-visual Sources	1.0 (4)	0.65 (22)	1.16 (18)
Library Personnel	1.0 (4)	1.39 (17)	1.58 (15)

$W = 0.333$; $X^2 = 24.98$; $X_{\alpha}^2 = 38.8$; $df=26$; $\alpha = 0.05$

Table 17

Use of Information Sources by the Biological Scientists in a University Environment: Nature of Research

Information Sources	Basic Research (N=19)	Applied Research (N=13)	Both (N=16)
	Mean Use Score(Rank)	Mean Use Score(Rank)	Mean Use Score(Rank)
Primary Journals	3.42 (2)	3.15 (2)	3.25 (4)
Research Reports	2.58 (5)	3.15 (2)	3.31 (3)
Conference/Seminar Papers	2.37 (6)	2.62 (6)	2.63 (6)
Patents	0.32 (24)	0.38 (21)	1.13 (16)
Standards	0.26 (25)	1.0 (18)	1.13 (16)
Trade Catalogues	0.58 (23)	1.15 (16)	1.19 (15)
Theses and Dissertations	2.16 (8)	2.85 (4)	2.00 (9)
Personal Contacts	2.11 (9)	1.85 (12)	2.06 (8)
Private Files	0.84 (21)	0.69 (20)	1.13 (16)
Newspapers	1.63 (14)	2.69 (5)	2.5 (7)
Govt Publications	0.95 (19)	1.62 (15)	1.75 (11)
Reprints/Preprints	3.53 (1)	3.69 (1)	3.86 (1)
Abstracting and Indexing Journals	3.21 (3)	2.92 (3)	3.56 (2)
Subject Bibliographies	2.16 (8)	2.31 (8)	2.81 (5)
Monographs/Textbooks	2.79 (4)	2.54 (7)	3.25 (4)
Dictionaries	2.21 (7)	1.85 (12)	2.5 (7)
Encyclopedias	1.89 (10)	2.15 (9)	1.94 (10)
Yearbooks & Directories	1.32 (17)	1.77 (13)	1.31 (14)
Geographical Sources	0.68 (22)	0.85 (19)	0.63 (18)
Handbooks and Manuals	1.68 (13)	1.92 (11)	1.56 (12)
Library Catalogue/s	1.84 (11)	2.08 (10)	2.00 (9)
Bibliography of Bibliographies	1.05 (18)	1.00 (18)	1.56 (12)
Guides to Subject Literature	1.47 (16)	1.62 (15)	1.94 (10)
Institutional Sources	1.74 (12)	1.85 (12)	2.00 (9)
Audio-visual Sources	0.89 (20)	1.08 (17)	0.81 (17)
Library Personnel	1.58 (15)	1.69 (14)	1.38 (13)

$W=0.598$; $X^2=44.85$; $X_{\alpha}^2=38.8$; $df=26$; $\alpha=0.05$

ordering of different sources of information among the biological scientists by their age. The Kendal's computed coefficient of concordance indicated that ($W=0.492$; $X^2=36.9$; $X \propto^2=38.88$; $df=26$; $\propto=0.05$) there was no significant relationship as to the rank ordering of different sources of information among the biological scientists belonging to the different age group. Table 15 shows the mean use score and rank ordering of sources of information among the biological scientists versus the teaching and research experience. The Kendal's Computed coefficient of concordance ($W=0.526$; $X^2=39.45$; $X\propto^2=38.8$; $df=26$; $\propto=0.05$) showed that there was a strong relationship as far as the use of different sources of information among the biological scientists with their varied experience. The use of information sources among the biological scientists and the nature of work is shown in Table 16. From the Kendal's computed concordance of coefficient ($W=0.333$; $X^2=24.98$; $X\propto^2=38.8$; $df=26$; $\propto=0.05$) it was found that there was no significant relationship with regard to the use of information sources among the biological scientists by their nature of work, but there was a significant relationship regarding the rank ordering of information sources as indicated by the Kendal's concordance of coefficient ($W=0.598$; $X=44.85$; $X\propto^2=38.8$;$df=26$; $\propto=0.05$) among the biological scientists by their nature of research work (Table 17). Thus, the personal attributes such as designation, experience and nature of research work have bearing on the use of information sources, while qualifications, sex, age, and nature of work have no bearing on the use of information sources among the biological scientists in a university environment.

SUMMARY OF FINDINGS

Some of the important findings of the study are reprints/preprints, abstracting and indexing journals, primary periodicals, research reports and subject bibliographies were the most frequently used sources of information. The monographs/ textbooks, library catalogues and newspapers were frequently used and dictionaries, personal contacts, conference/seminar papers, yearbooks and directories, encyclopedias, theses and dissertations, handbooks and manuals, and institutional sources were occasionally used. Library personnel and government publications were rarely used, while standards, patents, private files, trade catalogues, geographical sources, audio-visual sources, bibliography of bibliographies, guides to subject literature were never used by the majority of biological scientists in a university environment. The personal attributes such as designation, experience and nature of research work have bearing on the use of information sources, while qualifications, sex, age, and nature of work have no bearing on the use of information sources among the biological scientists in a university environment. The findings of the study have implications for deciding the sources of information for collection development in university libraries in India.

Appendix-I

QUESTIONNAIRE

1. Name : .....

2. Designation :
   ( ) Professor
   ( ) Reader
   ( ) Lecturer
   ( ) Research Scholar

3. Name of the Department :
   ( ) Botany
   ( ) Zoology
   ( ) Biochemistry

4. Qualifications :
   ( ) Ph. D.
   ( ) Non-Ph. D

5. Sex :
   ( ) Male
   ( ) Female

6. Age (in years) :
   ( ) < 35
   ( ) 36-45
   ( ) > 46

7. Experience in teaching and research :
   ( ) Initial Phase
   ( ) Middle Phase
   ( ) Later Phase

8. Nature of Work :
   ( ) Teaching
   ( ) Research
   ( ) Both

9. Nature of Research :
   ( ) Basic
   ( ) Applied
   ( ) Both

10. Do you have publications to your credit?
    ( ) Yes
    ( ) No

contd.

11. Please indicate the frequency of use of the following information sources for meeting your information requirements. Please tick (√) the appropriate one

Information Sources	Most Frequently Used	Frequently Used	Occasionally Used	Rarely Used	Never Used
	4	3	2	1	0
Primary Journals	( )	( )	( )	( )	( )
Research Reports	( )	( )	( )	( )	( )
Conference/Seminar Papers	( )	( )	( )	( )	( )
Patents	( )	( )	( )	( )	( )
Standards	( )	( )	( )	( )	( )
Trade Catalogues	( )	( )	( )	( )	( )
Theses and Dissertations	( )	( )	( )	( )	( )
Personal Contacts	( )	( )	( )	( )	( )
Private Files	( )	( )	( )	( )	( )
Newspapers	( )	( )	( )	( )	( )
Govt Publications	( )	( )	( )	( )	( )
Reprints/Preprints	( )	( )	( )	( )	( )
Abstracting and Indexing Journals	( )	( )	( )	( )	( )
Subject Bibliographies	( )	( )	( )	( )	( )
Monographs/Textbooks	( )	( )	( )	( )	( )
Dictionaries	( )	( )	( )	( )	( )
Encyclopedias	( )	( )	( )	( )	( )
Yearbooks & Directories	( )	( )	( )	( )	( )
Geographical Sources	( )	( )	( )	( )	( )
Handbooks and Manuals	( )	( )	( )	( )	( )
Library Catalogue/s	( )	( )	( )	( )	( )
Bibliography of Bibliographies	( )	( )	( )	( )	( )
Guides to Subject Literature	( )	( )	( )	( )	( )
Institutional Sources	( )	( )	( )	( )	( )
Audio-visual Sources	( )	( )	( )	( )	( )
Library Personnel	( )	( )	( )	( )	( )

Place:
Date:

Signature of the respondent