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Evaluation of Chemistry Journals at IIT Kharagpur, India: Use and Citation Analysis

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Introduction

Globally, librarians spend enormous sums of money to acquire library materials irrespective of the fact that national, state, and local economies vary widely, as do individual library budgets. Traditionally, librarians believed in a “collect everything” approach. But with recent budget limitations, space constraints, and rapid growth of digital materials, most librarians cannot continue with the same approach anymore. Librarians, as professionals, try to build and maintain collections that will meet their collection development goals and be appropriate for their users (Agee, 2005, pp. 92-95).

In this environment, it becomes a dilemma for the librarian, whether to switch completely to a digital environment or not. By evaluating current collections, librarians may better manage future collection development. Collection evaluations help librarians ascertain the usability of materials in their collections to the user community.

Aims and Objectives

The present study evaluates the collection of Chemistry Journals at IIT Kharagpur library with following objectives;

- To provide a strong basis for better collection management.
- To evaluate the performance measurement of Journals for research.
- To help cost-effective subscription of journals.
- To understand the impact of Chemistry Journals on research.
- To provide information regarding the global as well as local impact of each Chemistry Journals.

Scope and Limitations

The scope of the present study is confined only to Chemistry Journals subscribed by Central Library, IIT Kharagpur. It is quite a difficult task to take all the Journals subscribed by the Central Library under the purview of the study. The present study, therefore, has the following limitations:

i. The research is limited to the jurisdiction of IIT Kharagpur. (i.e. *limitation by the type of institution covered*)
ii. The population of this study is confined to the faculty and research scholars of Department of Chemistry, IIT Kharagpur but not of any other Department (i.e. *limitations by the size of the sample*)
iii. For the evaluation of chemistry journals, the present study investigates only the usage statistics and impact factor but not any other aspect (i.e. *limitation by type of investigation*).
iv. In the present study SciFinder Scholar has been used to retrieve usage statistics of some selected Journals through citation analysis (i.e. *limitation by database covered*).

Methodology

In the present study, the questionnaire data coupled with citation statistics from SciFinder were used for the evaluation of Chemistry Journals. A simple questionnaire was prepared to elicit pertinent data on the usage of journals by the respondents. In the second part of the study, the cited references of selected Journals for the year 2005 and 2006 were collected from SciFinder Scholar based on the analyzed data of questionnaire. At last ISI impact factor of each Chemistry Journal was obtained to find out the global usage trend of the journals in Chemistry.

Analysis of Data and Discussion

The researcher has devoted all its effort to meet the goal of the study, starting from drafting a simple questionnaire to distribute it to the faculty and research scholars of the Department of Chemistry, IIT Kharagpur. All the Journal titles categorized under Department of Chemistry have been collected from the website of Central Library. The Department of Chemistry, IIT Kharagpur is scattered in three different building, viz. Main Building, Organic Lab and High Pressure Lab. The researchers have distributed and collected 31 questionnaires from the faculty and research scholars available within the period 19th April 2007 to 25th April 2007. From the 31 collected questionnaires, only 30 questionnaires are being taken into study. The data collected from the questionnaire are divided into two segments for effective interpretation. The first part deals with the types of Journal version available in the Central Library and how many numbers of users prefer which one. The gathered data are portrayed in Tabl-1 for necessary analysis and interpretation.

Table-1: Distribution of Data by Preferred Versions of Journals

Sl. No.	Version Type	Preferred Version by Users	Percentage out of Total Sample (n=30)
1.	Only Print	1	3.33 %
2.	Only Online	8	26.66 %
3.	Both	21	70 %

The above table clearly describes about the preferred version of journals by user and percentage of use out of total sample (30) retrieved from the questionnaire. It is interesting to discover that, 21 (70%) respondents prefer to use both print and online version of the journals. However, 8 (26.66%) respondents like to use only online version and only 1 (3.33%) prefers only the print version of the journal. The data indicates that though digital and electronic technology has a great impact on publishing industry, they can not replace print or hard copy of journals completely.

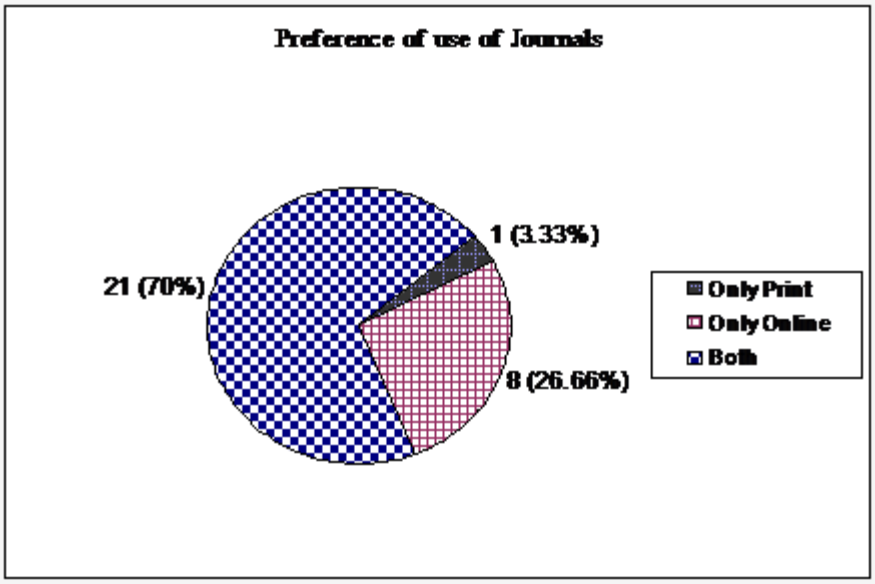


Fig.1: Distribution of Data by Preferred Version of Journals

Use of Journals

The second part of the questionnaire highlights about the usage of journals by the local users. Every library need to evaluate the usage statistics of their journals, since a major part of library budget is spend on it. There should not be a random selection of journals; it needs to be placed on a strong foundation of qualitative and quantitative data. With this objective in mind, the researcher has made an effort to study the usage statistics of all the 51 journals, taken as sample for the present study. At the same time researcher has also gathered the ISI Impact Factor of Journals which can be traced from the following table. The following table can also provide evidence about the local and global importance of each Chemistry Journals to the end users.

Table- 2: Distribution of Data by Usage Frequency of Journals

Name of Journal (s)	Nos. of users (f)	Use Percentage out of Total Sample (n=30)	Impact Factor
Journal of American Chemical Society	28	93.33 %	7.419
Chemical Reviews	27	90 %	20.869
Angewandte Chemie	26	86.66 %	9..596
Chemical Communications	23	76.66 %	4.43
Chemistry: A European Journal	23	76.66 %	4..907
Accounts of Chemical Research	22	73.33 %	13.141
Journal of Organic Chemistry	21	70 %	3.675
Organic Letters	21	70 %	4.368
European Journal of Organic Chemistry	20	66.66 %	2.598
Tetrahedron Letters	20	66.66 %	2.477
Tetrahedron	19	63.33 %	2.610
Tetrahedron: Asymmetry	19	63.33 %	2.429
Synthetic Communications	16	53.33 %	0.860
Organometallics	15	50 %	3.473
Synthesis	15	50 %	2.401
Journal of Medicinal Chemistry	13	43.33 %	5.076
Inorganic Chemistry	12	40 %	3.851
Journal of Natural Products	12	40 %	2.267
Chemistry of Materials	11	36.66 %	4.818

Journal of Chemical Education	11	36.66 %	0.51
Langmuir	11	36.66 %	3.705
Organic and Biomolecular Chemistry	11	36.66 %	2.547
Crystal Growth and Design	10	33.33 %	3.551
Dalton Transactions	10	33.33 %	3.00
European Journal of Inorganic Chemistry	10	33.33 %	2.514
Journal of Molecular Catalysis - A: Chemical	10	33.33 %	2.348
Nano Letters	10	33.33 %	9.847
Journal of Physical Chemistry - B	09	30 %	4.033
Chemical and Engineering News	08	26.66 %	0.521
Journal of Physical Chemistry - A	08	26.66 %	2.898
Journal of Molecular Catalysis - B: Enzymatic	07	23.33 %	
Physical Chemistry Chemical Physics	07	23.33 %	2..52
Analytical Chemistry	06	20 %	5.635
Journal of Solid State Chemistry	06	20 %	1.725
Synfacts	06	20 %	
Biophysical Journal	04	13.33 %	4.585
Organic Process Research and Development	04	13.33 %	1.749
Biomacromolecules	03	10 %	3.618
Journal of Combinatorial Chemistry	03	10 %	4.197
Molecular Pharmaceuticals	03	10 %	
Bioconjugate Chemistry	02	6.66 %	3..943
Energy and Fuels	02	6.66 %	1.494
Molecular Biosystems	02	6.66 %	
Biotechnology Progress	01	3.33 %	1.635
Electrophoresis	01	3.33 %	3.850
Inter Journal of Quantum Chemistry	01	3.33 %	1.19
Journal of Chemical Information and modeling	01	3.33 %	2..923
Journal of Chemical Theory & Computation	01	3.33 %	
Journal of Proteome Research	01	3.33 %	6..917
Chemical Research in toxicology	00	0 %	3..339
Electroanalysis	00	0 %	1.266

Table-2 uncovers the frequency of use of journals by the faculty and research scholars of the Department of Chemistry along with its respective percentage. It was found that some of the journals like *Journal of American Chemical Society* and *Chemical Reviews* are the highly used by more than 90% of the users. It was further found that 14 (27.45%) out of 51 journals are used only by 10% of the users. None of the users are using journals, *Chemical Research in Toxicology* and *Electroanalysis*. The rest of the journals have moderate percentage of use. From the above table it conclude that some of the journals have very low percentage of use and still library is subscribing them as a part of the package or individually.

Citing References Collected from SciFinder Scholar

Before coming to a conclusion about the usage of journals and dropping them from the collection, the library need to verify the relevancy of the data collected through questionnaire. The researcher has traced the

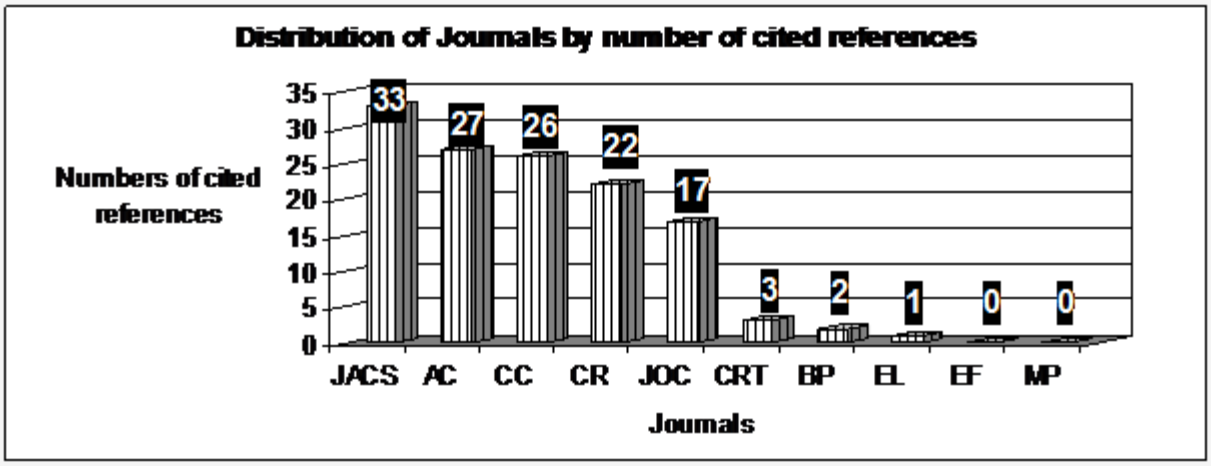
citing references of journal articles by IIT Kharagpur faculty and scholars in their research papers using SciFinder Scholar Database. As SciFinder is a database of Chemistry and Chemical Sciences and also provide citation search comparable to Science Citation Index, no other database can be proved as better as this. Simultaneously, most of the faculty and research scholar of this institute also use SciFinder Scholar for their research. The researcher has randomly selected 5 low usage journals and 5 high usage journals as sample for the study, based on the data retrieved from Table-2. And all the citing references by IIT, Kharagpur faculty and research scholars are traced using various steps in SciFinder Scholar. The use of Journals through citing reference can be better understood from the following table.

Table-3: Data Distribution by Citing References

Sl. No.	Name of Journal (s)	No. of Cited References
1.	Journal of the American Chemical Society	33
2.	Angewandte Chemie	27
3.	Chemical Communications	26
4.	Chemical Reviews	22
5.	Journal of Organic Chemistry	17
6.	Chemical Research in Toxicology	03
7.	Biotechnology Progress	02
8.	Electroanalysis	01
9.	Energy & Fuels	00
10.	Molecular Pharmaceuticals	00

The above table shows that *Journal of American Chemical Society* is highly cited (33) by the faculty and scholars of Chemistry at IIT Kharagpur. Similarly, *Angewandte Chemie* (27), *Chemical Communications* (26), Chemical *Reviews* (22) are mostly cited. However, the number of citation from journals likes *Biotechnology Progress* (02), *Chemical Research in Toxicology* (03), *and Electroanalysis* (01) are very low. Two journals, *Energy & Fuels* (00), and *Molecular Pharmaceuticals* (00) have not been cited by any one.

Fig. 2: Distribution of Data by Citing References



Comparison of Data

To prove the significance of the questionnaire data, it has compared with the citing references drawn from SciFinder. The data of the 10 sample journals are compared and shown in the following table.

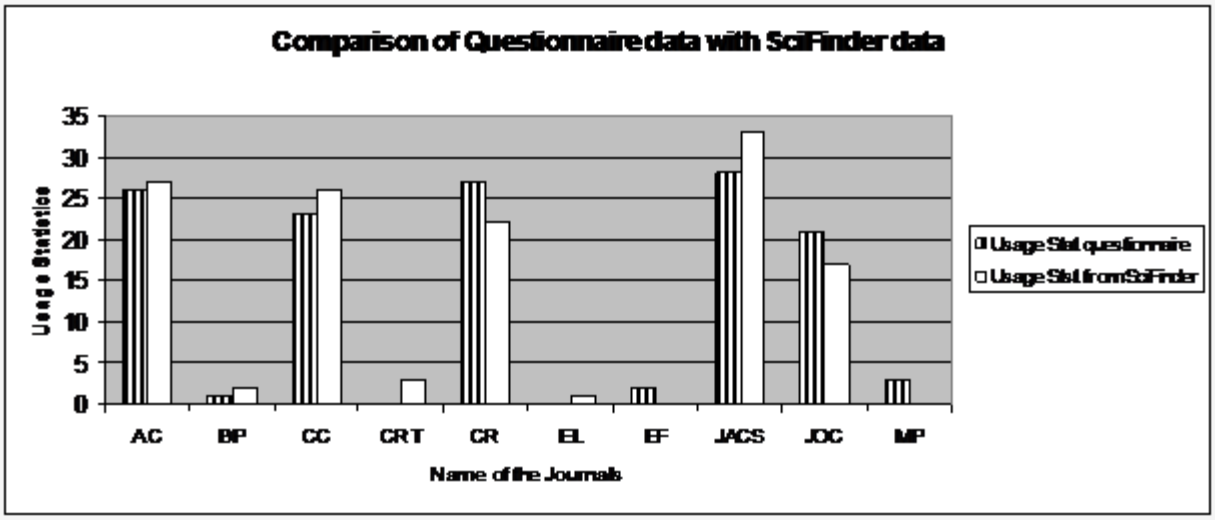
Table-4: Comparison of Questionnaire Data with SciFinder Data

Sl. No.	Name of Journals	Abbreviated Name	Usage statistics from Questionnaire	Usage statistics from SciFinder
1.	Angewandte Chemie	AC	26	27

2	Biotechnology Progress	BP	01	02
3.	Chemical Communications	CC	23	26
4.	Chemical Research in Toxicology	CRT	00	03
5.	Chemical Reviews	CR	27	22
6.	Electroanalysis	EL	00	01
7.	Energy & Fuels	EF	02	00
8.	Journal of the American Chemical Society	JACS	28	33
9.	Journal of Organic Chemistry	JOC	21	17
10.	Molecular Pharmaceuticals	MP	03	00

From the above table researcher conclude that data collected through questionnaire about the usage statistics is very relevant. The journals which are not referred by the faculty and scholars in the questionnaire have either very low or zero cited references in SciFinder. The comparative analysis has been graphically represented as under.

Fig.3: Comparison of Questionnaire Data with SciFinder Data



Suggestions

All the librarians practice to build a rich and well organized collection of documents in a cost-effective way for their library. But it can not be achieved with out knowing its utilization percentage along with user satisfactory level. For this regular evaluation of collection is needed. The investigator has proposed some suggestions as illustrated below for better collection management:

1. The journals which are never used or insignificantly used such as *Molecular Pharmaceuticals, Electroanalysis, Energy & Fuels, Chemical Research in Toxicology, Biotechnology progress*, etc. can be dropped from the package by negotiating with the publishers.
2. The library can go for subscription of online archive of heavily used journals or article based purchasing to provide quality based service.
3. The local usage percentage and ISI Impact Factor of each journal may be added with the list of Department wise journal distribution in the library website. This can prove as a value added service for the end users.
4. Usage studies of this type may be carried out each year before the order is placed for the journals.

Conclusion

Projects are being undertaken to study on a specific topic with available data and to come to an end with some observation and findings. After collection of data and analyzing, it is found that most of the Chemistry Journals subscribed by the Central Library have a high impact on the use for research carried out by

Department of Chemistry, IIT, Kharagpur. But there also some journals which have a very low impact with regard to their use by the user community. These types of journals with low usage are neither recommended nor referred by the faculty and research scholars of the Department of Chemistry. Still they are subscribed by the Central Library as a part of journal packages offered by different publishers. At the same time it is also found that most of the users like to use both online and print version of journals. So the present study concludes that all the journals of Central Library need to be evaluated for better organization of the collection.

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