

Scholarly Communication in the Sciences--A Third World Perspective

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KEYWORDS

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A study was undertaken to assess the impact of the Internet on scientific communication among a group of scientists and information professionals from leading research institutions in India. The object of the study was to understand the information-seeking behavior of Indian scientists and information professionals and the use of the Internet in their work. In order to determine subject specific differences in Internet use, participants included physicists, mathematicians, chemists, biomedical scientists and information professionals. This article also examines the perceptions of scientists on recent developments in scholarly communication and explores the role of Indian librarians and information professionals in the electronic environment.

INTRODUCTION:

The Internet is changing the way science is communicated. Electronic journals and preprint databases, online conferences and listservs are taking over from established modes of scholarly communication which have been globally accepted for centuries. The Internet is being hailed as a level playing-field by the many who have access to it. But for millions in the developing world who lack connectivity it is hardly that. Recent articles covering the World Conference on Science, held in Budapest in June of 1999, underline the fact that scientific research in the world's developing nations is lagging behind that of the industrialized countries and that the gap is widening. It is reported that Third World researchers see the Internet as "the best hope for globalizing science."¹

On a recent trip to India, I interviewed senior research scientists and information professionals from six publicly funded institutions on the impact of the Internet on their work. The institutions were all post-graduate degree granting institutions with good publishing records. Two of these also awarded professional degrees in medicine and engineering. Most of the scientists interviewed had twenty-plus years of research experience. Many had foreign collaborators or external funding. Some were editors of journals or had been asked to referee papers in their subject areas. They were all unequivocally positive about the influence of the Internet on their work. Some found it to be indispensable, others remarked that they don't know how they survived without it , and slow connections were a common complaint.

The development of new modes of scholarly communication via the Internet is occurring without regard to the prevailing information infrastructure in the developing world. Even the language of scientific communication presupposes a working knowledge of the English language. India is well-known for its software expertise and has had Internet connectivity since 1989, but still lags behind China as a producer and user of information technology.² The language of higher education in India is English but from an educational perspective Internet access has not been considered a priority. In fact, Internet access is not uniformly available in Indian universities although the National Task Force on IT and Software Development convened in May 1998 recommends in its Action Plan that computers and the Internet be made available to all schools nationwide by the year 2003.³ A networking initiative called INFLIBNET sponsored by the University Grants Commission promises to connect more than 170 universities and provide access to the Internet as well.⁴ In an earlier discussion of changing models of scientific communication, Hurd refers to the broadening of the Internet user base and the opportunities for active participation possible due to the open nature of networks. In the same article she goes on to say:

The impact of universal access can only be speculated; it is premature to say whether it will actually occur. It must also be recognized that the enabling technologies are not yet available to all, even in highly developed countries, and that a significant underclass of "information have-nots" are being disenfranchised because they lack adequate technology, appropriate training, or sufficient interest in the changes around them.⁵

This remains true of many Third World countries although in recent years the Internet has become more pervasive elsewhere.

The following study is an attempt to examine Internet use in a select group of scientific institutions in India that have connectivity, recognising the fact that it is institutions such as these that can provide the leadership and stimulus to enable more equitable access for all. The study also examines subject-specific differences in the information-seeking behavior of scientists and information professionals from these institutions. Finally, it is hoped to create an awareness of any equity issues that may exist, lest we adopt too North American a perspective.

METHODOLOGY:

Institutions were selected on the basis of the number of papers published during the years 1995-1998 as determined by a search of the Science Citation Index. The institutions chosen were later found to correspond well with the ranking of the top 50 institutions in terms of output and impact as reported in a recent Indian publication.⁶ The institutions were located in the cities of Mumbai, Delhi, Pune and Bangalore. Chemists, physicists, mathematicians, biomedical scientists and information professionals from these institutions were interviewed after obtaining their consent by e-mail. A series of open-ended questions pertaining to their use of the Internet and the types of information resources they use formed the major focus of the interview. Their views on other parts of the scholarly communication process such as serials issues and copyright were also solicited. A list of questions is appended. In all, 20 senior scientists including information professionals from the above institutions were interviewed. It was agreed to maintain confidentiality with regard to names of participants and the institutions to which they belonged. Interviews were informal and took about an hour, allowing for clarification of questions and encouraging comments by participants. The next section explores the perceptions of this group of scientists and information professionals on the impact of the Internet on their work.

RESULTS AND DISCUSSION:

Indian scientists interviewed use the Internet for e-mail communication, sharing files with collaborators and posting preprints on e-print servers especially in the areas of physics and mathematics. They use the Web to access electronic journals, read tables of contents, search subject-specific databases, download software, check product information and communicate with suppliers. They may also explore funding and educational opportunities on the Web. Reading journal articles on the Web is not considered convenient and most scientists prefer to print out the article. The availability of Tables of Contents and Instructions for Authors on journal homepages is a boon to researchers in all disciplines and is used as a current awareness tool. Chemists may also use Internet sources for patent and MSDS information. Biomedical researchers search genome sequence and structure databases, keep current with the literature using PubMed and look up homepages of the organisms they work with for up-to-date information. Their students belong to the online communities Biomednet and Chemweb and share the information they obtain from these sources with their peers. Information professionals interviewed use the Internet to search databases and keep current by joining discussion groups and monitoring journals and online conferences.

Comments on Scholarly Publishing:

Most Indian biomedical scientists were unaware of the proposed E-Biomed archive being sponsored by the National Institutes of Health (NIH).⁷ However on learning about it they were generally skeptical about whether it would work in a highly competitive field such as theirs where laboratories with greater access to resources could use the information to gain a competitive edge. Indian physicists and mathematicians face no such pressures and are regular users of preprint archives although they recognise that publishing in certain journals will afford

them the prestige which is not available with preprint archives. One participant remarked how there is little danger of ideas being borrowed as one generally knows the researchers working in the same field. However, publishing on the Web does help to stake a claim to the work. There is also the perception that people tend to post articles which are less complete works than what used to be sent in for publication when print was the only alternative. A report published after these interviews were conducted, indicates that the NIH has since decided to drop the notion of a preprint server containing unrefereed scientific papers. It has instead decided to pursue a model in which only reprints which have already undergone peer review by journals will be made accessible.⁸ It will be interesting to see how publishers respond to this.

Electronic publishing of journals in India is practically non-existent. A few Indian journals have online versions including the three biology journals published by the Electronic Publishing Trust for Development, featured in a recent issue of Nature.⁹ Although the scientists interviewed welcomed the exposure given to Indian science by having online versions of these journals available, they seldom publish in Indian journals. This is because they need the peer-review and international recognition available with publishing in international journals both for themselves and for their students. Moreover, when it comes to career advancement, the number of citations to their papers is becoming more important than the number of papers published. Indian scientists perceive themselves at a disadvantage when foreign authors prefer to cite local authors for work similar to theirs.

Serials and Resource sharing:

Problems associated with escalating serial costs are compounded with currency conversion and fluctuating exchange rates. Journal cancellations are the norm for most Indian academic libraries whose collections have been decimated in recent years. Personal

subscriptions by scientists are also being eliminated with journals sometimes costing as much as a researcher's monthly salary. It is felt that journal pricing should be based on purchasing power. Electronic access if it was cheaper is considered a better alternative. Although PDF files take an interminable time to download, they at least have the advantage of being available long before the print arrives. Pay-per-view services available on the Web are not considered an alternative for lack of a suitable charging mechanism, apart from the high costs involved. International credit cards are not widely held, although many Indians now have local credit cards.

Electronic resource sharing in libraries is largely unknown as many libraries are only just moving to online catalogues. Physical resource sharing is available to a large extent within regions and metropolitan areas mostly in the form of document delivery services. The Indian National Science Documentation Centre (INSDOC) runs a largely mail-based document delivery service called CAPS (Contents, Abstracts and Photocopying Service) which is used by smaller libraries with dwindling budgets to supplement their collections. Campus intranets are available at larger institutions for sharing databases and catalogues but remote access to these resources from home computers is not available. Cooperative collection development or consortia between libraries to increase purchasing power and negotiate better terms are not being sufficiently explored. Developing an infrastructure for network access between all university libraries is one of the goals of the INFLIBNET project and sharing resources is one of its prime objectives.

Librarians and information professionals were more likely to be aware about new initiatives in scholarly publishing such as SPARC.¹⁰ Scientists welcomed alternatives to high priced journals but had not heard of SPARC or the journals being published with SPARC sponsorship. It was interesting that an article in the local newspaper around that time actually mentioned SPARC in a discussion on serials pricing and its impact on Indian library collections.

Indian scientists are not well informed about copyright issues familiar to librarians, although many of them are more aware of patent rights to do with processes they have developed or genes they have sequenced. The implications of handing over copyright for their publications had not occurred to them.

Changing Roles of Librarians and Information Professionals:

Librarians and information professionals are concerned about their roles in the new electronic environment. Access to electronic information resources was found to vary with institution, ranging from standalone CD-ROM databases to campus-wide networked products. A few institutions also had subscriptions to Web databases such as MathSciNet. In the larger institutions I visited, librarians and information professionals are playing a proactive role in creating value-added information services such as personalized tables of contents and delivering the full-text of theses on the campus intranet. One institution is in the process of creating a digital library, digitizing its research publications with the object of making them available locally, and then nationally when Internet connectivity is available. Training in the use of the Internet is another area in which libraries and information centers are providing expanded services. Institutions are being registered for access to electronic journals only where online access is freely available with print subscriptions. These services have resulted in increased interaction with faculty.

Librarians and information professionals interviewed perceive a definite role as subject specialists in the packaging of information in the new environment. Listservs such as the Special Libraries Association's PAMnet and Cheminf-L are used by some to keep up with developments in their subject areas. They also belong to local professional associations. However, they tend to work in isolation and need to work in unison if they are going to make an

impact on the information needs of the country as a whole. In this context assuming advocacy roles may be critical, much as their counterparts in more developed countries are trying to lobby for changes in scholarly publishing. Enlisting public opinion on information issues may also be equally important if any progress is to be made.

CONCLUSION:

This study was undertaken to assess the impact of the Internet on scientific communication and research in some of the premier research institutions in India. The study reveals that Indian scientists are making full use of the Internet where connectivity is available. Slow access times and lack of universal access appear to be the major problems they are facing. There are subject-specific differences in the way they perceive some of the newer modes of scholarly communication such as preprint archives and current awareness sources. In general, the theoretical sciences appear to be more receptive of these changes, since the practice of exchanging reprints existed much before the electronic era. However, there is general agreement regarding the need for Internet connectivity if science is to be truly global. Librarians and information professionals have a definite role to play in making this happen.

NOTES

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APPENDIX

Interview Questions

1. Briefly could you outline your research interests and their significance and what you hope to achieve. Would you like to talk about any collaboration which you may have locally or in other countries, or groups which share the same research interests as you?
2. How is your work funded? Do you receive any additional funding from industry or private organizations.
3. Would you like to share with me any positive influences in your working environment or any constraints that you face in your kind of work?
4. What kinds of information sources do you use in your work? Would you like to comment about access to these sources? Are any of these current awareness sources?
5. Do you use any resource sharing networks, either local or international?
6. Are you aware of any electronic publishing initiatives in India or abroad in your research area? Would you care to describe them. Do you have any society memberships or editorial responsibilities, either locally or internationally?
7. How comfortable do you feel about assigning copyright for publications to publishers who may then charge libraries large subscriptions to access the same papers? Do you own any patents?
8. What impact does the Internet have on your work? For example, do you belong to any listservs or online communities, monitor online conferences or read electronic journals?
9. How would you react to increasing journal prices given a static serials budget?
10. Have you heard of SPARC, a coalition of research libraries which is developing online alternatives to high-priced journals owned by commercial publishers?

