

Reading Practices of Biomedical Scientists in India in Digital Era

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Abstract: *Use of electronic resources is being amplified by people at each stratum due to easy availability of information online and expansion of electronic devices and equipments. Use of it has been increased for not only accessing the information, but for reading and writing also. Present paper deals with preference of sources from print and electronic for reading, and the practices to read a document in both the formats. An online survey was organized to know it among biomedical scientists in India. Total 1013 scientists were selected for this study. Mails could be delivered to 702 scientists. 313 questionnaires received were considered for the study. Biomedical scientists were found reading more in digital era. Electronic were found more used than print within and outside the libraries. Annotation and underlining were more common in print where skipping and navigation were more common in electronic format. Consulting other information sources was found more in electronic sources. Overall it can be estimated that reading has been increased by biomedical scientists in India, and electronic are used more than print for reading also.*

Key Words: Electronic Resources, Print Resources, Screen Reading, Reading Strategy, Biomedical Libraries.

1. Introduction: Electronic resources changed not only habits of information searching and seeking, but the practices of reading and writing also. Reading experiences on the two formats are different. A major difference between print and electronic is that paper is interface and storage media - both for information retrieval in case of prints; where the interface (i.e. computer screens) and storage media (e.g. hard disk etc.) are different in case of electronic. Scrolling up and down at the screens is different than turning pages in case of papers. Reading is considered more enthusiastic on paper (**Kretzschmar, 2013**). However, electronic have advantages over print that it has more storage capacity than the later. Information communication is very fast in case of electronic resources. Moreover, electronic avails multimedia and hypermedia facilities which are not possible in print.

Libraries have been a remarkable place for lending study materials as well as reading space from centuries. But roles of libraries are being changed due to a paradigm shift towards electronic publishing and online availability of information sources. Libraries are now availing documents through its electronic services and lending facilities of it are minimizing. Documents

subscribed and in open access, are now accessed and read in extra-library spaces. Therefore, now libraries are trying to reach to its users and libraries are turning to be service-oriented at the place of collection-oriented. There are several studies on these issues, however very less of them directly deal with biomedical information and biomedical scientists in India. The present paper tries to investigate the status of reading and practices followed by biomedical scientists in India. The study is aimed to understand the library users better so that they could be served more appropriately.

1.1. **Objectives:** Following are the objectives of the present study:

1. To know the impact of digital era on reading.
2. To know time spent on reading within and outside libraries for both the formats i.e. electronic and print.
3. To ascertain if libraries suit for reading.
4. To find the status of various reading strategies during reading in electronic and print.

1.2. **Scope and Limitations:** The study has been carried out at the national level in India within institutes under two central ministries i.e. Ministry of Health & Family Welfare and Ministry of Science & Technology. These are four apex organizations under such two ministries i.e. Indian Council of Medical Research (ICMR), Council of Scientific & Industrial Research (CSIR), Department of Biotechnology (DBT) and Department of Science & Technology (DST). Some institutes are autonomous under the two ministries. A survey carried out was completed online electronically, assuming that all biomedical scientists in India are cyber-literate.

2. Literature Search: Introduction of audio-visual resources has affected the reading of textual materials. A comparison was made by **King** (2007) on the number of scholarly articles read in a year by University scientists in different periods i.e. 1977, 1984, 1990-93, 2000-03 and 2004-06 on the basis of surveys by National Science Foundation (1977 and 1984) and her own with Donald King and others and found it increases with time with number of 150, 172, 188, 216 and 252 respectively. This number was 100 and 130 for the mid-1990s and early 2000s for scientists from all works fields (**Tenopir & King**, 2002) clarifying increase in that case also. However, the average amount of time spent on reading scholarly articles was found relatively constant during

1977-2002 (**Tenopir & King**, 1998; **Tenopir**, 2002). Scientists seem to read more scholarly articles than non-scientists in University of Tennessee (**Tenopir & King**, 1998). However, Prints are not considered less important than electronic resources by research scholars and faculty members in the science domain in Mysore University (**Nikam & Dhruv Kumar**, 2013). The previous studies around last years of 20th century dictate that writing online offered clear advantages, whereas reading was far easier on paper (**O'Hara & Sallen**, 1997). Reading was done mostly for research purposes, current awareness and continuing education, teaching, and external communication. However, readings within libraries were noticed to be less as compared to other places. Only ten percent of students were found using libraries as their primary reading place in Kashmir by **Shafi & Loan** (2010). **Monopoli et al.** (2002) observed that workplace was the prime location to use the journals by faculty members in Patras University. However, libraries were found to be appropriate for reading purposes. **Vondracek** (2007) found that students seek comfort, convenience and quiet in extra-library and library environments, rely on knowledgeable individuals for research assistance and conduct the majority of their research online from home. **Chiemeke et al.** (2007) state that the researchers in Nigeria observed users feel comfortable using the library rather than a cyber café due to its serene environment. **Parameshwar & Patil** (2009) also found in Gulberga University that virtual resources centre and digital library (central library) is the most comfortable place to use the Internet.

Folb et al. (2011) found that printing and saving of books were preferred at the place of an annotation, highlighting etc. **Hannigan** (2007) conferred that generally most of the readers read the electronic books partially in University of Denver. Only 7.1 percent of 1148 respondents indicated that they read the entire book. The amount of material to read, the need to refer to the material at a later time, and the desire to annotate or highlight text are all factors that influence whether users read electronic books on a computer or PDA, or print out the materials.

Overall it seems that time spent on reading is static irrespective to increase in a number of articles read by learned people. It is interesting that reading is going on in the age of audio-visual resources too. The present study tries to ascertain it in the case of biomedical scientists in India.

3. Research Methodology: To accomplish the objectives of the study, an online survey was organized to know about the practices, views, and opinions of biomedical scientists in India. The survey was proposed at 95% confidence level and $\pm 5\%$ confidence interval. Scientists from 51 institutes from different organizations under Ministry of Health & Family Welfare and Ministry of Science & Technology were selectively taken. A questionnaire was structured to know about reading in the digital era. 'SurveyMonkey' online software was used to collect the data and generating master sheet. Microsoft Excel was used for calculating the data and presenting it in graphical forms. Total 1013 scientists were considered for the study in which email IDs were available for 974 scientists only. However, due to various issues, the questionnaire could be delivered to 702 scientists only. More than 325 questionnaires were received for the study in which some was much incomplete and could not be considered for the study. Only 313 questionnaires were suitable for the study against required number of 279 questionnaires at the parameters of 95% confidence level and 5% confidence interval.

4.1. Demographic Structure of the Respondents: Number of respondents in lowest and highest age groups (21-30 Years and '61 and above' respectively) is minimal. 4.8% of respondents only lie in these two age groups. The largest number of respondents is in the age group 31-40 Years (35.1%) followed by age groups 41-50 Years (31.9%) and 51-60 Years (27.5%) respectively. More than two-thirds (70.3%) of respondents are males and the rest are females. Almost half (49.2%) of respondents are at a middle level (Scientist – D/E/F) of designations followed by Scientist – B/C (32.3%) and Scientist – G/H (18.5%) (Table 4.1).

Table 4.1: Demographic Structure of the Respondents

Age (in Years)	Number	Gender	Number	Designation Levels	Number
21-30	4 (1.3%)	Female	93 (29.7%)	Scientist – B/C	101 (32.3%)
31-40	110 (35.1%)	Male	220 (70.3%)	Scientist – D/E/F	154 (49.2%)
41-50	100 (31.9%)	Total	313	Scientist – G/H	58 (18.5%)
51-60	86 (27.5%)			Total	313
61 and above	11 (3.5%)				
Not specified	2 (0.6%)				
Total	313				

4.2. Opinion on Impact of Digital Era on Reading (including Screen Reading): Digital era has changed the habit of an individual to read since numerous pages can be interfaced at a single computer screen. Origin of multimedia and hypermedia in electronic format also has affected the status of reading (including electronic and print). Reading generally means consulting text to get information where a person decodes language-encoded information encrypted in letters. At one hand, reading is thought to be decreased due to the introduction of audio-visual resources; at another, reading are thought to be increased due to the availability of numerous resources available online available on a single screen. To clear this picture, a question was asked to denote the views of respondents by them if the quantum of reading has been decreased in the digital era. The results are presented in Figure 4.2.

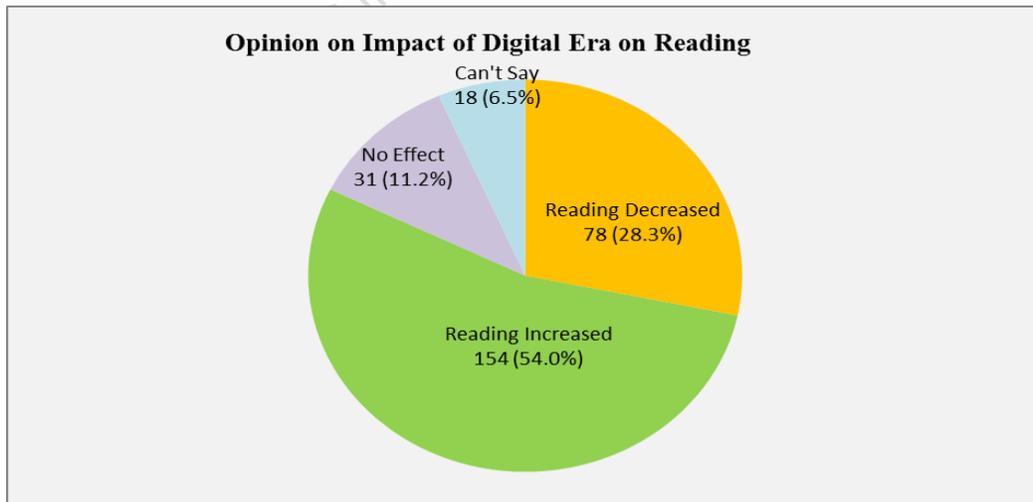


Figure 4.2: Opinion on Impact of Digital Era on Reading

In response to this question, 54.0% of respondents stated that reading by them has been increased after the introduction of online resources. Percentage of respondents declaring reading has been decreased - is only 28.3% which is half of the previous figure of percentage. 11.2% of respondents have opined 'No Effect' and the rest 6.5% have selected 'Can't say' option. Overall it seems that reading has been increased in the case of biomedical scientists in India. Previous studies state that number of scholarly articles read has been increased where time spent on reading has been also increased somewhat (King, 2007; Tenopir & King, 2002; Tenopir & King, 1998). This study confirms the same in the case of biomedical scientists in India.

4.3. Primary Place of Reading: a Physical visit to the libraries was essential for getting information before the Internet era which has been minimized for some/all types of libraries today. Virtual availability of electronic information and various library services has made users and library professionals interact with the information sources without physical visits to the library. In the same reference, the importance of libraries as reading place also has been redefined. In a question, it was tried to know primary/favorite place of reading at present. Table 4.3 details the results of it.

Table 4.3: Primary Place of Reading

Options	Library	Home	Working Places	Others	Sum
Number (%)	44 (15.9%)	59 (21.3%)	170 (61.4%)	4 (1.4%)	277

It was found that libraries are not primary place for reading for most of the respondents. 61.4% of them responded that working places are favorite places to read where 21.3% of them selected their homes as their favorite place to read. 15.9% only of them expressed libraries as their favorite place for the same. Similar findings were reported in other studies also by Shafi & Loan (2010), Vondracek (2007), Monopoli et al. (2006) that people prefer working places and homes than the libraries for reading and information access. It confirms that use of libraries as reading place has been diminished in the case of biomedical scientists in India also.

4.4. Suitability of Libraries as Serious Place of Study: Libraries are not first preference of a large percentage of respondents for reading – was confirmed in the previous question in this study and also by other studies. However, it does not entitle that libraries do not suit to serious readings. Therefore in a question, respondents were asked if respondents find their libraries as a suitable place for reading especially for serious reading. An objective of this question was to determine serenity of library environment that suits to serious reading (Table 4.4).

Table 4.4: Suitability of libraries as Serious Place of Reading

Options	Yes	No	Can't Say	Sum
Number (%)	212 (75.7%)	22 (7.9%)	46 (16.4%)	280

More than three-fourths (75.7%) of respondents stated that libraries suits for reading to them where only 7.9% of them selected opposite option to it. Serenity (**Chiemeke et al., 2007**) and comfort (**Parameshwar & Patil, 2009**) within libraries were also recognized in some other studies.

4.5. Duration of Reading: In a previous question, respondents were asked whether reading has been increased or decreased. In the present question, respondents were asked about time spent on reading within libraries and outside libraries per day (in hours) for electronic and print resources separately to know the relative status of print/electronic and within/outside the libraries. There were six options for the duration of reading i.e. no reading at all, 0-2 hours, 2-4 hours, 4-8 hours, 8-12 hours, and 12-16 hours. Averages were found in each case (Table 4.5).

Table 4.5: Duration of Reading per Day

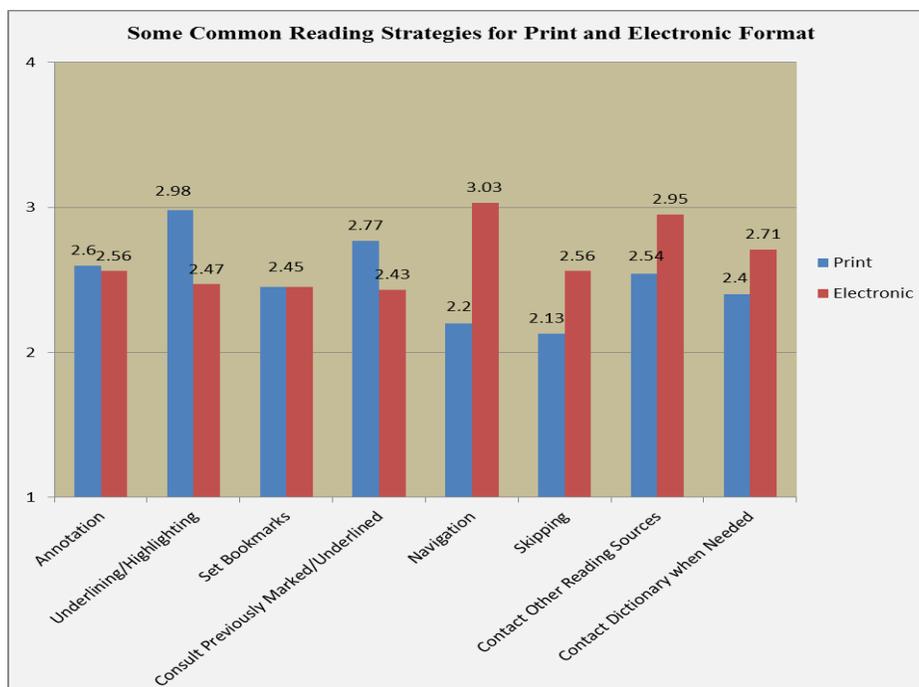
Options	Reading within Library		Total Reading	
	Print	Electronic	Print	Electronic
Hours Spent	0.84	1.83	2.29	3.49

Print was used less than electronic within (0.84 hours and 1.83 hours for print and electronic respectively) and outside (2.29 and 3.49 hours for print and electronic respectively) the libraries. The proportion of study hours of print in libraries out of total reading in the same is lesser than electronic in the same respect.

4.6. Reading Strategies for Print/Electronic: The users apply a number of strategies to make their reading more efficient. Some strategies are used to mark some text to read in further seating or making some notes in own way understanding. However, some strategies are used to omit some texts, lines or pages to make reading to complete shortly. Some types of strategies are used referring other sources while consulting a source of information.

Annotation, set bookmarks, underlining/highlighting and consult previously marked/underlined are used to make reading repeatedly in further seating. The former two strategies i.e. annotation and set bookmarks are used almost equally in print and electronic where the later two i.e. underlining/highlighting and consult previously marked/underlined are used more in print than the electronic.

Skipping and navigation are used to omit some text/line/pages which weaken complete reading – is more common in electronic. However referring to other sources is more common in electronic which a positive sign in favor of screen reading. In this way, it becomes clear that positive methods are more used in case of print which makes them effective while reading by a biomedical scientist in India (Figure 4.6). Printing and saving of books were found preferred at the place of an annotation, highlighting etc. in the case of electronic format in health science library system in University of Pittsburgh by **Folb et al.** (2011) also with users in the identical subject.



Always = 4; Often = 3; Sometimes = 2; Rarely = 1

Figure 4.6: Reading Strategies for Print/Electronic

4.7. Comparative Analysis Based on Designation Level of Scientists: To know the differences among practices and view of biomedical scientists at different designation levels, a comparative analysis was made for all the questions except the last question which is rather more complicated. No any variation beyond statistical variations could be observed in either case.

Table 4.7: Comparative Analysis Based on Designation Level of Scientists

Sr.	Question	D. f.	χ^2 Value	Critical Value	Significance of Relationship	
1	Opinion on Impact of Digital Era on Reading	6	5.734	12.592	No	
2	Primary Place of Information Access	6	4.279	12.592	No	
3	Suitability of Libraries as Serious Place for Reading	4	4.649	9.488	No	
4	Time spent on Reading	10	18.307	18.307	No	
	Within Library – Print					1.845
	Within Library – Electronic					4.702
	Total Reading – Print					8.066
	Total Reading - Electronic		6.488		No	

5. **Discussions:** The findings of this study have similarities and dissimilarities to that of previous studies. The present study clarifies that biomedical scientist considers reading to be increased after the introduction of the digital era. Previous studies also cleared that number of scholarly articles read has been increased where time spent on reading has been also increased somewhat (King, 2007; Tenopir & King, 2002; Tenopir & King, 1998). Libraries are less favored for a primary place of reading - is in the same accord of previous studies (Monopoli et al, 2006; Vondracek, 2007; Adams & Bonk, 2005; Shafi & Loan, 2010). Libraries were found a suitable place for reading by most (75.7%) of biomedical scientists in India which are identical to findings by Chiemekwe et al. (2007) and Parameshwar & Patil (2009) who found libraries environment serene and comfortable. Folb et al. (2011) found that printing and saving of e-books were preferred at the place of an annotation, highlighting etc. confirming more use of a print version of books.

6. **Conclusions:** Reading has been increased in present digital era in case of biomedical scientists in India. Annotation, underlining/highlighting, consult previously marked are more practiced in print resources than electronic, confirming repetition of reading is more common in the same format. Skipping, navigation etc. are more common in electronic resources which show users spare less time on reading on screen. However, consulting dictionaries and other information sources in case of electronic resources signify that it supports in-depth reading on a matter. Electronic is used more than print within and outside the libraries. Libraries suit for reading; however it is not the primary place of reading by the biomedical scientists.

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