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ENRICHED PUBLICATIONS

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Aims and Scope

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Journal of Advances in Computational Sciences and Information Technology

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Contents

Use of E-journals in Chemistry by Faculty Members and Research Scholars in University of Delhi and Jamia Millia Islamia: A Study

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A B S T R A C T

Abstract: Present paper focuses on the Perception and Use of E-journals in Chemistry Discipline by Faculty Members and Research Scholars in University of Delhi and Jamia Millia Islamia: A Case Study. The main aim is to determine the needs of research scholars and faculty members of University of Delhi (DU) and Jamia Millia Islamia (JMI) in Chemistry discipline and to find out how far their information needs are fulfilled by the information available through e-journals. The paper attempts to define the use and awareness of e-journals especially in the chemistry discipline for research and teaching excellence. Design/methodology/approach – To study the usage pattern, perception about e-journals and needs of the respective users, a survey was conducted among faculty and research scholars in Chemistry Department, University of Delhi and Jamia Millia Islamia. The population included in the study comprised faculty members and research scholars selected randomly of DU and JMI of Chemistry departments. Findings – The study tangibly explains the perception, use and awareness of e-journals among faculty members and research scholars in the respective field of DU and JMI. And further, the study explains the importance of e-journals in teaching and research activities.

Keywords—Keywords: Electronic journals, E-journals, Electronic information, Electronic Resource, and ICT

INTRODUCTION

The recent developments in the field of Information and Communication Technology (ICT) have changed the each and every aspect of every organization and libraries are not exception to it. Consequently, now means of dissemination and the flow of information are not restricted by any kind of boundaries. The way information is generated, stored, organized, accessed, retrieved and consumed have changed dramatically. Consequently, traditional functions of libraries and library professionals have undergone of radical changes in todays' information society context of ICT. The developments in ICT have brought e-journals as a boon to research community, which are becoming a major source for scholarly communication and the demand for e-journals to the academic and research community has been increasing year by years (Bhatt 2005). Now libraries and information Centers have started

incorporating and adopting various e-resources for its collection developments to meet and fulfill the requirements of the users in a better way, so that the objectives of the library and library professionals can be fulfilled.

OBJECTIVES OF THE STUDY

The study is designed to seek users' perception regarding the use of e-journals by the research scholars and faculty members in Department of Chemistry of University of Delhi and Jamia Millia Islamia with the following objectives:

- ❖ To study the awareness, use and purpose of using e-journals among faculty members and research scholars in the field of chemistry of universities under study.
- ❖ To find out the important e-journals being referred by faculty members and research scholars.
- ❖ To study the research output and satisfaction of users after usage of e-journals by faculty members and research scholars.
- ❖ To find out the problems faced by faculty members and research scholars while use of e-journals.

SCOPE OF THE STUDY

The scope of the study is confined to the faculty members and research scholars of Department of Chemistry of two universities located in Delhi i.e. University of Delhi and Jamia Millia Islamia regarding the users' perception and use of e-journals.

REVIEW OF RELATED STUDIES ON E-JOURNALS USE

In present scenario with the changing demands of academicians the importance of electronic information has been increased exponentially. Information available in Electronic form is being popularizing day by day among the academicians. Institutions are spending huge budget on subscribing the electronic information and electronic journals are vital part of electronic information. Since, institutions are spending lot on electronic information, it is imperative to examine the use and its benefits. Numerous studies have been conducted on use of e-journals for instance Khan and Ahmad (2009) describe the level of awareness and use of e-journals by the researchers of the Aligarh Muslim University (AMU) and the Banaras Hindu University (BHU), both central universities funded by the University Grants Commission. Further the study reveals that most of the research scholars are aware of the availability of e-journals and largely use them for reference purposes in their research work. They

fully agree that with the usage of e-journal the quality of research work improves with enrichment of appurtenant contents and materials leading to high-quality manuscript. It is however found that lack of training is the obstacle in proper and full utilization of e-journals. Kapoor (2010) finds that, although many more users at the University are accessing electronic journals, it is not affecting the use of the print collection. The numbers of transactions and photocopy requests of print articles are continuously on the rise. Kaur and Verma (2009) describe about the issues like use of electronic information resources, its impact on the collection of print and electronic journals its awareness among the users, and the places where the users are accessing these resources. Further, the study show that users from all these categories were using e-resources; the awareness about e-resources encourages users to use such resources to the maximum; and the users are using computer centre and hostels more for accessing the Information. The impact of e-resources was visible from the decrease in number of printed journals in comparison to the increase in number of electronic journals. The use of e-journals has increased manifold. The electronic resources are quickly replacing the printed material. Kaur and Verma (2009) describe the use of electronic resources and services provided at the central library of Indian Institute of Technology, Delhi and the authors find that usage of e-journals is increasing; this is due to awareness among the users about the library e-resources and services. Owing to an easy access available at various places in the institute, users are accessing these resources at hostels and departments more as compared to the library. The users coming to library have decreased. Chirra, and Madhusudhan (2009) describe about the use of electronic (e)-journals by doctoral research scholars of Goa University, Goa (India). The main aim is to know the use of e-journals for research work. Further, the study aims to highlight the problems in accessing e-journals, degree of utilization, and influence of e-journals on research work. The study shows that there is need for user orientation for efficient searching of e-journals. The most common problem faced by the respondents is that there is difficulty in accessing full text and many of the respondents are not satisfied with the Internet facilities available in Goa University and they provide some constructive suggestions for improving the accessing of e-journals. Nikam and Pramodini (2007) describe about the use of e-journals and databases (subscribed by UGC-INFONET consortium) by the users of University of Mysore. Nearly 200 responses to a survey based on questionnaire have been analyzed and presented. Besides studying the use of e-journals and databases, the paper also examines the utilization and satisfaction levels of users with respect to the e-resources. The role of Information Communication Division (ICD) of the University of Mysore in informing the users about the availability of these resources is also discussed. Use of internet as an alternative to UGC-INFONET consortium resources is presented. Kaur and Verma (2009) study the issues like use of electronic information resources, its impact on the collection of print and electronic journals its awareness among the users, and the places where the users are accessing these resources. The findings of the study show that users from all these categories were using e-resources; the awareness about e-resources encourages

users to use such resources to the maximum; and the users are using computer centre and hostels more for accessing the Information. The impact of e-resources was visible from the decrease in number of printed journals in comparison to the increase in number of electronic journals. The use of e-journals has increased manifold. The electronic resources are quickly replacing the printed material. Madhusudhan (2008) describe in his paper that e-journals perform an increasing important role in research at DLIS. And the study highlights that there is an ever-increasing demand for subscription of more e-journals titles in LIS. Naushad Ali and Nisha (2011) conducted a survey and found that more than 60% of users in Central Science Library are using e-journals weekly for the purpose of research. Printed journals are consulted by the majority of users compared with e-journals. And further, keyword is the most popular searching technique for searching e-journals among research scholars, whereas the date of publication carries the least percentage among all the options. However, it is found that slow downloading of PDF files is the major problem that would discourage users while using e-journals. Suseela (2011) highlights in her study the application of usage reports by the university library in decision making during renewals/subscriptions, i.e. the selection of databases, upgrading the versions, increasing licenses, cancellation of subscriptions, etc.

RESEARCH METHODOLOGY

After scanning carefully the existing literature available in the area of study, a well-structured questionnaire was designed and distributed personally to the faculty members and research scholars of DU and JMI and most of them got filled on the spot. Total 100 questionnaires were distributed. After collection, the opinions expressed by the faculty members and research scholars were analyzed and presented in tabulated form. It was decided that the questionnaire should be distributed to sample population (selected randomly) of research scholars and faculty members of the department of chemistry of DU and JMI for the purpose of study and 40 research scholars and 10 faculty members were selected from both universities. And further, it is observed that most of the respondents attended all the questions from the questionnaire. Overall it may be remarked that the response to the questionnaire was very good. The responses received from both the questionnaires were helpful in drawing conclusions and it was found that research scholars have responded more than faculty members. Because most of the faculty members were busy in performing their academic activities.

Analysis of the Responses Received from Users

Table – 1 Sample Size of Users

Category	DU		JMI	
	D	R	D	R
Research Scholars	40 (100)	31 (77.5)	40 (100)	29 (72.5)
Faculty Members	10 (100)	7 (70)	10 (100)	6 (60)
Total	50 (100)	38 (76)	50 (100)	35 (70)

Note: Figures in parenthesis indicates percentage. (D- Distributed, R- Received, DU- Delhi University, JMI- Jamia Millia Islamia)

The table 1 indicates the total numbers and percentage of questionnaires distributed and response received from the respondents. Overall response rate of DU and JMI is 76%, 70%. So DU has high response of 76% whereas JMI has low response of 70% in comparison to DU. And further, it is also found that the response rate of research scholar is high than the faculty members of both the universities, it is so perhaps they were busy in their teacher and any other academic assignments.

Table - 2 Frequency of Visit to Library

Frequency	DU		JMI	
	FM (N=7)	RS (N=31)	FM (N=6)	RS (N=29)
Daily	2 (28.57)	8 (25.80)	1 (16.66)	3 (10.34)
Once a week	-	7 (22.58)	3 (50)	8 (27.58)
Twice a week	2 (28.57)	16 (51.61	2 (33.33)	18 (62.06)
Monthly	2 (28.57)	-	-	-
Occasionally	1 (14.28)	-	-	-
Any other	-	-	-	-

Note: Figures in parenthesis indicates percentage. (N- Total Number, FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

Table 2 reveals out the fact that majority of the respondents (FM & RS) visits the library twice a week. Response is not encouraging as only 28.57% faculty members and 25.80% research scholars and 16.66% faculty members and 10.34% in DU and JMI respectively visits the library daily.

Table - 3 Purpose of Visit the Library

Purpose of Visit	DU		JMI	
	FM (N=7)	RS (N=31)	FM (N=6)	RS (N=29)
Borrowing & Returning of Reading Material	5 (71.42)	20 (64.51)	5 (83.33)	23 (79.31)
Light Reading	3 (42.85)	1 (3.22)	-	7 (24.13)
To keep yourself up-to date	7 (100)	17 (54.83)	4 (66.66)	19 (65.51)
Consulting e-journals	1 (14.28)	25 (80.64)	1 (16.66)	21 (72.41)
Any other	-	-	-	-
Total				

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

Table 3 reveals the fact that the main purpose of users, 71.42% faculty members 64.51% research scholars, 83.33% faculty members 79.31% research scholars, in DU and JMI respectively visits the

library only for borrowing and returning of reading material and then after they visit the library for consulting e-journals. The response is also not very much encouraging for LIS professionals.

Table - 4 Awareness about E-journals

Awareness about E-journals	DU		JMI	
	FM	RS	FM	RS
Yes	7 (100)	31 (100)	6 (100)	29 (100)
No	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is noticed from table 4 that all the respondents (faculty member and research scholars) of the universities under study are well aware of e-journals service in their respective library. Response is very encouraging as 100% respondents (faculty member and research scholars) of both the universities under study are well aware of e-journals service.

Table - 5 Awareness about E-journals in Chemistry Field

Awareness about E-journals in Chemistry	DU		JMI	
	FM	RS	FM	RS
Yes	7 (100)	31 (100)	6 (100)	29 (100)
No	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is noticed from table 5 that all the respondents (faculty member and research scholars) of the universities under study are well aware of e-journals service in chemistry field in their respective library. Response is very encouraging as 100% respondents (faculty member and research scholars) of both universities are well aware of e-journals service in chemistry field.

Table - 6 Access to E-journals

Access to E-Journals	DU		JMI	
	FM	RS	FM	RS
Yes	7 (100)	31 (100)	6 (100)	29 (100)
No	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is noticed from table 6 that 100% respondents (faculty members and research scholars) of universities under study have access facility to e-journals. Response is very encouraging as 100%

respondents (FM & RS) have the access facility, which indicates the efforts and hard work of the library and information science professionals in the universities.

Table - 7 Place of Access

Place	DU		JMI	
	FM (N=7)	RS (N=31)	FM (N=6)	RS (N=29)
Departmental Library	-	-	-	-
Computer Lab	1 (14.28)	26 (83.87)	-	13 (44.82)
Central Library	3 (42.85)	23 (74.19)	2 (33.33)	21 (72.41)
University Hostel	-	-	-	-
Your Chamber	7 (100)	12 (38.7)	6 (100)	9 (31.03)
Home	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

Table 7 reveals the fact that majority of the research scholars to access e-journals are dependent computer lab (83.87%) and in JMI majority of the research scholars (72.41%) are dependent on central library whereas the 100% faculty members in DU and JMI access e-journals from their chamber.

Table - 8 Information about E-journals

Information availability of e-journals	DU		JMI	
	FM N=7	RS N=31	FM N=6	RS N=29
Library Orientation	2 (28.57)	5 (16.12)	1 (16.66)	3 (10.34)
Teacher/Research Supervisor	3 (42.85)	13 (41.93)	2 (33.33)	21 (72.41)
Colleagues	4 (57.14)	7 (22.58)	5 (83.33)	9 (31.03)
University Website	2 (28.57)	16 (51.61)	2 (33.33)	11 (37.93)
Any other	-	2 (6.45)	-	7 (24.13)
Total	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is observed from table 8 that majority of the faculty members 57.14% in DU, 83.33% in JMI, have the information about e-journals in chemistry field from their colleagues and majority of the research scholars 51.61% in DU and 72.41% in JMI have information about e-journals in their respective field through university website and their research supervisor/teacher respectively. Response is not encouraging because the respondents do not get the information from library orientation programmes.

Table - 9 New Addition Information

	DU		JMI	
	FM N=7	RS N=31	FM N=6	RS N=29
Library Staff	-	5 (16.12)	3 (50)	-
Friends	4 (57.14)	25 (80.64)	-	17 (58.62)
Email	1 (14.28)	-	2 (33.33)	-
Colleagues	5 (71.42)	-	4 (66.66)	11 (37.93)
Newsletter	-	-	-	-
Any other	-	15 (48.38)	-	9 (31.03)

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is noticed from table 9 that in DU 80.64% and in JMI 58.62% research scholars get the information about new additions and change the journal name form their friends And further it is observed that in all the universities under study majority of the faculty members 71.42% in DU, 66.66% in JMI gets the information from their colleagues. Response is not encouraging because the respondents do not get the information from library staff.

Table - 10 Purpose of Accessing E-journals

Purpose of accessing e-journals	DU		JMI	
	FM N=7	RS N=31	FM N=6	RS N=29
Writing article/Research Paper	-	15 (48.38)	-	7 (24.13)
For Research/Project work	5 (71.42)	13 (41.93)	4 (66.66)	17 (58.62)
Teaching Purpose	2 (28.57)	-	2 (33.33)	-
Preparation of various examinations	-	19 (61.29)	-	12 (41.37)
For study	-	-	-	-
To know current development in field	5 (71.42)	11 (37.93)	-	5 (17.24)
To keep yourself up-to-date	4 (57.14)	9 (29.03)	3 (50)	15 (51.72)

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is observed from table 10 majority of the FM 71.42% in DU and 66.66% in JMI, access e-journals for research/project work. And in DU majority of the RS access e-journals for preparation of various examinations whereas in JMI research scholars access e-journals for their research/project work.

Table – 11 Electronic v/s Print Journals

Print version of Electronic Journals	DU		JMI	
	FM N=7	RS N=31	FM N=6	RS N=29
Yes	2 (28.57)	17 (54.83)	3 (50)	19 (65.51)
No	5 (71.42)	14 (45.16)	3 (50)	10 (34.48)

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

From table 11 it is clear that majority of the faculty members 71.42% in DU and 50% in JMI, are not in favor of subscription of print version of e-journals whereas majority of research scholars 54.83 in DU and 65.51% in JMI are in favor of subscription of print version of e-journals. This shows the difference of opinion between the FM and RS.

Table – 12 Access to E-journals

Access to E-Journals	DU		JMI	
	FM N=7	RS N=31	FM N=6	RS N=29
Direct URL address	2 (28.57)	2 (6.45)	2 (33.33)	5 (17.24)
Through University Website	5 (71.42)	27 (87.09)	1 (16.66)	23 (79.31)
Through Publishers Website	3 (42.85)	15 (48.38)	2 (33.33)	19 (65.51)
Through Subject Gateways	2 (25.57)	9 (29.03)	2 (33.33)	13 (44.82)
Through Database	3 (42.85)	11 (35.48)	1 (16.66)	5 (17.24)
Any other	-	-	1 (16.66)	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is noticed from table 12 that in majority of the respondents (faculty members and research scholars) in DU 71.42% FM and 87.09% RS in access e-journals through university website whereas in JMI 79.31% RS access e-journals through university website. It was found that university website and publisher's website are very popular among the users in accessing e-journals, very few of them use subject gateways, databases and direct URL for accessing e-journals.

Table - 13 Searching Techniques

Searching Technique	DU		JMI	
	FM N=7	RS N=31	FM N=6	RS N=29
Boolean Operator	3 (42.85)	15 (48.38)	-	-
Truncation	2 (28.57)	-	-	-
Phrases	4 (57.14)	19 (61.29)	-	13 (44.82)
Field Search	5 (71.42)	-	-	7 (24.13)
Simple Search	6 (85.71)	29 (93.54)	4 (66.66)	21 (72.41)

Author (s) Name	6 (85.71)	13 (41.93)	-	-
Title	4 (57.14)	-	-	-
Title Index	-	-	-	-
Keywords	7 (100)	31 (100)	5 (83.33)	25 (86.20)
Date/Year of Publication	1 (14.28)	2 (6.45)	-	3 (10.34)
Any other	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is revealed from table 13 that majority of the users (FM & RS) use keyword technique and simple search most in accessing e-journals, these are very popular among the users. And further, truncation and title index techniques are least preferred by the users in accessing e-journals.

Table - 14 E-journal Access Skills

Methods	DU		JMI	
	FM N=7	RS N=31	FM N=6	RS N=29
External Courses	-	9 (29.03)	-	2 (6.89)
Trial & Error	4 (57.14)	17 (54.83)	2 (33.33)	10 (34.48)
Guidance from other Students, Faculty or Colleagues	2 (28.57)	11 (35.48)	4 (66.66)	17 (58.62)
Self-Learned	5 (71.42)	25 (80.64)	3 (50)	21 (72.41)
Guidance from Lectures	-	-	-	-
Library Staff	-	3 (9.67)	-	2 (6.89)
Courses offered by University or College	-	1 (3.22)	-	-
Guidance from Computing Staff and Technician	-	2 (6.45)	-	-
Any Other	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia,)

It is revealed out from the table 14 that majority of the users, 71.42% FM and 80.64% RS in DU, 72.41% RS in JMI have learned the e-journals accessing skills by self and 66.66% faculty members in JMI have learned e-journals accessing skills from the Guidance from other Students, Faculty or Colleagues. And further most of the users learned from trial and error method. So the results is not much encouraging for the library staff.

Table - 15 Orientation Programmes

| | DU | | JMI | |
	FM	RS	FM	RS
Yes	1 (14.28)	3 (9.67)	2 (33.33)	2 (6.89)
No	6 (85.71)	28 (90.32)	4 (66.66)	27 (93.1)

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is clear from table 15 that majority of the users 85.71% faculty members and 90.32% in DU and 66.66% FM and 93.1% RS in JMI have not received any orientation programme or training session organized by the library.

Table - 16 Need of Orientation Programmes

| | DU | | JMI | |
	FM	RS	FM	RS
Yes	3 (42.85)	21 (67.74)	2 (33.33)	23 (79.31)
No	4 (57.14)	10 (32.25)	4 (66.66)	6 (20.68)

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is noticed from table 16 that majority of the research scholars 67.74% in DU, and 79.31% in JMI responded that they need orientation programmes of making use of e-journals effectively. Further it was noticed that 57.14% FM in DU, 66.66% FM in JMI responded that they need not any orientation programme or training regarding e-journals.

Table - 17 Training Format

| Format | DU | | JMI | |
	FM N=3	RS N=21	FM N=2	RS N=23
Lectures	-	-	1 (50)	-
Workshops	1 (33.33)	13 (61.9)	-	3 (13.04)
Tutorials	3 (100)	7 (33.33)	2 (100)	13 (56.52)
Printed Manuel	-	2 (9.52)	-	7 (30.43)
One to One	-	-	-	-
Seminars	1 (33.33)	-	1 (50)	6 (26.08)
Training Programmes	2 (66.66)	5 (23.8)	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is revealed out from table 17 that in DU, JMI 100% faculty members are in favor of the training in tutorial format whereas research scholars in DU (61.9) are in favor of workshop and in JMI 52.56% are in favor of tutorials.

Table - 18 Quality of E-journals

Quality of E-Journals	DU		JMI	
	FM N=7	RS N=31	FM N=6	RS N=29
High Quality	5 (71.42)	21 (67.74)	4 (66.66)	19 (65.51)
Very High Quality	1 (14.28)	3 (9.67)	1 (16.66)	6 (20.68)
Somewhat High Quality	1 (14.28)	7 (22.58)	1 (16.66)	4 (13.79)
Poor Quality	-	-	-	-
Very Poor Quality	-	-	-	-
Any Other	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is revealed from table 18 that majority of the users (FM & RS) 71.42% FM and 67.74% RS in DU, 66.66% FM and 65.51% RS in JMI, think that e-journals provide high quality of information. And further it was found that nobody said that that poor quality or very poor quality of information which is very encouraging.

Table - 19 Features E-journal Provide

Features E-journals Provide	DU		JMI	
	FM N=7	RS N=31	FM N=6	RS N=29
Yes	6 (85.71)	23 (74.19)	5 (83.33)	27 (93.1)
No	1 (14.28)	8 (25.8)	1 (16.66)	2 (6.89)

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is noticed from table 19 that majority of the users (RS & FM) 85.71% FM and 74.19 RS in DU, 83.33% FM and 93.1% RS in JMI think that e-journals provide more features in comparison to print journals.

Table – 20 Features of E-Journals

Features of E-Journals	DU		JMI	
	FM N=6	RS N=23	FM N=5	RS N=27
Charts	-	7 (30.43)	-	3 (11.11)
Table	1 (16.16)	5 (21.73)	-	7 (25.92)
Diagrams	-	9 (39.13)	-	2 (7.40)
Bibliographical References	-	-	-	-
Feedback Provision	5 (83.33)	11 (47.82)	4 (80)	13 (48.14)
Animation	-	3 (13.04)	-	3 (11.11)
Multimedia Features	2 (33.33)	4 (17.39)	-	-
Annotation (More Clarification)	4 (66.66)	-	2 (40)	2 (7.40)
Links to Relevant Database/E-Journals	3 (50)	13 (56.52)	3 (60)	15 (65.55)
Any Other	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is clear from table 20 that majority of users (FM & RS) say about the features of e-journals provided in comparison to print journals that feedback provision and links to relevant databases are the most accepted feature by them.

Table - 21 E-journals Help in Research Activities

E-journal Help in Research	DU		JMI	
	FM N=7	RS N=31	FM N=6	RS N=29
Yes	6 (85.71)	27 (87.09)	4 (66.66)	24 (82.75)
No	1 (14.28)	4 (12.90)	2 (33.33)	5 (17.28)

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is revealed out from table 21 that majority of the users (FM & RS) 85.71% FM and 87.09% RS in DU, 66.66% FM and 82.75% RS in JMI said that e-journals help in enhancement of their research activities.

Table - 22 Satisfaction of users

Satisfaction of Users	DU		JMI	
	FM N=7	RS N=31	FM N=6	RS N=29
Yes	5 (71.42)	23 (74.19)	5 (83.33)	19 (65.51)
No	2 (28.57)	8 (25.8)	1 (16.66)	10 (34.48)

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is noticed from table 22 that majority of the users (FM and RS) 71.42% FM and 74.19% RS in DU, 83.33% FM and 65.51% RS in JMI are satisfied with number of e-journals subscribed by the library in chemistry field. Some of them are not satisfied with e-journals subscribed by the library in chemistry field they want some more e-journals to be subscribed by the library. Further it was found that in IPU 100% FM and RS are satisfied.

Table - 23 Provide Easier Access to Information

Easier Access to Information	DU		JMI	
	FM N=7	RS N=31	FM N=6	RS N=29
Yes	7 (100)	31 (100)	6 (100)	29 (100)
No	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is revealed out from table 23 that in both the universities under study 100% users (FM & RS) think that e-journals help in easier access to information which is very encouraging fact.

Table - 24 Faster Access to Information

Faster Access to Information	DU		JMI	
	FM	RS	FM	RS
Yes	7 (100)	31 (100)	6 (100)	29 (100)
No	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is revealed out from table 24 that in all the universities under study 100% users (FM & RS) think that e-journals help in faster access to information which is very encouraging fact for the growth and development of e-journals.

Table - 25 Help to Meet Information Needs

	DU		JMI	
	FM	RS	FM	RS
Yes	7 (100)	31 (100)	6 (100)	29 (100)
No	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is revealed out from table 25 that in all the universities under study 100% users (FM & RS) think that e-journals help to meet their information needs which is very encouraging fact for the growth and development of e-journals.

Table - 26 Help to Make More Knowledgeable

	DU		JMI	
	FM	RS	FM	RS
Yes	7 (100)	31 (100)	6 (100)	29 (100)
No	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is revealed from table 26 that in all the universities under study 100% users (FM & RS) think that e-journals help to make them more knowledgeable which is very encouraging fact for the growth and development of e-journals.

Table - 27 Help to keep Up-to-date

	DU		JMI	
	FM	RS	FM	RS
Yes	7 (100)	31 (100)	6 (100)	29 (100)
No	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is revealed out from table 27 that in all the universities under study 100% users (FM & RS) think that e-journals help to keep them up-to-date with latest development for the growth and development of e-journals.

Table - 28 Help to Increase Research Output

	DU		JMI	
	FM	RS	FM	RS
Yes	7 (100)	31 (100)	6 (100)	29 (100)
No	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is revealed out from table 28 that in all the universities under study 100% users (FM & RS) think that e-journals help in increasing research output for the growth and development of e-journals.

Table - 29 Help in Completion Project/Presentations

	DU		JMI	
	FM	RS	FM	RS
Yes	7 (100)	31 (100)	6 (100)	29 (100)
No	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia).

It is revealed out from table 29 that in all the universities under study 100% users (FM & RS) think that e-journals help in completion of project/presentations for the growth and development of e-journals.

Table - 30 Writing Research Papers

	DU		JMI	
	FM	RS	FM	RS
Yes	7 (100)	31 (100)	6 (100)	29 (100)
No	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is revealed from table 30 that in all the universities under study 100% users (FM & RS) think that e-journals help in writing research papers for the growth and development of e-journals.

Table - 31 Help in Teaching

	DU		JMI	
	FM	RS	FM	RS
Yes	6 (85.71)	19 (61.29)	4 (66.66)	21 (72.41)
No	1 (14.28)	12 (38.70)	2 (33.33)	8 (27.58)

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is revealed out from table 31 that in both the universities under study majority of the users (FM & RS) 85.71% FM and 61.29% RS in DU, 66.66% FM and 72.41% RS in JMI think that e-journals help in teaching which is very encouraging for the growth and development of e-journals.

Table - 32 Satisfaction about Services

| | DU | | JMI | |
	FM	RS	FM	RS
Yes	5 (71.42)	22 (70.96)	4 (66.66)	19 (65.51)
No	2 (28.57)	9 (29.03)	2 (33.33)	10 (34.48)

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is revealed out from table 32 that in all the universities under study majority of the users (FM & RS) 71.42% FM and 70.96% RS in DU, 66.66% FM and 65.51% RS in JMI are satisfied with the services provided to them and very few of them are not satisfied.

Table - 33 Problems in accessing e-journals

| | DU | | JMI | |
	FM	RS	FM	RS
Yes	2 (28.57)	9 (29.03)	2 (33.33)	10 (34.48)
No	5 (71.42)	22 (70.96)	4 (66.66)	19 (65.51)

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is revealed out from table 33 that in both the universities under study majority of the users (FM & RS) 71.42% FM and 70.96% RS in DU, 66.66% FM and 60% RS in JMI do not face any problem in accessing e-journals, very few of them face problems in accessing e-journals.

Table - 34 Problems to Access E-Journals

| Problems | DU | | JMI | |
	FM N=2	RS N=9	FM N=2	RS N=10
Lack of Information about availability of E-journals	1 (50)	4 (44.44)	-	2 (20)
No Library Orientation about E-journals	1 (50)	3 (33.33)	-	2 (20)
Limited number of Computer Terminals to access	-	2	-	2 (20)
Limited Timing to Access	-	-	-	-
Slow Speed of Internet	2 (100)	5 (55.55)	2 (100)	5 (50)
No Printout Facility	-	6 (66.66)	-	7 (70)
Any other	-	-	-	-

Note: Figures in parenthesis indicates percentage. (FM- Faculty Member, RS- Research Scholars, DU- Delhi University, JMI- Jamia Millia Islamia)

It is revealed out from table 34 that in all the universities under study majority of the users (FM & RS) 100%% FM and 55.55% RS in DU, 100% FM and 50% RS in JMI face the problem of slow speed of Internet in accessing e-journals.

CONCLUSION

The study investigates the opinion of faculty members and research scholars regarding the use and acceptance of e-journals in chemistry discipline. The findings indicate that the majority of the faculty members and research scholars in Chemistry discipline are well aware of the e-journals in their respective field and make use of them frequently for their academic work. Further, study reveals that 100% respondents feel that e-journals provide easier and faster access to information, help to meet information needs, make more knowledgeable, keep up-to-date and enhance their research output and support academic activities. Above and all the study reveals the fact that majority of the respondents of the are not happy with the slow speed of internet and suggested to increase the speed of internet and number of computer terminals.

Since, the study was confined to the faculty members and research scholars in Chemistry discipline of University of Delhi and Jamia Millia Islamia to explore the perception and use of e-journals in Chemistry discipline, the research results are limited to this environment only. However, considering the value and use of e-journals by faculty members and research scholars for their academic as well as professional benefits, it is suggested that there should be some more comprehensive studies especially be conducted in a comparative nature covering some more academic institutions together. At last, one finds and concludes that e-journals have created a great impact on the users of DU and JMI in their research and development activities and it can be inferred from the study that faculty members and research scholars need to accept and adopt the new technological advancements and electronic information skills in order to effective utilization of electronic journals being made available to them. And further, it can also be suggested that library should conduct regular user studies and give emphasis on feedback system. In this regard staff members should work promptly and bring improvement in collection and services to provide efficient and effective services.

REFERENCES

Bhatt, R. K. (2005). E-Journals and Libraries: Vexing Issues. Journal of Library and Information Science. (India), 30(½), 65-73.

Chirra, Rekha & Margam, Madhusudhan. (2009). Use of Electronic Journals by Doctoral Research Scholars of Goa University, India. Library Hi Tech, 26(10), 12-15.

Kapoor, Kanta. (2010). Print and electronic Resources: Usage Statistics at Guru Gobind Singh Indraprastha University Library. Program: Electronic Library and Information Systems, 44(1), 59-68.

Kaur, Baljinder & Verma, Rama. (2009). Use and Impact of Electronic Journals in the Indian Institute of Technology, Delhi, India. The Electronic Library, 27(4), 611-622.

Kaur, Baljinder & Verma, Rama. (2009). Use of Electronic Information Resources: A Case Study of Thapar University. DESIDOC Journal of Library & Information Technology, 29(2), 67-73.

Khan, Abdul Mannan & Ahmad, Naved. (2009). Use of E-Journals by Research Scholars at Aligarh Muslim University and Banaras Hindu University. The Electronic Library, 27(4), 708-717.

Madhusudhan, Margam. (2008). Use of UGC-Infonet E-Journals by research scholars and students of University of Delhi, Delhi: A Study. Library Hi Tech, 26(3), 369-386.

Naushad Ali, P.M. & Nisha, Faizul. (2011). Use of e-journals among Research Scholars at Central Science Library, University of Delhi. Collection Building, 30(1), 53-60.

Nikam, Khaiser & Pramodini, B. (2007). Use of E-Journals and Databases by the Academic Community of University of Mysore: A Survey. Annals of Library and Information Studies, 54(1), 19-22.

Suseela, V. J. (2011). Application of Usage Statistics for Assessing the Use of E-journals in University of Hyderabad: A Case Study. The Electronic Library, 29(6), 751-761.

Preservation of Digital Information in the Knowledge Society

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A B S T R A C T

Digital preservation is a set of processes, which is involved in physical and intellectual protection and technical stabilization of digital resources over time to ensure them long term accessibility. The purpose of this paper is to point out the issues, strategies, and challenges of preservation of digital information in digital era.

Keywords: Digitization, Preservation, Knowledge society, Digital resources, Digital information, Preservation standard, Digital content

INTRODUCTION

Today knowledge has become the driving force for social development and people's demand for more information and knowledge are increasing day by day. The core processes of organizations, companies, governments and individuals have become increasingly dependent on digital objects of all kinds –including documents, images, videos, sound files, spreadsheets, datasets (such as patient records) and executable programs etc (Venkadesan 2010). Therefore in knowledge based society library has become a treasure house of human knowledge, participate in knowledge innovation and become an important link in the knowledge innovation chain. Presently libraries acquire digital materials through different channels that include buying digital contents from publishers or aggregators and licensing access to online database and journals. Moreover, libraries and institutions around the world are taking projects to convert their analogue collections into digital form with an aim to increase their access thus far confined to the four-walls of their libraries, many a times, without ensuring their long term accessibility. And digital preservation technology play important role for keeping digital material alive for the future. It is the set of processes, activities and management of digital information over time to ensure its long term accessibility.

CONCEPT OF KNOWLEDGE BASED SOCIETY

Twenty first century will be the century of knowledge. Only those nations will survive and succeed, which will build themselves by understanding the dynamics of the knowledge and create true knowledge society. In fact, knowledge management is a sub component of knowledge based society or knowledge economy. A knowledge based society has the following characteristics (Keishaam and Thoudam 2007):

- It uses knowledge through all its constituents and endeavors to empower and enrich its people;
- It uses knowledge as a powerful tool to drive societal transformation;
- It is a learning society committed to innovation;
- It has the capacity to generate, absorb, disseminate and project knowledge and also use it to create economic wealth and social good for all its constituents; and
- It enlightens its people to take an integrated view of life as a fusion of mind, body and spirit.

ABOUT THE DIGITAL PRESERVATION

Digital preservation is the set of processes, activities and management of digital information over time to ensure its long term accessibility. The goal of digital preservation is to preserve materials resulting from digital reformatting, and particularly information that is born-digital with no analog counterpart. Because of the relatively short lifecycle of digital information, preservation is an ongoing process. Digital preservation is a processes involved in the physical and intellectual protection and technical stabilization of digital resources through time in order to reproduce authentic copies of these resources.

Digital preservation refers to the various methods of keeping digital material alive for the future (Mani 2009). Digital imaging technologies create an entirely new form of information from traditional documents. It is not simply another reformatting option in the preservation tool kit.
Before initiating a digitization programme, the following should be kept in mind

1. The condition and status of the document being converted
2. The capabilities of the present technology for digital conversion, and
3. The method by which the digital images will be utilized

Digital archivists agree that focusing on environmental conditions for digital materials is insufficient. Rather the best way to preserve digital materials is through an active management approach as files in a trusted digital repository. A trusted digital repository is like any other digital repository, except that is structured by specific commitments to technology, resources and organization.
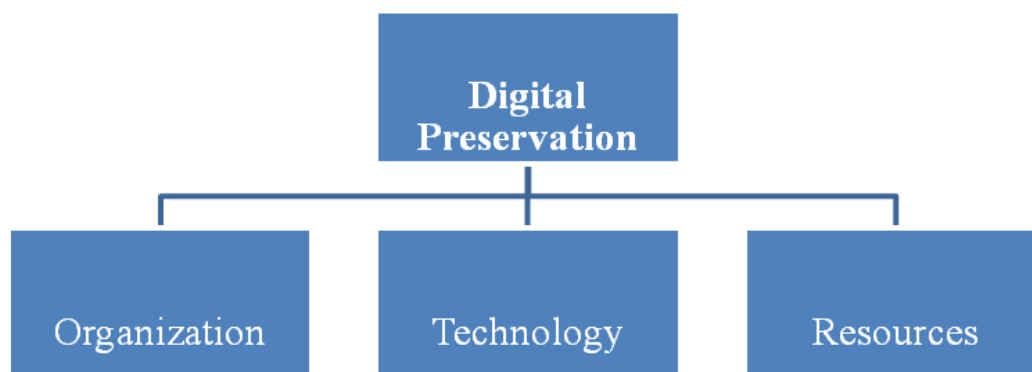
Figure 1

DIGITAL PRESERVATION STRATEGIES

A set of digital preservation strategies can be applied depending on the lifespan of a digital object as mentioned below:

Long-term preservation: Continued access to digital materials, or at least to the information contained in them, indefinitely

Medium-term preservation: Continued access to digital materials beyond changes III technology for a defined period of time but not indefinitely

Short-term preservation: Access to digital materials either for a defined period of time while use is predicted but which does not extend beyond the foreseeable future and/or until it becomes inaccessible because of changes in technology

However, protocols, strategies and technologies involved in digital preservation have now been well defined and understood. Digital preservation is a cost-intensive activity of continuing nature.

SPECIFICITY OF PRESERVATION ISSUES

Preservation of digital resources although in general follow the various agreed standardized formats; these are highly impacted upon by the local realities of the implementing organizations.

Information policies

Knowledge resources although it places prominence on the improvement of Information and Communication Infrastructure (ICT). The improvement of ICT infrastructure will do well if there are policy frameworks at the country level that support the preservation and permanent storage of knowledge resources wherever they might be found and in whatever format they might in.

Infrastructure

Infrastructure is still lacking in handling large preservation of knowledge resources, especially resources that are in electronic form. Access to ICT facilities are a daily struggle for most institutions,

that are just barely managing to maintain access to print resources to be able to meet the daily requirement for academic learning in higher educational institutions.

Financial

The overall financial commitments to digital preservation are understood to be substantial; the exact costs of preserving digital resources over time are now difficult to identify and define. Normal digital preservation activities may include several different ongoing costs:

- Technical infrastructure (storage media is only a small portion of this cost, which includes equipment purchases and ongoing maintenance, technological obsolescence monitoring, and network connectivity)
- Staffing (hiring, general and specialized ongoing staff training)
- Financial planning (seeking project grants, securing ongoing budget commitments)
- Outsourcing (preservation methods undertaken by outside vendors)

Funding

Digital preservation is a costly process, it is essential that funding be made available at all levels, institutional, country, regional and the continent for any continental preservation strategy to be effective. This funding should be all encompassing, i.e., it should be for training, infrastructure and software needed for the preservation process.

Technical skill

Technical skill on the digital elements of electronic documents is largely important among staff for preservation of digital documents. The presence of preservation departments in most of the higher educational institutions is really in name only as most of them concentrate on book and journal binding. This is coupled with the lack of preservation training. This lack of knowledge extends to deficient know-how on the equipment and software that is required for the preservation of digital information resources.

Amongst the library and information science schools that do offer training in preservation, they only do so at a theoretical level.

Digital preservation presumes that there should be constant and continuous learning on the part of preservation staff both in software knowledge as well as hardware.
This is because digital preservation methods are always changing depending on the nature of the hardware and software applied.

Training in modern preservation methods

Introduction of preservation courses in various training programmes that deal with the digital archiving should be encouraged. These should cut across all disciplines so that institutional repositories of members of staff of particular universities and research institutions do their own archiving within the laid down procedure and standards of their institutions. Mainstreaming the curricula in library and information science is especially important because digitization is a specialized discipline in itself.

Legal Barriers

Digitization of information requires obtaining copyright permission from various publishers to be able to duplicate anything in large quantities. However, most licensing agreements for journals or books produced by major publishers prohibit duplication of electronic documents or local storage of the document. What is allowed when one has a subscription is usually the online access to the particular journals for instance, without the subscribing institution having permanent access to content of the journal. Once subscription ends, access to the electronic content of journal is not possible. It is unlike in the print subscription model where once one has subscribed model where once one has subscribed to the journal, the institution will have permanent access to the journal because the journal will be physically present the libraries own space.

DIGITAL PRESERVATION STANDARDS

To standardize digital preservation practice and provide a set of recommendations for preservation program implementation, the reference model for an Open Archival Information System (OAIS) was developed. The reference model (ISO 14721:2003) includes the following responsibilities that an OAIS archive must abide by:

- ❖ Negotiate for and accept appropriate information from information producers
- ❖ Obtain sufficient control of the information provided to the level needed to ensure Long-Term Preservation
- ❖ Determine, either by itself or in conjunction with other parties, which communities should become the designated community and, therefore, should be able to understand the information provided.
- ❖ Ensure that the information to be preserved is independently understandable to the designated community. In other words, the community should be able to understand the information without needing the assistance of the experts who produced the information.
- ❖ Follow documented policies and procedures which ensure that the information is preserved against all reasonable contingencies, and which enable the information to be disseminated as authenticated copies of the original, or as traceable to the original.

❖ Make the preserved information available to the Designated Community

❖ OAIS is concerned with all technical aspects of a digital object's life cycle: ingest into and storage in a preservation infrastructure, data management, accessibility and distribution.

METADATA

Metadata is fundamental to preserving library's digital resources. Preservation metadata includes a number of different types of metadata: First administration (used in managing information resources including rights and permissions),Second technical (describing hardware and software needed to maintain an information object)And third structural (identifying the relationship between objects such as part of, dependent upon that form intellectual entities)Particular attention is paid to the documentation of digital provenance (metadata documenting the history of the object and any actions taken to maintain and provide access), and of relationships among different objects within preservation repositories (vs. relationships between resources, i.e., structural metadata).The preservation process must be able to understand, take in, and maintain metadata submitted with the digital resource while resource while creating its own metadata to manage the preservation of that resource.

CHALLENGES FOR PRESERVING DIGITAL CONTENTS

Digital technology offers several advantages over their print counter part, it along with other associated internet and web technologies are in a continuous flux of change. New standards and protocols are being defined on a regular basis for file formats, compression techniques, hardware components, networks interfaces, storage media and devices, etc. The digital contents face the constant threat of "techno obsolescence" and transitory standards. Magnetic and optical discs as a physical media are being re-engineered continuously to store more and more data. There is a constant threat of backward compatibilities for products, including software, hardware and associated standards and protocols that were used in the past. The challenges in maintaining access to digital resources overtime are related to notable differences between digital and paper-based material. Some of the important challenges for preserving digital contents are dynamic nature of digital contents, machine dependency, fragility of the media, technological obsolescence, shorter life span of digital media, format and styles, copyright and intellectual property rights (IPR) issues (Arora 2009)

CONCLUSION

Preservation in the digital world is a challenging task for librarians and archivists. Digital preservation refers to the various methods of keeping digital material alive for the future. This is the set of processes, activities and management of digital information over time to ensure its long term accessibility. Digital preservation strategies are three types such as long term, medium and short term preservation. Digital

imaging technologies create an entirely new form of information from traditional documents.

References

1.   S. Venkadesan (2010). Digital preservation of electronic resources. INDEST-2010. Retrieved from http://www.library.iitkgp.ernet.in/sites/workshop/pdf/Digital%20_Preservation%20of%20Electronic%20Resources-INDEST2010-IIT%20Kgp%20-%20S.%20Venkadesan.pdf

2.   Keishaam, Sangeeta, Thoudam, Suleta (2007). Knowledge management in the libraries in a knowledge based society. 5th International CALIBER -2007, Punjab University, Chandigarh, 311-317

3.   Mani, N.S. (2009). Digitisation: Preservation and Challenges. DESIDOC Journal of Library & Information Technology, 29(1), 69-71

4.   Jagdish, Arora (2009). Digitisation and digital preservation. DESIDOC Journal of Library & Information Technology, 29(2), 82-84

E-learning Initiatives in India and Libraries

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"Once you stop learning, you start dying."   Albert Einstein

A B S T R A C T

The rapid advances in technology has created the need of e-learning. To provide mass education, e-learning has emerged as a great tool. E-learning environment has also provided various new opportunities among the library professionals. Library professionals can play a vital role in providing information to the needed ones and in spreading awareness regarding e-resources. Different initiatives are taken around the world to impart e-learning. Our country has also undertaken different initiatives in leaps and bound to educate its countrymen. This paper deals with the concept of e-learning, forms of e-learning, learning management systems, advantages and disadvantages of e-learning, role of LIS professionals in e-learning and what are the initiatives taken by India to promote e-learning.

Keywords—E-learning, Information and Communication Technology (ICT), Learning Management System, Library Professionals, Distance Learners.

INTRODUCTION

We are thriving in a world of instability and constant change. In the present digital information era, the knowledge gained by us becomes obsolete or improved in a very short time. Due to new technological developments, information is growing at a very fast rate. It has affected every nook and corner of life. Teaching and learning has also undergone a change. Learning is now extended from the four-walls of the class-rooms. Lifelong learning is the only way to survive in this metamorphosing world. E-learning is only the cutting edge of life-long learning. Information and Communication Technologies has given rise to unprecedented opportunities to library and information professionals. Library professionals should act as an active bridge between learners and the information.

CONCEPT OF E-LEARNING

E-learning stands for 'electronic learning'. The term e-learning is used in a variety of ways such as Online Learning, Computer Based Learning (CBL), Web Based Training (WBT), Online Resource-Based Learning (ORBL), Networked Collaborative Learning (NCL), Computer Supported

Learning (CSCL) (Lobo & Bhandi, 2006). E-learning is totally different from traditional class-room learning. It involves making available the interactive learning material to the learners at his convenience.

The term e-learning is in existence since 1999, when the word was first used in CBT (Computer Based Training) systems seminar. E-learning is based on the concept of creating media-rich collaborative virtual experience that offers the benefits similar to the real physical experience in face to face learning and teaching (Singh, 2004).

NEED OF E-LEARNING

Learning is a continuous process; it starts in the cradle and ends in the graveyard. When the distance education was started, the learner had to consult syllabus from the nearby libraries or through the material supplied by the course coordinator. In those days, radio and television also use to help in the distance learning process. But with the technological developments, video conferencing between the learners and the instructor started.

With the advances in communication technologies, ICT and its surrogates has now made the learning process interactive and easiest one. Different multimedia interactive programmes and learning systems are made available to the learners to make the learning according to their pace. Now, e-learning is not only meant for distance learners but is used by regular learners also. E-learning is helping in the acquisition of new skills and competencies. One can easily update their skills and can also sustain them for the future use.

Forms of E-Learning

The three widely known forms of e-learning are:

a)   **Web-based learning:** Web-based learning is more content focused, delivery driven with minimal or no interaction with the tutor and other learners.

b)   **Supported online learning:** Supported online learning is learner-focused, activity-driven with significant interaction with the tutor and other learners, generally in small groups; and

c)   **Informal e-learning:** Informal e-learning is group-focused, practice-driven with multi way interaction among participants in an organization. Participants can be both learners as well as tutors (Manish & Chauhan, 2009).

Further, e-learning can again be of two types:

Synchronous e-learning: takes place in real time i.e., it allows students to ask their queries at the same time. It is a participative kind of learning. In this kind of learning, a proper interaction between the students and the teacher take place, e.g., online chat, instant messaging, video conferencing, etc. Synchronous e-learning helps in overcoming the problem of isolation among the students.

Asynchronous e-learning: takes place when the student and teacher both are offline. In this, the student can access to pre-packaged training material. In this form, student do not have the proper interaction with the teacher and they complete their coursework without the internet, e.g., e-mail, video-on demand, etc.

Creation of e-Content

e-Content can be defined as learning material specially designed for imparting education and can be accessible via electronic media. Creation of e-Content requires the following steps:

Step 1: Making the structure of the course. It comprises of introduction, objectives, content, applications from daily life, examples, illustrations, etc.

Step 2: Enrichment of the content with multimedia.

Step 3: Providing link to external sources such as glossary, Wikipedia, FAQs, etc.

Step 4: Inclusion of self-assessment material such as multiple choice questions, true & false, quizzes, etc.

Stakeholders in the Creation of e-Content

The following are the stakeholders involved in the creation of e-Content:

a)   Content Writer / Subject Expert: Content writer is the expert who plays a vital role in the creation of e-Content. She/he is responsible for packaging the content in an interesting way.

b)   Technical Expert: Technical experts make the content interactive one by enriching the content with multimedia effects. The following two types of technical experts are involved in the enrichment of the content:

i.   **Multimedia experts / Graphic Designers:** They make the content interactive one by providing animation, simulation in the content.

ii.   **Web Experts:** They install and maintain learning management software (LMS) where all the e-Content are uploaded in a logical framework.

LEARNING MANAGEMENT SOFTWARE (LMS)

LMS developed for managing online courses, distributing course materials and allowing interaction between the teachers and the taught. A LMS allows managing online course from the registration of the students to storing the test results. LMS are built on various platforms such as PHP, .Net or JAVA and they hooked to databases such as MySQL, SQL server, etc. There are various LMS available. They can be both commercial as well as open source. One of the best examples of LMS is moodle.

Moodle is an open source learning platform. With comprehensive, customizable and secure learning management features, it can be used to create a private website for online courses. Moodle stands for Modular Object-Oriented Dynamic Learning Environment. This platform is used in various universities, organizations, etc. for imparting e-learning. Moodle was originally developed by Martin Dougiamas to help educators in the creation of online courses with a focus on interaction and collaboration. The first version of moodle was release on 20th August 2002. Moodle helps in providing MOOC, Massive Open Online Course to the learners.
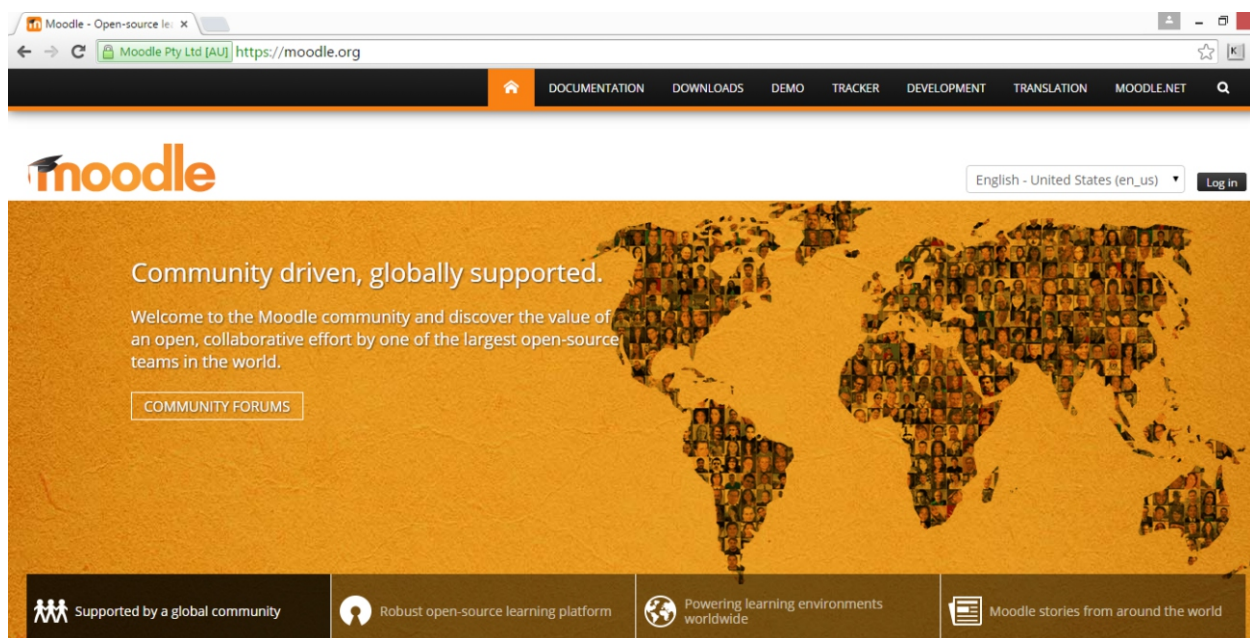
Fig. 1: Snapshot of Moodle (https://moodle.org/)

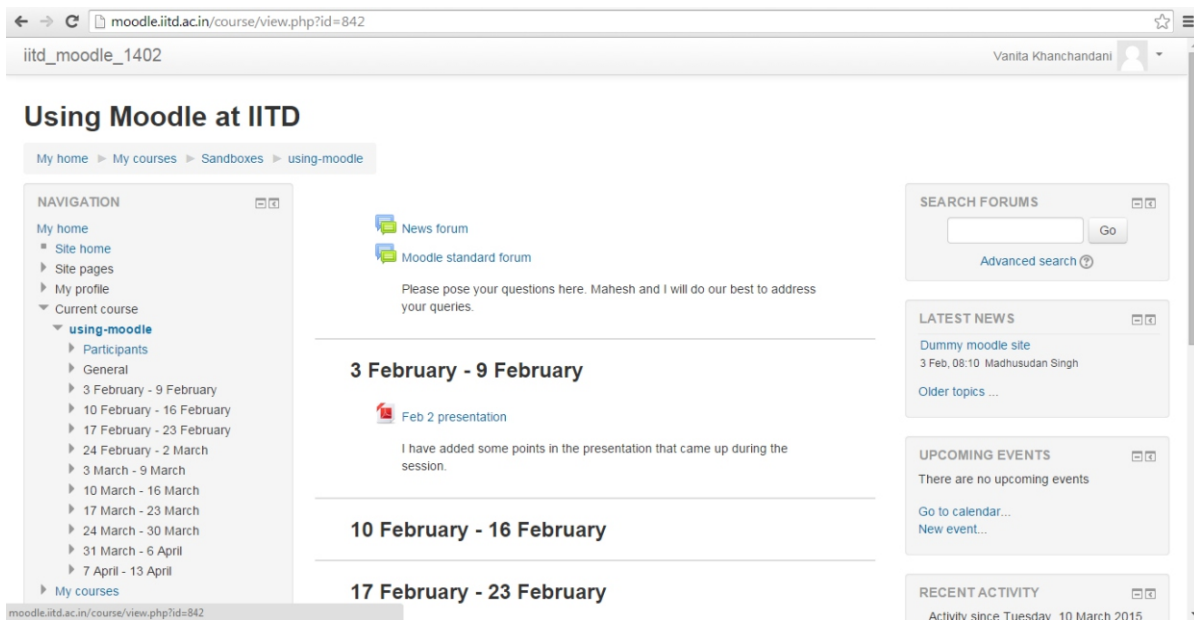**Fig. 2: Another Snapshot of Moodle**

Fig. 3: Snapshot of Moodle @ IIT Delhi

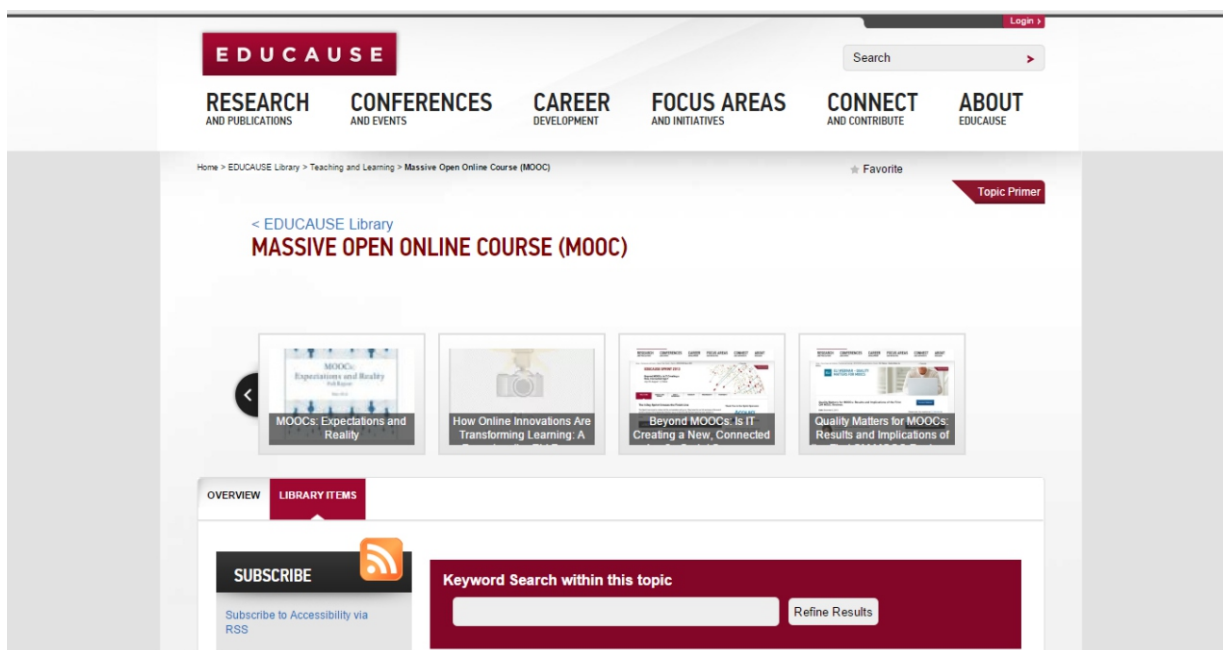**Fig. 4: Snapshot of MOOC (http://www.educause.edu/library/massive-open-online-course-mooc)**

Advantages of E-Learning

Following are the advantages of e-learning:

a) Time-saving;

b) Flexible;

c) Accessible into 24 x 7;

d) Able to reach masses;

e) Overcoming geographical barrier; and

f) Able to track learner's progress

Disadvantages of E-Learning

Besides various advantages of e-learning, there are some disadvantages of e-learning too. These are as follows:

a)   Need training on the part of the teacher as well as to the student;

b)   Expensive as requires computer and Internet facility; and

c)   Sometimes misuse of e-content leads to infringement of copyright.

Role of Library Professionals

Due to technological developments, the paradigm shift in the librarianship has demanded to imbibe new professional skills on the part of library professionals. The library professionals can support e-learning in the following way:

a)   Libraries can develop infrastructure facilities in the libraries to support e-learning environment;

b)   Prepare a list of e-resources on their library websites;

c)   Conduct information literacy programmes both for the teachers and the students;

d)   Develop digital libraries and institutional repositories for enhancing e-learning;

e)   Provide remote login facilities for accessing e-resources through ezproxy;

f)   Provide consultancy services through e-mails or through telephone;

g)   Provide online reference services to the learners;

h)   Inter-library loan and document delivery services can be provided to the learners; and

i)   Librarians need to make aware the e-learners about intellectual property and copyright issues.

E-Learning Initiatives in India

India is the hub of education since its ancient times. Nalanda and Takshashila were famous higher learning institutions. Since the opening of University Grants Commission (UGC) in 1956, Indian Government is taking efforts to inculcate education to masses. To provide mass education, IGNOU (Indira Gandhi National Open University) was established in 1985.

On 20th September 2004, a communication satellite was launched by ISRO, known as EDUSAT (GSAT-3). EDUSAT is the first satellite primarily devoted to education sector. It is mainly intended to meet the demands on distance learners of the country. Consortium for Education Commission (CEC) is one of the major primary user of EDUSAT.

In order to provide India a leading edge in education, National Knowledge Commission (NKC) was established on 13th June 2005.

To promote technology driven education, Government of India during its Eleventh five year plan (2007-2012) has launched National Mission on Education through Information and Communication Technology (NME-ICT) on 2nd February 2009.

Another initiative was undertaken by government when National Mission on Libraries (NML) was launched on 3rd February 2014 by then the President of India, Pranab Mukerjee to pursue the recommendations of National Knowledge Commission.
Recently, government has decided to set up National Electronic Library (NEL), whose materials will be accessible to everyone specially in the remote areas.

Some of the major projects to enhance and support e-learning in India are as follows:

1)IGNOU Online, Education Broadcast and Virtual Classrooms: All these resources are provided by IGNOU to cater the needs of its distance learners.

Fig. 5: Snapshot of IGNOU Online (http://www.ignouonline.ac.in/)

Fig. 6: Snapshot of IGNOU Education Broadcast (http://www.ignouonline.ac.in/Broadcast/)
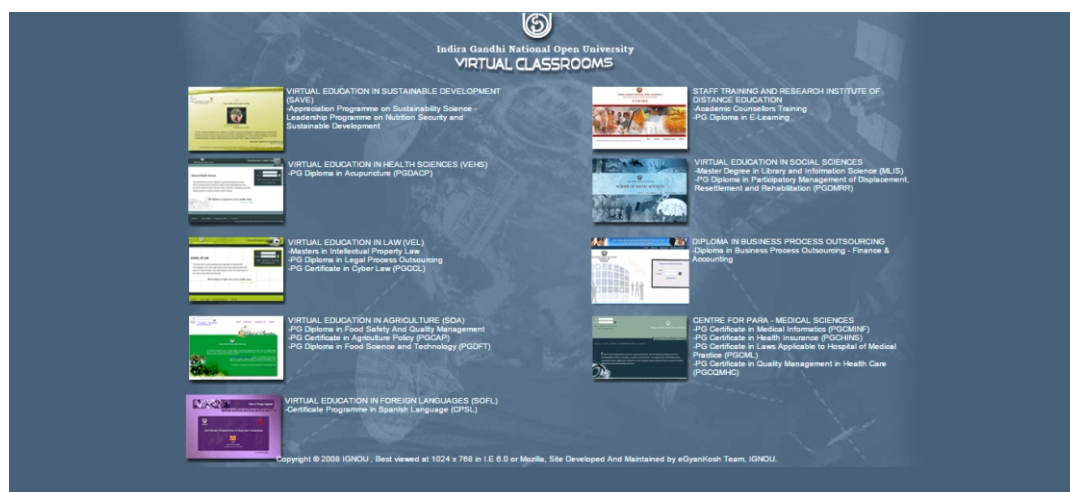
Fig. 7: Snapshot of IGNOU Virtual Classrooms (http://www.ignouonline.ac.in/VirtualClass.htm)
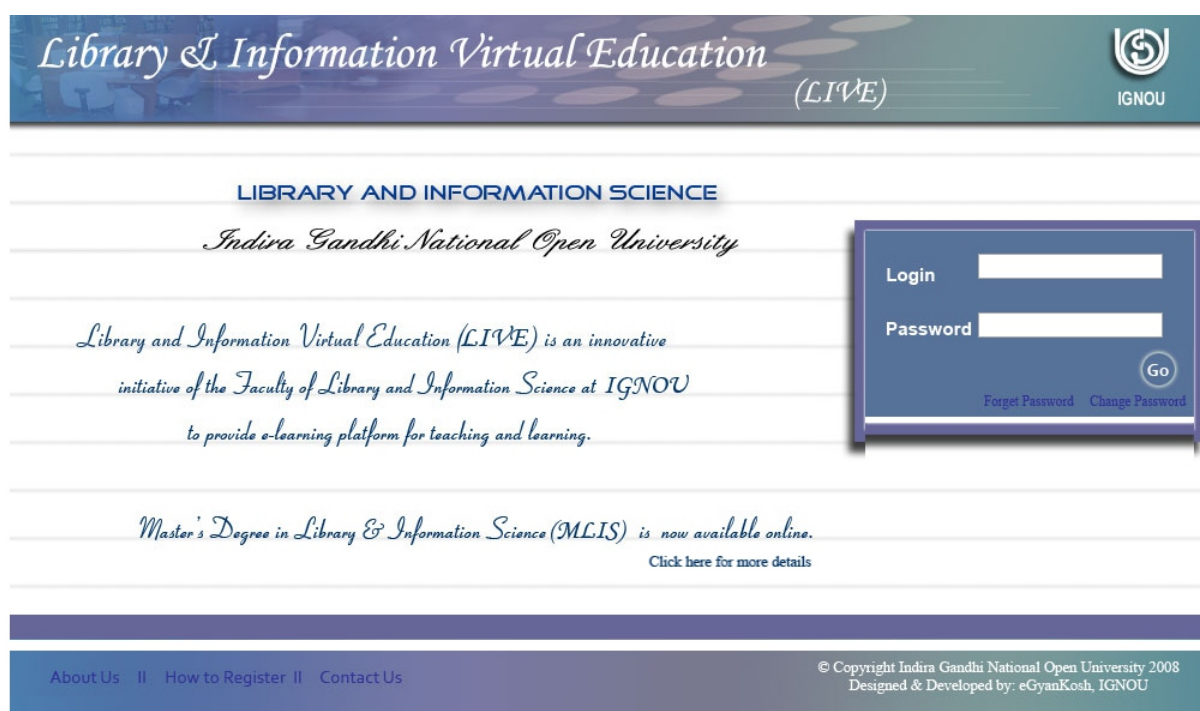
Fig.8: Snapshot of LIS Virtual Education (http://www.ignouonline.ac.in/live/)

2) National Programme on Technology Enhanced Learning (NPTEL): NPTEL provides E-learning through online Web and Video courses in Engineering, Science and Humanities streams. The mission of NPTEL is to enhance the quality of Engineering education in the country by providing free online courseware.

Fig.9: Snapshot of NPTEL (http://nptel.ac.in/)

3) Sakshat: A One Stop Education Portal launched on October 30, 2006 by the President of India to facilitate lifelong learning for students, teachers and those in employment or in pursuit of knowledge free of cost to them.

Fig. 10: Snapshot of Sakshat portal (http://archive.sakshat.ac.in/)

4) Consortium for Educational Communication (CEC): It is one of the Inter University Centres set up by UGC. It has been established with the goal of catering the needs of higher education through the powerful use of ICT and television.
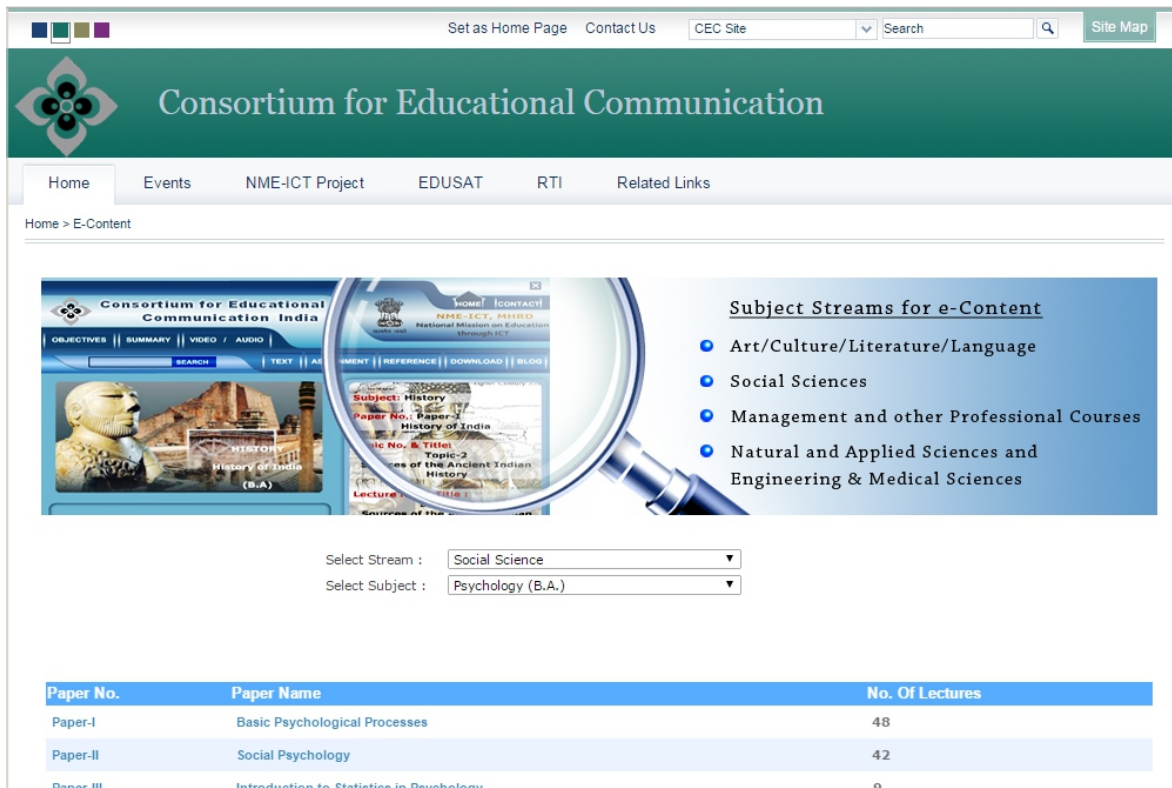
Fig. 11: Snapshot of Consortium for Educational Consortium (http://cec.nic.in/)

5) Institute of Life Long Learning (ILLL) and SOL e-learning Gateways: Both of these initiatives have been undertaken by University of Delhi to address the need of its students.
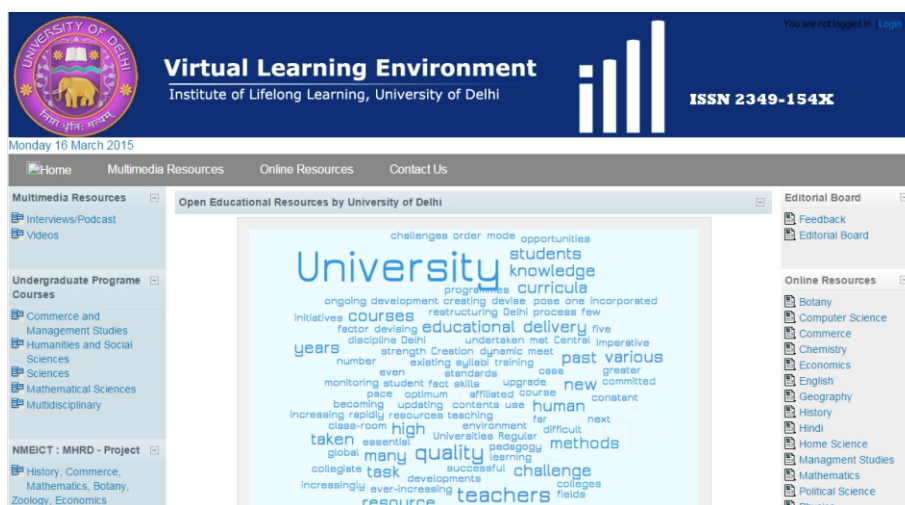

Fig. 12: Snapshot of ILLL e-Content Portal (http://vle.du.ac.in/)

Fig. 13: Snapshot of SOL e-Learning Gateway (http://elearning.sol.du.ac.in/)

CONCLUSION

Change is the way of life. Different technological developments have changed the society from agrarian to information one. The library profession has also got effected in this information era. Being the custodian of the society, librarians cannot run away from the change. They have to accept it and should acquire new skills and competencies to get along with the e-environment. There are various projects undertaken in India for e-learning and for providing the mass education. But due to lack of awareness people are unable to derive benefits from them. It is the responsibility of library professionals to make the learners aware them.

E-learning is just a tool, before providing the e-Content must evaluated. The role and responsibilities of library professionals will definitely get increased in the present era instead of elimination.

REFERENCES

Ali, N. P. (2002). Emerging role of Digital Libraries in e-Learning Challenges and Opportunities. CALIBER-2002 (pp. 1-5). Jaipur: INFLIBNET Centre. Retrieved March 5, 2015, from http://ir.inflibnet.ac.in/bitstream/1944/45/1/pdf_43.pdf

Chandwani, A., Lihitkar, S., & Shradha, A. K. (2010). E-learning Initiatives in India. In Modern Practices in Library and Information Services. Nagpur. Retrieved March 12, 2015, from http://eprints.rclis.org/15721/6/E-learning.pdf

Consortium for Educational Communication. (n.d.). Retrieved March 13, 2015, from http://cec.nic.in/

Dhiman, A. K. (2010). Evolving Roles of Library and Information Centres in E-learning Environment. World Library and Information Congress: 76th IFLA General Conference and Assembly (pp. 1-12). Sweden: IFLA. Retrieved March 5, 2015, from http://conference.ifla.org/past-wlic/2010/107-dhiman-en.pdf

Educase. (n.d.). Retrieved March 12, 2015, from http://www.educause.edu/library/massive-open-online-course-mooc

E-learning: Concepts, Trends, Applications. (2014, January). V1.1. United States of America: Epignosis LLC. Retrieved March 12, 2015, from http://www.talentlms.com/elearning/

IGNOU Education Broadcast. (n.d.). Retrieved March 12, 2015, from http://www.ignouonline.ac.in/Broadcast/

IGNOU Online. (n.d.). Retrieved March 15, 2015, from http://www.ignouonline.ac.in

IGNOU Virtual Classroom. (n.d.). Retrieved March 12, 2015, from http://www.ignouonline.ac.in/VirtualClass.htm

Lobo, J., & Bhandi, M. K. (2006). E-learning Indian Scenario and it's Impact on Library and Information Science Professionals. 4th International Convention CALIBER-2006 (pp. 232-239). Gulbarga: INFLIBNET Centre, Ahmedabad. Retrieved February 28, 2015, from http://ir.inflibnet.ac.in/bitstream/1944/568/1/26%28cal%2006%29.pdf

Manish Kumar., & Chauhan, S. K. (2009, Dec). E-learning Environment and Role of Library and Information Professionals. Journal of Library and Information Science, 34(2), 211-215.

Moodle. (n.d.). Retrieved March 12, 2015, from https://moodle.org/

Moodle@IITD. (n.d.). Retrieved March 13, 2015, from moodle.iitd.ac.in

NPTEL. (n.d.). Retrieved March 15, 2015, from http://nptel.ac.in/

Pallavi, A. K., & Thakur, A. (2013). e-Learning: Initiatives in India. 9th International CALIBER-2013 (pp. 458-469). Gujarat: IFLIBNET Centre. Retrieved February 28, 2015, from http://ir.inflibnet.ac.in/bitstream/1944/1788/1/50.pdf

Pujar, S. M., & Kamat, R. K. (2009, January). Libraries-A Key to Harness E-Learning: Issues and Perspectives. DJLIT, 29(1), 23-30. Retrieved March 12, 2015, from http://publications.drdo.gov.in/ojs/index.php/djlit/article/view/226/135

Sakshat. (n.d.). Retrieved March 15, 2015, from http://archive.sakshat.ac.in/

Singh, J. (2004). E-learning, Knowledge Management, and Globalization : An Outlook. 2nd International CALIBER (pp. 12-14). New Delhi: INFLIBNET Centre, Ahmedabad. Retrieved March 2, 2015, from http://ir.inflibnet.ac.in/bitstream/1944/309/1/04cali_3.pdf

Singh, P. (2005). Role of Digital Libraries in E-Learning. 3rd International CALIBER-2005 (pp. 559-564). Cochin: INFLIBNET Centre, Ahmedabad. Retrieved March 3, 2015, from http://ir.inflibnet.ac.in/bitstream/1944/1564/1/66.pdf

SOL e-Learning Gateway. (n.d.). Retrieved March 13, 2015, from http://elearning.sol.du.ac.in/

Vatnal, R. M., Prakash, K., & Mathapati, G. C. (2004). Developing Library and Information Services for E-learning Environment. 2nd International CALIBER (pp. 426-431). New Delhi: INFLIBNET Centre, Ahmedabad. Retrieved February 27, 2015, from http://ir.inflibnet.ac.in/bitstream/1944/364/1/04cali_56.pdf

Virtual Learning Environment. (n.d.). Retrieved March 15, 2015, from http://vle.du.ac.in/

Exploring The Emerging Role Of Data Mining And Related Technologies In Retail Forecasting: Contextual Issues & The Road Ahead

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A B S T R A C T

The arrival, growth and spread of Information Technology and related tools have revolutionized the way modern day businesses are being conducted at the global as well as national levels. Optimum and precise decisions in the given dynamic and competitive business environment has emerged as a prerequisite for competitive growth and survival. Further, forecasting decisions also assume crucial significance across all areas of business with Retail also not being an exception. Forecasting decisions in context of Retail are associated with their own share of challenges and issues. The present working paper seeks to explore the emerging roles of Neural Networks and Data Mining in Retail Forecasting in context of today's business environment. It further explores the possible applications of other related IT technologies and also discusses the related issues and trends.

Keywords—Information Technology; Retail; Decision Making; Data Mining; Business Environment;

INTRODUCTION

Data Mining as a technique for handling high volumes of data by uncovering patterns in the data and aiming towards predicting or forecasting trends of the future has over the few decades been employed in the retail markets with satisfactory results(Fayyad, U. M., et. al. 1996).

The technique if used judiciously has resulted in enhancing the competitive advantage of the firms employing it by ensuring growth in revenue, cutting of costs and an over-all better awareness and response to market place changes in the present dynamic and competitive business environment(Berry, M. J. et. al. 1997).

The areas of applications of this very potent tool in the retail scenario includes the designing of customized models for trading and also inventory related activities and investment or portfolio selection has been facilitated through it(Ahmed, Syed Riaz, 2004).

The numerous advantages that Data Mining provides includes (but is not limited to) are opportunities to enhance knowledge and awareness, providing solutions to extremely complicated data related issues, nurturing the core competencies of employees & organizations and above all sustaining and fuelling the competitive advantage and growth of firms(Westphal, C., & Blaxton, T. 1998; Hormozi, A. M., & Giles, S. 2004; Berkhin, P. 2006).

RETAIL & DATA MINING: THE LINKAGE

Reviews of existing literature on the subject point towards the fact that the Retail sector over the recent past has witnessed exponential growth and this growth has naturally been associated with increased competitiveness at the global level. The challenges to survive and flourish in such an environment are not an easy task(Apte, C. et. al. 2002;Chen, M. S. et. al. 1996).

To remain competitive and generate higher revenues a firm has to ensure that cost of production should be kept to a minimum with minimal compromise on quality and the mantra therefore is to provide low cost but high quality products and also nurture the skills and core competencies of its employees(Grupe, F. H., & Mehdi Owrang, M. 1995; Porter, A. L., & Cunningham, S. W. 2004).

This requires a firm to adopt a knowledge driven approach and it needs to exploit all possible sources of relevant and existing knowledge. The wide and huge volumes of knowledge available require focus upon the relevant knowledge and it is here that data mining comes into the picture(Groth, R. 2000).

Without employing data mining it is an extremely cumbersome task for the firm to explore and exploit knowledge in an optimal manner.

DATA MINING IN RETAIL: THE PRESENT SCENARIO

A brief overview of the commonly employed techniques that are employed by retail firms in today's business environment is presented in the following section.

Depending upon the type of knowledge that is being dealt with Data Mining techniques that are in use in today's times include:

i. Database driven/management of information repositories approach to identify hidden and relevant trends in data to facilitate effective forecasting and precise decision making. As for instance, analyzing the shopping preferences of customers by using the data of last few years to come to a decision regarding their expected choices in the future.

ii. Model based approach backed up by statistical tools and techniques which are most commonly employed in areas like medical diagnosis, approval of loans, deciding upon investment avenues and related.

iii. Clustering of data sets based on existing similarities or likeness to come to accurate analysis and future forecasts which ismoreappropriate for those situations where the volume of data is very huge and without proper demarcation into some facilitating units it is not possible to proceed further.

iv. Sequential pattern and time series analysis for risk management and economy related aspects.

v. Data visualization techniques which help to ensure that one need not be overwhelmed by the huge volumes of data and can visualize it in terms of manageable units so that they may be analyzed better.

DATA MINING IN RETAIL: THE FUTURE TRENDS

Taking into account the fact that there has been an exponential growth in the volume of data owing to factors like businesses going global as a result of the application of IT for all firms in the future Data Mining is going to be a prerequisite for business growth, survival and management. However, there are some challenges that are present like:

i.   The high cost of software and training of the users to reap benefits of the technique is at times too high for new or smaller firms.

ii.   The technology is still evolving and application of the same on "as is" basis often associated with a risk of technological obsolescence

iii.   It is a bit of a dicey decision to be sure about the volume of data that a firm handles to be sure of employing Data Mining techniques.

iv.   The infrastructural requirements for employment of the technique often pose some operational problems for the employing firms.

CONCLUSION& SCOPE FOR FUTURE RESEARCH

On the basis of the present paper that relies heavily upon review of literature concerning the subject it can be said that the importance of Data Mining cannot be ignored. Most of the firms have already been employing the technique to streamline their data and thereby facilitate efficient decision making. For the firms that are not yet employing the technique are facing pressures to do so in the near future to remain competitive in the business.

It would be interesting to observe the newer technologies that emerge in the future that reshape businesses and their data managements and hence there is an ample scope for further research in the area.

REFERENCES

- *Ahmed, Syed Riaz. "Applications of data mining in retail business." Information Technology: Coding and Computing, 2004. Proceedings. ITCC 2004. International Conference on. Vol. 2. IEEE, 2004.*
- *Apte, C., Liu, B., Pednault, E. P., & Smyth, P. (2002). Business applications of data mining. Communications of the ACM, 45(8), 49-53.*
- *Berkhin, P. (2006). A survey of clustering data mining techniques. In Grouping multidimensional data (pp. 25-71). Springer Berlin Heidelberg.*
- *Berry, M. J., & Linoff, G. (1997). Data mining techniques: for marketing, sales, and customer support. John Wiley & Sons, Inc.*
- *Chen, M. S., Park, J. S., & Yu, P. S. (1998). Efficient data mining for path traversal patterns. Knowledge and Data Engineering, IEEE Transactions on,10(2), 209- 221.*
- *Fayyad, U. M., Piatetsky-Shapiro, G., Smyth, P., & Uthurusamy, R. (1996). Advances in knowledge discovery and data mining.*
- *Groth, R. (2000). Data mining: building competitive advantage. prentice Hall PTR.*
- *Grupe, F. H., & Mehdi Owrang, M. (1995). Data base mining discovering new knowledge and competitive advantage. Information System Management,12(4), 26-31.*
- *Hormozi, A. M., & Giles, S. (2004). Data mining: A competitive weapon for banking and retail industries. Information systems management, 21(2), 62-71.*
- *Porter, A. L., & Cunningham, S. W. (2004). Tech mining: exploiting new technologies for competitive advantage (Vol. 29). John Wiley & Sons.*
- *Westphal, C., & Blaxton, T. (1998). Data mining solutions: methods and tools for solving real-world problems.*

Development Of Predictive Simulation Models For Drug Dissolution Parameters Computing

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A B S T R A C T

Over recent years, drug dissolution computing has been the subject of intense and profitable scientific developments. Whenever a new batch profile is developed or produced, it is necessary to ensure that drug dissolution occurs in an appropriate manner. The quantitative analysis of the values obtained in dissolution tests is easier when statistical formulas that express the dissolution results as a function of some of the dosage forms parameters are used. In most of the cases the theoretical concept does not exist and some empirical equations have proved to be more appropriate.

Keywords—Drug Dissolution, Drug release; Drug release models simulation; Parameters Computing.

1. INTRODUCTION

Dissolution testing plays an important role in pharmaceutical quality control and in the development of solid, semi-solid, and transdermal pharmaceutical forms. The dissolution kinetic is reexamined under simulated physiological conditions, which are specified in both the U.S. Pharmacopeia (USP) and the European Pharmacopeia (EP) dissolution testing regulations. As such, these analytics are performed in a highly regulated Good Manufacturing Practice (GMP) environment, and present particular challenges for that facilitate those computations software applications. The role of computer based information systems has considerably increased in pharmacy as well as clinical practice in the last decade. However, the use of such systems in dissolution test is still not widespread. Several mathematical systems are commercially available for dissolution parameters calculations. In addition, comprehensive systems customized to specific needs have also been developed. The use of such systems in dissolution parameters calculations, questions regarding the role of structured data versus free text input, standardization of nomenclature, and compatibility with other systems, are hotly debated. This paper

has in its scope the above stated considerations in the development of software for dissolution parameters calculations records, which attempts to resolve some of these issues. The model described herein is specifically designed to meet the requirements of the dissolution parameters calculations of a tertiary referral. An additional module has been included to allow modification and update of previously recorded data. A unique number assigned to each has been used as a primary identifier throughout the record.

2. MATERIALS AND METHODS

Requirements:

The central objective of this initiative is to create a data model capable of accurately representing the calculations for dissolution parameters in a computer-suitable format. The main requirements include that the system should (a) be simple enough to be directly operated by the analytical scientist(s) in analytical research laboratory, (b) can easily run on personal computers, (c) allow comprehensive data entry conforming to accepted procedures which are currently carried out, (d) can generate a printed report, (e) allows modification and update of data, and (f) permit subsequent statistical analysis of records in a tabular format and displays the results of analysis. As dissolution data are to be handled by analytical scientists with minimal previous computer experience, an emphasis is laid on a user-friendly interface.

Software Construction:

The software has been developed in visual logway in Visual Basic. It has a set of two screens for data entry. One relating to (a) calibration curve and the other relates to (b) cumulative percentage release. Data flow is designed in two directions: (a) to a database, after appropriate coding, for storage and subsequent analysis at a later date, and (b) to the report generator. An additional module is included to allow modification and update of previously recorded data. Another module is designed for filling test reports on specimens obtained during the procedure, as and when these results became available. A unique identifier assigned to each test record is to be used as a primary identifier throughout the record.

Data Entry:

Modules are developed to allow easy user access and facilitate data entry. On completion of one module,

automatic transfer to the subsequent module is envisaged. The basic module is structured as a large window, with smaller sub-windows appearing only on demand. The entire software is menu driven, with a simple and consistent hierarchical structure. As far as possible, all fields are structured, with the user allowed to choose one or more options from list of choices. These options included important and/or commonly observed conditions, and are chosen to cover majority of everyday findings after consulting experienced faculty members and reviewing previous records. A standard terminology developed for the structured items based on available literature and general consensus. The fixed choices are displayed either as searchable list boxes, check boxes, or as radio buttons. Free text is allowed in some fields, such as the information beyond the fixed choices available to the user. To allow complete data acquisition in each test, all data fields are marked mandatory, and the user is not allowed to proceed to a subsequent field without recording data in such fields. (Fig. 1 and 2)

Debugging and Modification:

After initial development, the software is tested over a four-week period by input of data. An attempt is made to rectify problems faced initially by the users. Opinion is sought from faculty members regarding possible modifications and improvements. Inconsistencies in the programming script, which gave rise to error messages during operation of software, are corrected. Finally the software is put to routine use.

Software Validation:

To evaluate the actual utility of the software, all consecutive test records entered using this computer software. Analytical scientists are asked to assess the overall quality of the reports andthe content of information. After entry of data for 60 consecutive test procedures, these details are subjected to statistical analysis to evaluate the robustness of the database component.

Linearity or calibration curve [6]:

The linearity of an analytical procedure is its ability (within a given range) to obtain test results, which are directly proportional to the concentration (amount) of analyze in the sample. A linear relationship should be evaluated across the range of the analytical procedure. It may be demonstrated directly on the drug substance (by dilution of a standard stock solution) and/or separate weighing of synthetic mixtures of the drug product components, using the proposed procedure. The latter aspect can be studied during investigation of the range.

Linearity should be evaluated by visual inspection of a plot of signals as a function of analyze concentration or content. If there is a linear relationship, test results should be evaluated by appropriate statistical methods, for example, by calculation of a regression line by the method of least squares. In some cases, to obtain linearity between assays and sample concentrations, the test data may need to be subjected to a mathematical transformation prior to the regression analysis. Data from the regression line itself may be helpful to provide mathematical estimates of the degree of linearity. The correlation coefficient, y-intercept, slope of the regression line and residual sum of squares should be submitted for regulatory purpose. A plot of the data should be included. In addition, an analysis of the deviation of the actual data points from the regression line may also be helpful for evaluating linearity. For the establishment of linearity, a minimum of 5 concentrations is recommended. For the dissolution, concentrations of drug are calculated from the respective calibration curve (Fig. 3).

Dissolution study [1, 4-5]:

In vitro dissolution specifications are established to guarantee batch-to-batch consistency and to indicate potential bioavailability problems. For new drug products, dissolution specifications must be based on data obtained from the batch used in the bioavailability assay (bio-batch). For generic drugs, the dissolution specifications are generally the same of the reference drug product. These specifications are confirmed by testing the performance of the bio-batch dissolution. If the generic drug dissolution is substantially different from the reference drug product dissolution, and the in vivo study had proved the bio-equivalence between them, a different dissolution specification for the generic drug can be established, provided it is based upon a validated IVIVC. In that case, the specification must be fulfilled throughout the permanence of the generic drug in the market. The specifications must be based on the bio-batch dissolution characteristics. If the formulation developed for commercialization differs significantly from the bio-batch, the comparison of the dissolution profiles and the bio-equivalence study between these two formulations is recommended.

The dissolution tests must be undertaken under such conditions as: basket method at 50/100 rpm or paddle method at 50/75/100 rpm. To generate a dissolution profile, at least five sampling points must be obtained of which a minimum of three must correspond to percentage values of dissolved drug lower than 65% (when possible) and the last point must be relative to a sample period of time equal to, at least, the double of the former period of time. For drug products of rapid dissolution, samples at shorter intervals (5 or 10 minutes) may be necessary. For drug products with highly soluble drugs that present rapid dissolution (cases I and III of BCS), a dissolution test of a single point (60 minutes or less) that proves a dissolution of, at least, 85% is sufficient for batch to batch uniformity control. For drug products

containing drugs poorly soluble in water, which dissolve very slowly (case II of BCS), a two points dissolution test, that is, one at 15 minutes and another at 30, 45 or 60 minutes, to ensure 85% of dissolution is recommended (Fig. 4 and 5).

Dissolution Efficiency [7]:

Khan suggested Dissolution Efficiency (D.E.) as a suitable parameter for the evaluation of in vitro dissolution data. D.E. is defined as the area under dissolution curve up to a certain time „t‟ expressed as percentage of the area of the rectangle described by 100% dissolution in the same time. The D.E. values are calculated from the dissolution data. (Fig. 6)

$$\text{Dissolution efficiency (D.E.)} = \frac{\int_0^t y.dt}{y100^t} \times 100$$

Comparison of dissolution profiles by similarity and dissimilarity factor [2-3, 8-9]:

To avoid the requirement of bioequivalence studies of the immediate release pharmaceutical forms of lower dosage, when several presentations with the same formulation exist, the dissolution profiles must be compared and must be identical among all dosages.

Until recently, single point dissolution tests and specifications have been employed to evaluate scale-up and post-registration changes. When minor alterations are carried out, the single point dissolution test may be adequate to ensure drug product quality and performance. For major alterations, the comparison of dissolution profiles obtained in identical conditions between the altered formulation and original one, is recommended. In this comparison, the curve is considered as a whole, in addition to each sampling point of the dissolution media, by means of independent model and dependent model methods. Independent model method employing the similarity factor. A simple independent model method employs a difference factor (f1, Fig. 7) and a similarity factor (f2, Fig. 8) to compare dissolution profiles. Factor f1 calculates the percentage difference between two the profiles at each sampling point and corresponds to a relative error measure between the profiles:

$$f_1 = \left\{ \left[\sum\nolimits_{t-1}^{n} | R_i | \right] + \left[\sum\nolimits_{t-1}^{n} R_i \right] \right\} \times 100$$

where:

n = number of sampling points

Rt = value dissolved in time t (percentage), obtained with the reference product or with the original formulation (before the alteration)

Tt = percentage value dissolved from the altered formulation, in time t. Factor f2 corresponds to a similarity measure between the two curves:

$$f_2 = 50 \times \log \left\{ \left[1 + \frac{1}{n} \sum_{t-1}^{n} |R_t - T_t|^2 \right]^{-0.5} \times 100 \right\}$$

The procedure is described as follows:

- Determine the dissolution profile of products, test and reference, using twelve units of each.
- Calculate factors f1 and f2 using the equations presented previously.
- Criteria for two dissolution profiles to be considered similar.
- The nominal range of f1 and f2 values are 0 to 15 and 50 to 100, respectively.

3. RESULTS

A software for drug dissolution parameter computation developed with Graphical User Interface (GUI). During execution, it takes for the drug concentration, instrument response and time data. After taking input it display list where user can opt for specific set of computations and can get the results for desired set of computation. The software supplements visualization along with computation. The user can opt for reports to be provided by the software. It generate calibration curve, cumulative percentage release, dissolution efficiency, comparisons of two products through similarity and dissimilarity factors. The software has various modules for input and modification of data, computation of various parameters and visualization with facilities to generate reports of dissolution parameters. The use of interface is designed for work with much ease in respecting. With little practice, scientists soon became adept at entering details correctly and quickly. The slightly increased time of data entry into the computer is more than made up by uniform and complete report generation. A user-friendly software providing computation and visualization parse drug dissolution parameters. The analytical scientists can utilize the software for intensive research as wide variety of parameter computation at simple key stroke.

The computer software currently used has two modules for data input: (a) calibration curve, and (b) cumulative percentage release. The data is linked to a MS-SQL Server having a set of two tables related to (a) calibration curve, and (b) cumulative percentage release and their reports. The two tables are linked to each other using the unique number. Another module deals with screen preview of reports and generation of printed reports.

In the calibration curve module, the number identifies each test record uniquely. The date of procedure is automatically derived from the system date maintained by the computer clock, but can be changed manually. The user has to enter the number of observations of concentration and instrumental response. After completion of calibration curve test record, the user is transferred directly to the „cumulative percentage release" module. The possible locations in the dissolution parameters tree are represented by a cascading hierarchy of tables. An additional table listing the appropriate divisions/segments appears.

On completion of data entry, the user is transferred to the print module, where he can preview the report prior to printing. The printed report contains all the information entered in the database. It also contains a standard set post- procedure instruction for the test, and also has space for signatures for the analytical scientist carrying out the procedure.

Problems initially faced by users are primarily related to data entry. Scientists, not having any working knowledge of computers, encountered problems such as a slow speed of data entry and failure to enter data in mandatory fields (with a consequent error message that did not allow the user to proceed further without rectifying the mistake). With little practice, they became adept at entering details correctly and quickly. Almost all the analytical scientists reported a slightly increased time of data entry into the computer, in comparison to writing reports on a standard printed proforma. However, all agreed that the report and data generated through the software are uniformly complete, and more than made up for the extra time spent. The new report has a uniform and easily understood structure, and is free of any inadvertent omissions.

The database component is evaluated by analyzing 60 consecutive records entered over a 4-month period. Data access and analysis are easily and quickly performed. Data are found to have been completely transferred from data entry screens to the database and no missing values are encountered.

4. DISCUSSION

Structured input and free-text input represent two fundamentally different ways of entering data into a computer. Initial reports of test databases relied heavily on text based tools. Such input facilitates personalized style and flexibility in description of test records, and generates a well readable report. However, free-text input weakens the utility of the database, as it is not suited to subsequent analysis. Structured input and the resulting categorical data offer an important advantage in this regard. Data thus entered is more likely to be complete and is well suited for research and analysis, as well as for the generation of analytical reports and for quality control. It has been estimated that use of computerized test records improves completeness of data entry by more than 50 percent. However, a major trade-off for structure is flexibility. We therefore used a basic structured data entry protocol, supplemented by use of free text only under special situations. Besides operator related factors, it is related to the amount of free text entered and the number of tables accessed during structured data entry. However, the additional effort is rewarded by a more comprehensive, precise and accurately documented report.

A major feature of the software is the powerful database component. This portion of the software has been built as a set of two interrelated database in MS-SQL Server, which can easily handle large database and also offers a wide range of analytical tools through a versatile query system. We have evaluated the robustness of this module of the software through an analysis of 60 consecutive test records.

Although such analysis requires some working knowledge of the database system, it is easy of learn. No data is lost and statistical analysis could be easily performed. Both user-friendliness of the software and completeness of data entry are critical to the success and acceptance of such software. This software allows easy integration of buttons, text boxes, check boxes and fields for free text to achieve this end. The format for data input is optimized through continuous interaction between scientists and the programmer. Scientists and other faculties are involved early and frequently during the development of the software, so that they are able to contribute ideas and advice. The software has been under routine use, and has performed well in areas of data entry, report generation and data analysis. Successful development and routine application of the database is, however, only a short-term achievement. The system is adaptable and capable of keeping pace with new technological advances.

REFERENCE:

1. *"Dissolution testing", United State Pharmacopoeia, XXIII, NF XVIII, The USP convention, Inc, Rockville, MD, (1995).*

2. *M. C. Gohel and M. K. Panchal, "Refinement of lower acceptance value of the similarity factor f2 in comparison of dissolution profile". Dissolution Technol., vol. 2, pp. 18-22, 2003.*

3. *M. C. Gohel, K. G. Sarvaiya, N. R. Mehta, C. D. Soni, V. U. Vyas and R. K. Dave, "Assessment of similarity factor using different weighting approaches". Dissolution Technol., vol. 11, pp. 22-27, 2005.*

4. *Guidance for industry: Dissolution testing of immediate release solid oral dosage forms. US food and drug administration, Rockville, MD, USA, 1997.*

5. *Guidance for industry: Immediate release solid oral dosage forms, scale-up and post- approval changes: chemistry, manufacturing and controls, in vitro dissolution testing, and in vivo bioequivalence documentation. US food and drug administration, Rockville, MD, USA, 1995.*

6. *International conference on harmonisation of technical requirements for registration of pharmaceuticals for human use, ICH harmonised tripartite guideline validation of analytical procedures: Text and methodology Q2 (R1), 2005.*

7. *K. A. Khan and C. T. Rhodes, "Concept of dissolution efficiency". J. Pharm. Pharmacol, vol. 27, pp. 48-49, 1975.*

8. *J. W. Moore and H. H. Flanner, "Mathematical comparison of dissolution profiles". Pharm. Technol., vol. 20, pp. 64-74, 1996.*

9. *J. E. Polli, G. S. Rekhi, L. L. Augsburger and V. P. Shah, "Methods to compare dissolution profiles and a rationale for wide dissolution specification for metoprolol tartrate tablets", J. Pharm. Sci., vol. 86(6), pp. 690-700, 1997.*

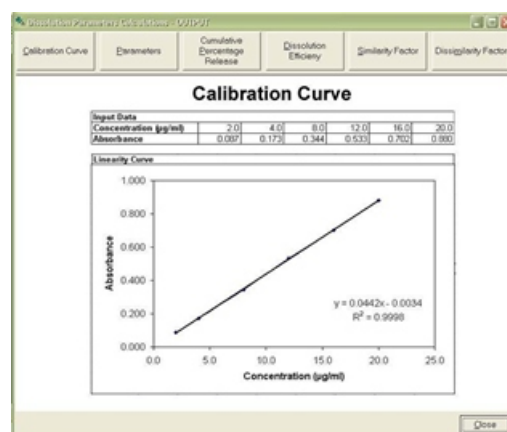**Fig. 1 Input form of calibration curve – Data entry**   **Fig. 3 Output report of calibration curve**

Fig. 2 Input form of Cumulative percentage release – Data entry

Fig. 4 Output report of parameters

Fig. 5 Output report of cumulative percentage release

Fig. 7 Output report of similarity factor

Fig. 6 Output report of dissolution efficiency

Fig. 8 Output report of dissimilarity factor

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