OPAC Usability: Assessment through Verbal Protocol

KEYWORDS: OPAC Studies, User Studies, Verbal Protocol, Think Aloud, Qualitative Research, LIBSYS

Abstract: Based on a sample of eighteen OPAC users of British Council Library, Kolkata, this study has investigated how the participants have interacted during the execution of Online Public Access Catalogue (OPAC) search, whether they were satisfied or dissatisfied or confused. While implementing the verbal protocol method this study has developed a scheme of coding with the help of which the protocol data were analysed and proposed a generic model of Online Catalogue Searching Process Flow, as well as suggested that the method has a great potential in Library and Information Science Research.

INTRODUCTION

OPAC in its very rudimentary form first emerged in late-1970s and early-1980s. Hence after, as identified by Tedd (1994), has crossed through at least three generations of development. The basic purpose of Library Automation software are to help in creating the library holding database, which will, in turn, provide an online catalogue to help the users in identifying and locating their required documents. The present trend in this field is that, these artefacts are also supporting the web-OPAC facility, by which the library catalogue can be browsed over Internet by graphical browsers. It presents the library catalogues in a hypertext format, which can be linked to the full-text electronic resources. This new and fourth-generation OPACs emerged during the late 1990s and is the state-of the-art, till date. These interactive web-OPACs allow the users to access various resources of other libraries, publishers, online vendors, etc., connected to Internet.

Though most of developed countries have automated their libraries way back in early and mid 1980s, libraries in country like India, of course with some exceptions, have recently joined in the automation movement. This particular scenario has ignited the software production houses to produce many new library automation software, especially in India. Slim++ (System for Library Information Management, a product of Algorhythms, Pune, India), SOUL (Software for University Libraries, developed by INFLIBNET, Ahmedabad, India), TLSS (Total Library

Software Systems, developed by I.T. Solutions Pvt. Ltd., New Delhi, India) and LibSys (a product of LibSys Corporation, New Delhi, India), to name a few.

With the increasing availability of Library Software and OPAC systems in the market, the libraries introduced the same with the assumption that users will usually use the OPAC to determine the availability of a document or set of documents in its various formats. Therefore, online catalogue became an extremely important interface for library users, which ought to be as easy to use as possible (Morrison, 1999). It is also important to keep in mind that, OPACs are used by extremely heterogeneous user population, probably the broadest of any type of information retrieval system (Beaulieu and Borgman, 1996). Hence, evaluating the performances of the online catalogues, based on the criteria like, ease of use, reliability, etc., became a necessity to assess, whether the new or updated systems are up to the performance as claimed while purchased, whether the output quality are up to the satisfaction of the users or some refinements are required. In order to ensure the implementation of these software, it is a necessity to find out the suitable methods and techniques to investigate how the users of these OPACs search and satisfy themselves.

LITERATURE REVIEW

Extensive research works have been conducted and published on online catalogues, till date. Similarly, several review works on the same area have highlighted the different aspects of OPACs. While reviewing OPAC related literatures Larson (199l), as well as, Husain and O'Brien (1992) have emphasized on subject searching on OPAC and Seymour (1991) has stressed on the methodological issues of online catalogue research. In addition to data collection methodologies in OPAC researches, Large and Beheshti (1997) have covered the literatures on several variables that play significant role in this domain of research such as the problems related to different variables, namely, users, library settings, search strategies, systems, etc. They have concluded that though the users have been endlessly studied yet determining users' behaviour represents an illusive research problem for the librarians. On the other hand, it can be observed that, in spite of all these studies, users still find difficulties to use the online catalogues (Borgman, 1986; Borgman, 1996; López de Prado, 2000; Wang, Hawk

and Tenopir, 2000). This perplexity raises the question of the appropriateness of the methods and techniques used in OPAC researches and called for more user-centred qualitative methods which emphasize developing the researcher's understanding of the complex and interactive environment in which the subject of study occurs; by adopting a holistic approach of human events; instead of reducing them to quantifiable objects for manipulation and measurement.

For the purpose of this study, the Verbal Protocol technique (alternatively known as 'think aloud', or 'concurrent verbalization' technique), a lately popular qualitative research method, has been used to collect the data about library users. Though in the recent past the verbal protocol method has been used in different areas of Library and Information Science, like, search strategies, system interfaces, information-seeking processes and relevance judgements of CD-ROM based databases and online electronic resources (Wang, Hawk and Tenopir, 2000; Branch, 2001; Cockrell and Jayne, 2002; Vakkari, Pennanen and Serola, 2003, Whitmire, 2004), its use in OPAC studies however, is still limited. Sullivan and Seiden (1985) assessed the online catalogue user education needs using this method and compared the traditional methods of studying the use of OPACs with the protocol method. To determine the type of knowledge used by experienced librarians while searching for subjects in OPACs, Connell (1995) used the verbal protocol method. Morrison (1999) examined the feasibility of using verbal protocol as a method of field research on the online catalogue and found that it is a useful means of obtaining data on the online catalogue, as well as, has a lot of potential applications in librarianship, including interface design, the research process, and the reference interview.

This article has delineated how the users collected the required information during the execution of OPAC search, whether they were satisfied or dissatisfied or confused while using a particular OPAC system.

METHODOLOGY

'Verbal Protocol' or 'Think-aloud Protocol' (hence after mentioned as 'Verbal Protocol'), was chosen for the purpose of this study because it helps to gain information about the cognitive processes of a participant's internal states while performing tasks and provides a window for

uncovering the psychological mechanisms and knowledge structures underlying human problem-solving activities with respect to specific tasks (Yang, 2003). Verbal Protocol “is the term given to the commentary or verbalization produced by an individual or small team when asked to described what they are doing, why they are doing it, what they are about to do, what they hope to achieve, etc. with respect to a particular task or behaviour” (Johnson and Briggs, 1994).

While considering the research site, it was thought that a public library, catering to different segment of society, with fully automated library system would be ideal for the purpose of this study. Accordingly, The British Council Library, Kolkata, was approached for the purpose and permission obtained to conduct the study. The Library has implemented the Online Catalogue system, about three years back, with the help of an Indian library software, known as LibSys (version 4.0 on SCOUNIX hosted on DELPOWER EDGE 2300 server), a product of LIBSYS Corporation, New Delhi. At the time of conduct of this study, it had four OPAC terminals, which are connected through a Local Area Network. The Library maintains a substantial collection of books, periodicals, and other non-book materials.

The users of the online catalogue station were asked if they would participate in the study. To minimize bias in the sample, OPAC terminals were numbered and users were approached in advance on alternation basis. Total 32 users were approached during the period of the study, of which 18 participants had accepted the proposal.

The participants were requested to "think out loud" or "think aloud" about their searches, keys pressed and reactions to the information on the screen, as they perform their own searches on the OPAC. These verbal protocols of the participants were audio recorded, as well as, notes were also taken, about the finger movements, expressions, for example, excitements, dissatisfaction, starting and ending time of the search etc.

“Acknowledgment Tokens” were provided to the participants as and when it was necessary to remind them to keep talking. Boren and Ramey (2000) suggested that careful use of these

token responses helps the participants to promote ‘speakership’. However, proper care was taken so that minimum distractions would take place.

Personal Data; like gender, age, qualification, experience of using the OPAC under study, experience of using any other OPACs; were also collected after the search sessions. Out of eighteen users, four were female and fourteen were male participants and fifteen participants were within the age group of 15-40 years. Total eight participants had qualified 12th Standard, four had acquired graduation degree, five were post-graduated, and there was only one participant who had qualified M.Phil. Half of the participants used the OPAC for more that one year and the other nine used it less than a year. Seven out of eighteen participants used some different OPAC systems in other libraries.

ANALYSES OF VERBAL PROTOCOLS

The audio-recorded protocols were converted into type written transcriptions. In the next stage transcribed protocols were segmented into meaningful statements that may suggest discrete mental process. The segmentation of the text into phrases (which might loosely be described as minimum grammatical units) is done by natural language understanding (Bainbridge and Sanderson, 1995). Segmentation involves, dividing the protocol into statements that can be encoded more or less independently. Here, cues for segmentation are by looking at the completion of the ideas, the completion of sentences, clauses, or pauses.

Each statement was then encoded. Time can be lost if an analyst commits prematurely to an encoding scheme and applies it to an entire data set without planning how the results will be analysed (Fisher and Sanderson, 1996). Therefore, in this study the verbal protocol first had undergone through a preliminary analysis using simple coding such as, 'Defining ', 'Planning', ‘Monitoring’, and ‘Evaluating’ so forth. After that, an initial coding scheme based on the task directive coding scheme of Branch (2001) was used to identify the operators that would generate or instantiate the relevant knowledge in the verbal protocol. The final coding scheme for the users of the OPAC was derived from this initial coding scheme through refining and revising the conceptual operators. Table-1 (Coding Scheme) demonstrates that the OPAC users used the following set of conceptual operators.

Table 1: Coding Scheme

CODE	SUB-CODES	OPERATORS
Planning →	a. Step	
	b. Procedure	
Defining →	a. Document	
	b. Heading →	1.Author
		2.Title
		3.Subject
	c. Data →	1.Name of Author
		2.Title of Document
		3.Subject of Document
	d. Action	
Monitoring →	a. Read	
	b. Identify	
	c. Examine →	1. Compare-to-expected
		2. Determine-relevancy
		3. Identify-availability
Evaluating →	a. Infer	
	b. Satisfy	
	c. Dissatisfy	
Indiscretion →	a. Confusion	
Meta-reasoning →	a. Comment	

To start a search, the users of OPAC, plans for performing operations, through 'Step' and 'Procedure'. In other words, to start a search the users first plan what are the steps they will follow or which procedure will be followed to accomplish the job.

The above Coding Scheme reveals that the OPAC users 'Define' their task through the types of 'Document' or documents they are looking for. Then they define under which access point of 'Heading' they will be looking for the document. This study has found the users to access through 'Author', 'Title' and 'Subject' options. Followed by which, the users define the 'Data' or the actual 'Name of Author' or 'Title of Document' or 'Subject of Document'. They also defined different 'Actions' involved in performing the search, for example, "pressing the Enter key".

After the results are retrieved by the OPAC, they start the monitoring operations by 'Reading', 'Identifying' and 'Examining'. 'Compare-to-expected' is used at the examining stage, and they also 'determine-relevancy' of the retrieved results, which may be followed by 'identify-availability' of the documents in the library, means, whether the document is currently issued to any other library users or not.

The OPAC users goal, in this episode, is to interpret the significance of a given document by inference. For example, "well, this seems to be a related subject to me, because, it talks about

introduction to information retrieval". They may feel satisfied or dissatisfied at this stage with the results of the search.

The 'Indiscretion' or confusion, however, may arise at any stage while performing the job. At the 'Meta-reasoning' stage the user make a general or specific comment about doing the search.

RESULTS

Total 617 statements were encoded from the 18 participants, out of those, 24 were the other comments, for example – "Finished the search", which were not relevant for the study, hence removed. The actual number of protocol statements reduced to 524 after removing 69 'Acknowledgement Tokens', which were provided to the participants. The user-wise break-ups of the statements are described in the Table-2 (Number of Total Statements by participant).

Table 2: Number of Total Statements by participant.

Sl.No.	User Identification Number	Acknowledgement Token Provided	Statements
1.	USER – 01	NIL	7
2.	USER – 02	2	21
3.	USER – 03	2	18
4.	USER – 04	5	37
5.	USER – 05	4	37
6.	USER – 06	14	26
7.	USER – 07	NIL	23
8.	USER – 08	5	44
9.	USER – 09	6	27
10.	USER – 10	13	28
11.	USER – 11	4	20
12.	USER – 12	2	22
13.	USER – 13	1	31
14.	USER – 14	NIL	29
15.	USER – 15	NIL	58
16.	USER – 16	1	19
17.	USER – 17	3	58
18.	USER – 18	7	19
	Total	**69**	**524**

The highest number of statements could be achieved from two users, 58 each, whereas least number of statements could be derived from the user number 01. It can also be observed that, no acknowledgement token was required for 4 users. The average number of statements was 29 per participants.

The Table-3 (Number of Statement coded for each participant) shows the range in the number of Think Aloud statements for each participant.

Table 3: Number of Statement coded for each participant.

USER I.D.	Planning	Defining	Monitoring	Evaluating	Indiscretion	Meta-reasoning	TOTAL
USER – 01	1	5		1			7
USER – 02		12	1	4	4		21
USER – 03	3	4	5	3	3		18
USER – 04	8	10	12	4	3		37
USER – 05	6	11	11	4	3	2	37
USER – 06	4	14	6	1		1	26
USER – 07	3	9	5	2	3	1	23
USER – 08	6	16	8	13	1		44
USER – 09	5	6	6	6	4		27
USER – 10	2	12	8	4	2		28
USER – 11	3	10	6		1		20
USER – 12	3	8	7	3	1		22
USER – 13	3	13	11	2	2		31
USER – 14	4	11	10	1	2	1	29
USER – 15	2	13	34	6	1	2	58
USER – 16	1	3	4	6	4	1	19
USER – 17	13	19	16	6	2	2	58
USER – 18	2	8	2	1	2	4	19
TOTAL	**69**	**184**	**152**	**67**	**38**	**14**	**524**

The above table shows that all the users had defining statements and most of the users had planning, monitoring and evaluation statements, At the same time except 2 users rest all the participants had expressed indiscretion at different time during their search task.

Based on the above-proposed coding scheme, the frequency distribution of the each conceptual operator was computed and presented in the Table-4 (Frequency distribution of conceptual operator).

Table 4: Frequency distribution of conceptual operators

Conceptual Operators	Frequency		Percentage
Planning		**69**	**13.17%**
Step	22		
Procedure	47		
Defining		**184**	**35.11%**
Document	11		
Heading	28		
Data	76		
Action	69		
Monitoring		**152**	**29.00%**
Read	60		
Identify	40		
Examine	52		
Evaluating		**67**	**12.79%**
Infer	11		
Satisfy	13		
Dissatisfy	43		
Indiscretion		**38**	**7.25%**
Confusion	38		
Meta-reasoning		**14**	**2.67%**
Comment	14		
Total Count: 524			

A major part of the OPAC search activities is related to 'define' the search procedure and most of which is, defining the 'data' to be retrieved, as it can be observed from the above table. Monitoring activity is also a major task to perform the search. It is interesting to see that, while performing the task total 43 times the participants expressed their dissatisfaction, whereas, only 13 times satisfaction were expressed. The participant wise break-ups of satisfaction and dissatisfaction is presented in Table-5 (Number of Satisfaction/Dissatisfaction expressed by participant).

Table 5: Number of Satisfaction/Dissatisfaction expressed by participant

USER I.D.	SATISFACTION	DISSATISFACTION
USER – 01	1	NIL
USER – 02	1	2
USER – 03	1	3
USER – 04	2	1
USER – 05	NIL	4
USER – 06	NIL	NIL
USER – 07	NIL	2
USER – 08	NIL	11
USER – 09	NIL	4
USER – 10	2	1
USER – 11	NIL	NIL
USER – 12	3	NIL
USER – 13	1	1
USER – 14	1	NIL
USER – 15	1	3
USER – 16	NIL	6
USER – 17	NIL	5
USER – 18	NIL	NIL
TOTAL	**13**	**43**

From the above table it can be observed that while searching the OPAC out of 18 participants three users have neither expressed satisfaction nor dissatisfaction, three users expressed satisfaction, six users had satisfaction along with dissatisfaction and rest six participants have expressed dissatisfaction at different time of their search, The Table-6 (Background details and satisfaction / dissatisfaction) explained the relationship between the background details of the participants and the satisfaction and dissatisfaction data revealed from the protocol analysis.

Table 6: Background details and satisfaction / dissatisfaction

USER	AGE	Qualification	Profession	Experience of the OPAC	Satisfaction	Dissatisfaction
USER-01	15-30	U.G.	U.G.	Less than 1 year	1	NIL
USER-02	15-30	U.G.	U.G.	Less than 1 year	1	2
USER-03	15-30	U.G.	U.G.	Less than 1 year	1	3
USER-04	15-30	P.G.	Others	Less than 1 year	2	1
USER-05	55-60	P.G.	Teacher/Lecturer/ Reader/Professor	2-3 years	NIL	4
USER-06	15-30	Graduation	U.G.	2-3 years	NIL	NIL
USER-07	30-35	P.G.	Others	Less than 1 year	NIL	2
USER-08	15-30	U.G.	U.G.	Less than 1 year	NIL	11
USER-09	35-40	M.Phil	Research Scholar	2-3 years	NIL	4
USER-10	15-30	U.G.	U.G.	Less than 1 year	2	1
USER-11	15-30	U.G.	U.G.	2-3 years	NIL	NIL
USER-12	35-40	P.G.	Others	Less than 1 year	3	NIL
USER-13	15-30	U.G.	U.G.	Less than 1 year	1	1
USER-14	30-35	Graduation	Others	1-2 years	1	NIL
USER-15	30-35	P.G.	Others	2-3 years	1	3
USER-16	Above 60	Graduation	Others	2-3 years	NIL	6
USER-17	55-60	Graduation	Others	2-3 years	NIL	5
USER-18	15-30	U.G.	U.G.	2-3 years	NIL	NIL

Legend: U.G. – Under Graduate Student; P.G.- Post Graduate.

It can be observed that, out of the six participants, who have expressed only dissatisfaction, only one participant, was undergraduate student and rest had gradate or above degrees. Out of these six participants four have used the OPAC for more than 2 years. It has been observed that, three, out of these six participants, are above the age of 55 years, two are within the age group of 35-40 years and one is below 30 years.

On the other hand, out of the three users, who have expressed satisfaction, two have used the system for less than 1 year and only one have used it for 1-2 years. Two of them, are within the age group of 30 to 40 years, and one below 30 years.

Presenting diagrammatically (Diagram-1:Cross-references between phases in verbal protocol analysis) it can be seen that, after planning of the search, 43 times the participants have defined their search, then 41 times they have monitored the search results, and 27 times evaluated the results. It can be observed that, after evaluating 12 times and after monitoring 19 times, the participants have started defining their search, again.

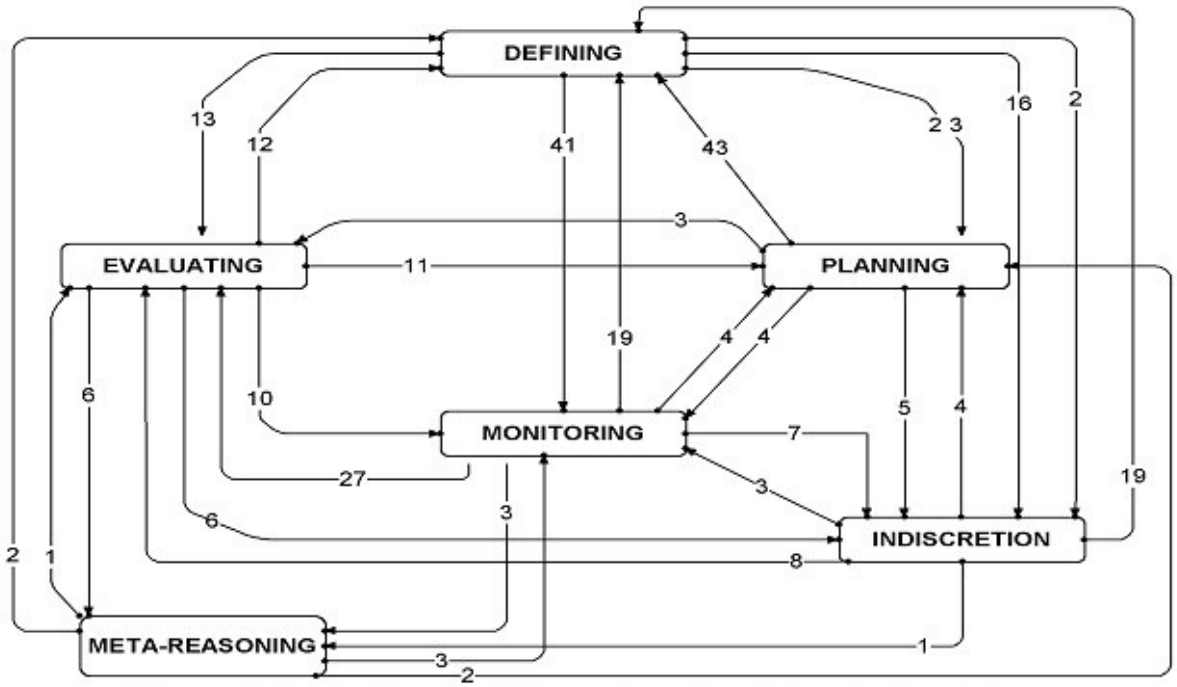

Diagram 1: Cross-references between phases in verbal protocol analysis

The diagram has also revealed that, 7 times the participants were confused, and 19 times, after they felt confused, went back to the definitional statements. Similarly, 6 times they were confused while evaluating.

The analysis of the verbal protocol also resulted in the identification of coding scheme to analyse verbal protocol data. This simplified coding scheme is a representation of users' knowledge to use an Online Catalogue. With the help of this scheme the verbal protocol data were analysed and a generic model of Online Catalogue Searching Process Flow was developed and presented below as a diagram (Diagram-2: Online Catalogue Searching Process Flow).

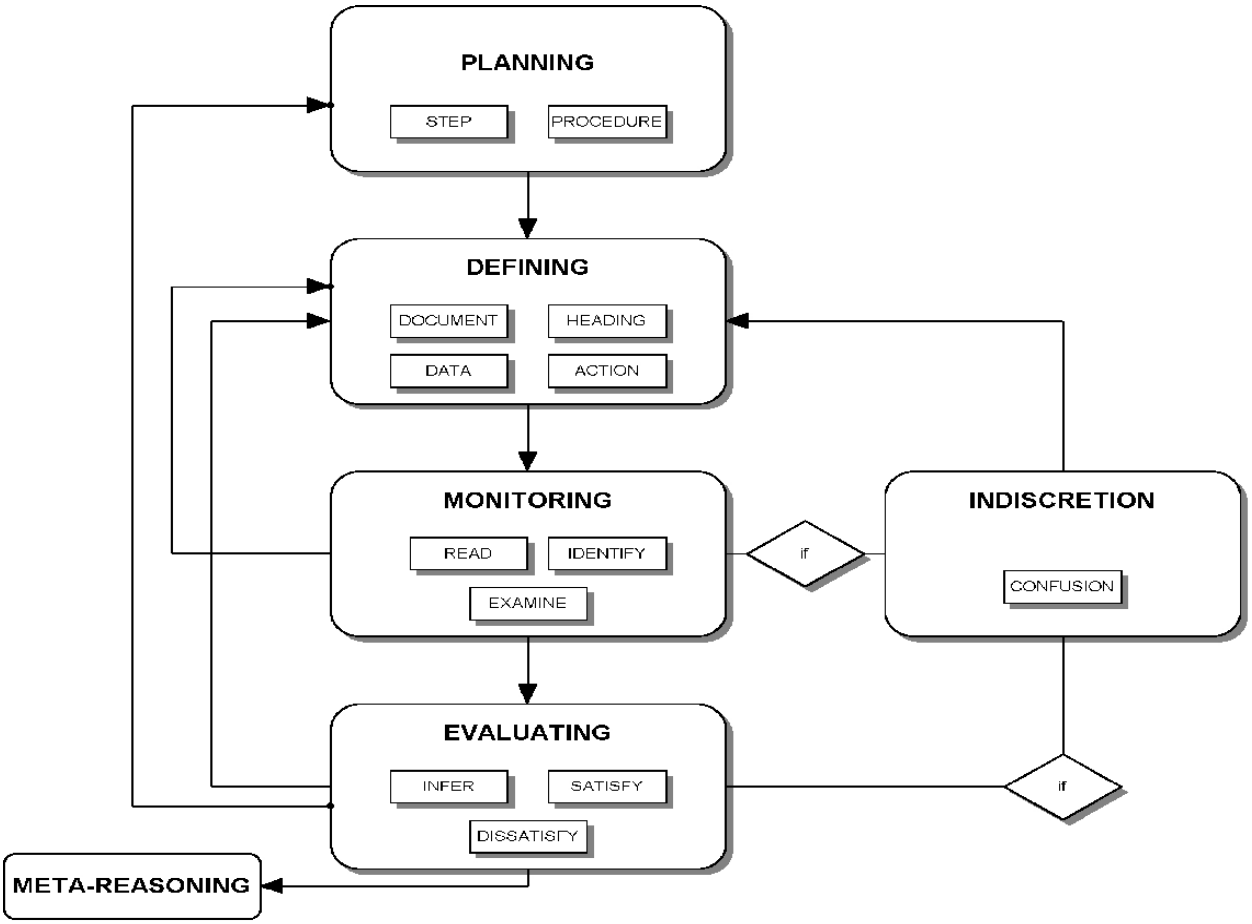

Diagram 2 - Online Catalogue Searching Process Flow

This model explains how the online catalogue users conduct their searches. They start with a planning of a step or procedure, then define the type of document they are looking for under which access point, and what document, as well as, action involved in conducting the search. The results of the search then monitored by reading, identifying and examining. After monitoring they may go back to defining process again and conduct further search. However, generally after monitoring they try to evaluate by inferring and may evaluate the results as satisfactory or dissatisfactory. After evaluation they may start another planning process or defining the next search. If they feel confused, at the stage of monitoring and evaluating, defining process starts again. This model can be used to analyse the verbal protocols data, to assess the users' satisfaction, while they conduct searches on an electronic information retrieval system to gather information.

CONCLUSION

This discourse has outlined how information were collected by the users during the execution of OPAC search, whether they feel satisfied or dissatisfied or become confused and examined how the users interact with and retrieves information from an OPAC and how they navigate within that system, as well as the usability of it.

From the study it was revealed that, most of users have actually expressed their dissatisfactions and were confusions, while using the Online Catalogue. Those who have expressed satisfaction while using the OPAC, have not used the same for longer duration, whereas most of the participants who have expressed dissatisfaction have used the system for more that two years, as well as, most of them are Graduated and involved in different profession.

SUGGESTIONS AND FUTURE DIRECTIONS

The findings of this research have academic and practical values. The verbal protocol method, which is new to Library and Information Science, has been successfully used in the field of Ergonomics, Marine Navigation, Aircraft Traffic Controlling and Human Computer Interactions. This method helps to evaluate and assess the clients or users' need, satisfaction, problems, difficulties, etc. The library professionals are also trying to assess the same for quite a long time, by now. This method will help them to understand the library users, better. The method offers great potential while designing library web pages, intranets and customized interfaces for various library databases.

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