CHAPTER 2

LITERATURE REVIEW
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2.0 INTRODUCTION

The pivotal theme of this discourse concentrates on the methodological issues of users' reaction to OPAC and users' studies in Library and Information Science Research with an emphasis to qualitative methods. Though many researches have been conducted to determine the nature of information users to guide the library system designer so that efficiently acquiring, processing, storing, retrieving and deliver becomes easy, many of them, however, had to face the criticism of using poor methodological base. In fact, the past decade has seen the information science field starting to undergo this kind of self-examination; raising philosophical issues associated with doing research in information systems, and debating about which philosophical traditions should guide work and which could serve as a legitimate basis for grounding research methods (Klein et al, 1991).

Beginning from late 1940s' till date, the exercises in the above-mentioned direction, could loosely be divided into four phases based on the methods used –
First Phase (late 1940s' to mid 1960s') – Phase of generalization.

Second Phase (late 1960s' to late 1970s') – Phase of early systematic studies.

Third Phase (1980's) – Phase of 'cost-benefit analysis' and 'recall and precision'.

Fourth Phase (mid 1990s' to till date) – Phase of user-centred studies and emergence of Qualitative Research methods.

2.0.1 First Phase

Primarily with growing awareness of a professional identity in the late 1940s' and fifties, the 'information-providing community' began to realize the necessity of assessing the needs of its users community, in order to improve the service it was offering. "The origin of user studies can be traced back to Royal Society's conference on scientific information in 1948 in London and the Washington conference of 1958" (Prasad, 1992). However the research techniques used in this first phase of user studies, the time span of which is well spread over fifties to mid-sixties, drew a considerable amount of criticisms. "The technique most commonly employed was that of the self-administered questionnaire, and the purpose of enquiry was generally exploratory, in that the desired result was a description in general terms of the information-gathering habits and needs, quantified as far as possible, of the users studied. In the same way that a garment manufacturer collects information about the general proportions of the population and produces suits in a number of standard sizes that will
more or less fit all, so it was hoped that a knowledge of the general characteristics of information users would permit the design of the systems that would more or less meet the majority of the needs of the majority of users. This hope was not fulfilled. Individual respondents expressed clear preferences, but in the aggregate, responses were frequently contradictory. Most important, the range and complexity of information needs and habits proved to be considerably more varied than had been expected. As a result, the possibility of filling almost all the needs of a large number of users by the operation of a single system appeared remote. Most studies failed to provide information that could be used for the purposes of decision making or information-systems design" (Martyn, 1974).

2.0.2 Second Phase
The later half of sixties experienced a more systematic way of surveying the users community, however, the whole activity was heavily depended on the questionnaires techniques. Indirect observational techniques such as citation analysis were introduced. To study the information flow channels more sociological methods were introduced. "For the study of literature use alone, indirect methods such as the counting of citations or the analysis of loan records seem to have been preferred" (Wood, 1971).
2.0.3 Third Phase
The following decade experienced adaptation of concepts like 'cost-benefit analysis' and 'recall and precision'. Roberts (1985) opined that, "in library management, cost-benefit analysis has been used more widely to connote assessments of effectiveness and performance". The concept of 'recall and precision' engendered number of studies assuming that the "average user is interested in retrieving large amounts of relevant materials (producing a high recall performance), while at the same time rejecting a large proportion of the extraneous items (producing high precision)" (Salton, 1992). These system-centred studies, however, had to face a major setback with the up coming of user-centred design paradigm, which dominates the present day studies of information needs and information retrieval.

2.0.4 Fourth Phase
Though there had been a shift from quantitative methods to qualitative methods since the early 1980s, actual implementations started in late 1980s and early 1990s. The proponents of the new approach, namely Kuhlthan (1988) Wilson (1990) Fidel (1987) accentuated the importance of information-users in an active participation in research and emphasized the need to analyse how information systems fit in the life of the users, but not treat them as passive objects.
After surveying the literature on 'user-centred perspective of information retrieval research and analysis methods' published in 1986 and onwards, Sugar (1995) summarized that "Two main approaches advocate user-centred design theory: (1) the cognitive approach, and (2) the holistic approach. The cognitive approach is based on identifying how users process information and what constitutes an appropriate model to represent this process. The holistic approach considers not only the cognitive aspects of an information search but also affective and psychomotor aspects". The reviewer observed that almost all of the studies that identified cognitive characteristics have used quantitative methods to measure them and therefore suggests that it is needed to have qualitative study and appropriate methods to ascertain these cognitive characteristics. Few have concluded that the central weakness of the cognitive viewpoint is that it pays little attention to the social aspects of information processes, either in terms of the socio-cultural context of the users or the socio-cultural context of the information system (Capurro 1992; Vakkari 1994). Wilson (1980) is of the opinion that "the practitioners of information work have been disappointed by user-studies research, largely because they fail to find within it recommendations for service provision. Equally, information researchers have generally failed to make an impact within any social scientific discipline because their work lacks integration with theories within
those disciplines." He therefore suggested “the answer to the first of these problems may lie in turning to a different model of research, where its application or utilization is considered to be part of the process. An answer to the second problem is more difficult to propose because it is bound up with the problems of socialisation into research within a field of practice without a research tradition: 'qualitative research' is proposed as a way of confronting directly the issue of the lack of theory in user studies”.

Subsequently, during 1981, under his able editorial guidance a series of articles were published by different researchers in Social Science Information Studies, of which, Brenner was one of the contributors of qualitative research in Library and Information Science and discussed some of the problems, which the information scientists face when having to select a particular social science research strategy (Brenner, 1981). Brenner disfavoured the established measurement approach, as it is incompatible with the actual social and psychological conditions under which data are collected. These initial impetuses to the methodological practices in users’ studies paved the way for qualitative research. The realization developed that the use of melodramatic quantitative methods to understand real-life situation has produced the inconclusive researches and imbalanced use of those methods have either perplexed or oversimplified the results of users studies from the very inception of the
idea of determining the needs of the users. The researchers recognized that the urgent need of the time is to excavate in the unexplored universe of qualitative methodologies, assimilate them in Library and Information Science, corroborate them with essential theoretical framework and utilize them to understand the need of the users, instead of depending on feeble survey methods.

The following survey of literature reveals that the serious endeavours have started within the discipline of Library and Information Science to recognize the utility of qualitative research, only recently. The following few paragraphs shall also highlight the philosophical conflicts of qualitative research methods (abbreviated as QUALs) and quantitative research methods (abbreviated as QUANs), their methods of discovering the social reality and the ramification of such discords on Library and Information Science (LIS) research methods.

2.1 REVIEW OF LITERATURE

A thorough recent search on LISA PLUS™ winter 2001 issue and other bibliographic tools resulted about hundred articles and books references, similarly internet search with the help of search engines like Yahoo, Google, Lycos, Rediff and meta-search engine like c4.com retrieved another thirty articles and sites which have, by some means, implemented or discussed or repudiated the qualitative research methods in Library and
Information Science. Some have also compared them with quantitative methods. These articles can be broadly divided into following three categories:

2.1.1 The Theoretical Discourses
These treatises can be considered as serious contributions towards the development of the philosophical grounds of QUALs in Library and Information Science and understanding the core issues of the conflict between QUALs and QUANs. This category, again, can be subcategorised on the following five areas:

- The Philosophical and Methodological Issues
- The Critical Appraisals of QUALs
- The Critical Evaluation of QUANs
- The Triangulation theorists
- The General Aspects and Techniques of QUALs

2.1.1.0 The early phase: By early 1970s the QUALs appeared in Library and Information Science literature. A couple of papers were presented by librarians at a Conference (Stevens, 1971) on historical and bibliographic methods in library research. Glossop (1978) discusses phenomenological methods in relation to librarianship, and concludes that a qualitative approach to research which acknowledges the importance of subjective knowledge will enable librarians to adopt a research and development stance to their work and develop a researcher's role which supports such a
stance. Busha and Harter (1980) in their general text on research in library science included discussions of the historical method, case study method, comparative librarianship research and content analysis.

Wilson's work on the INISS Project (Information needs in local authority social services departments) (Wilson & Streatfield, 1977; Wilson, et al., 1979; Streatfield & Wilson, 1982) employed observation and semi-structured questionnaires and the investigation phase were followed by the evaluated implementation of a number of innovations in social services departments. Wilson's experience of information seeking in this very practical context led him to develop a model of information seeking behaviour that is prompted by the individual's physiological, cognitive and effective needs (Wilson, 1981b). The philosophical and methodological perspectives of QUALs started gaining momentum, however slow but steadily, with the support of these above mentioned research works.

2.1.1.1 The Philosophical and Methodological Issues: Few authors have emphasized on the philosophical and methodological intricacies of QUALs and QUANs. Fidel (1993) in a review of literature showed that the number of research projects in information retrieval which employ qualitative methods is on the rise and described qualitative research as non-controlling, holistic and case oriented, open and flexible, diverse in methods, humanistic, inductive and scientific. Sutton (1993) surveyed
some of the theoretical underpinning of various qualitative research methods and discussed methodological issues, like conceptualisation, understanding, pluralism and ambiguity and expression or the writing up of qualitative research. Park (1994) discussed the concept of ‘relevance’, which has played a major role in the evaluation of information retrieval. The author is of the opinion that the study of ‘relevance’ suffers from lack of discussions and emphasized the need to develop the concept of ‘user based relevance’ for the benefit of users and for the meaningful development of future research in information retrieval. Proposal has been made to use of a qualitative research approach as an alternative methodology for studying ‘user based relevance’ and discussed the essential characteristics and the core philosophical assumptions underlying the inquiry paradigm. Behrens (1996) explored and explained the theoretical sensitivity in qualitative research and defined the grounded theory and investigated the areas where theoretical sensitivity manifests in the grounded theory project. Elucidated how such sensitivity came into play during the initial identification of the problem to be investigated, for the selection of the sample for interview purposes, in the preparation of the interview guide, during the interviews themselves, and during the data analysis.
2.1.1.2 The Critical Appraisals of QUALs: Not to forget that few have abandoned the significance of qualitative methods and applauded the quantitative methods. Olson (1995), through a deconstructive reading of texts on qualitative method and its contrast with quantitative method and through information needs studies, concluded that the focus on method should not drive research and emphasized that the ontological and epistemological stands of researchers are more important for library and information science research.

2.1.1.3 The Critical Evaluation of QUANs: Vis-à-vis, several contributors have discarded the quantitative paradigm and appreciated the qualitative methods and also described the salient features of qualitative researches. Hammersley (1981) has highlighted some of the theoretical and applicability aspects, Oldman (1981) argued that the term 'qualitative' is applied to different aspects of research, which are sufficiently independent of each other. Attempt has been made to expose the underlying interests of the critics of qualitative research and suggested that criticisms of qualitative research are 'ideological in the sense that they give support to existing institutions wherein some classes or groups [research sponsors] try to exert control over others'.

A conceptual framework was offered by Grover and Glazier (1985) for library and information science research, and analysed QUALs. Rationale
for use of QUALs in theory building and the use of structured observation for data gathering of information users' behaviour and information needs, were discussed and comparison between QUALs and QUANs, were made. Michael (1986) stressed for abandoning the positivist approach to library and information science research. Bradley (1993) considered some of the methodological issues arising from empirical enquiries conducted within the framework of qualitative assumptions of the nature of reality. Issues raised include the researcher as interpreter, the emergent nature of qualitative research and trustworthiness in qualitative research. Yeh (1996) are of the view that most of the researches into library and information science over past decades has employed quantitative methods, which however, are not without flaws. The characteristics and limitations of both the quantitative and qualitative methods and the different approaches of the two research paradigms were discussed and expressed the view that the qualitative method should be utilized to a greater extent in order to enrich library and information science research.

2.1.1.4 The Triangulation theorists: Few have hold up the 'between methods', which try to extract the positive features of both the methods. While discussing about the course contents of library and information science Master's program, Liebscher (1998) proposed that the integration of both quantitative and qualitative methods through 'between methods'
triangulation, allows to explore research problems from multiple perspectives and stressed on the needs for such an integrated approach. Considering the value of qualitative research, which derives primarily from its emphasis on words rather than numbers, Riggs (1998) asserted that qualitative research has been regarded too negatively for too long, definitions have tended to carry a tone of apology and concluded that both qualitative research and quantitative research should be evaluated on the same basis. Elaborating with the help of examples of qualitative elaborations of statistical analyses or quantitative data analyses of interview protocols, Suedfeld and Soriano (1998) recommended that instead of debating the appropriateness of qualitative versus quantitative research, investigators should benefit from the strengths of both.

2.1.1.5 The General Aspects and Techniques of QUALs: Quite a few articles have discussed the techniques and other general aspects of qualitative research methods. Chatman (1984), based on personal fieldwork experiences described the field research related issues, like researcher’s role, empathy, reciprocity, etc. Payne (1988) reported a lecture delivered by Margaret Slate on QUALs, which comprise a range of most commonly used techniques like depth interviews and group discussions and also of the view that qualitative research methods are concerned with developing insights, facilitating understanding, looking for solutions to problems and
building theory. Slater’s (1990) treatise on research methods offered a useful but brief overview on quantitative-qualitative conflict, different data-gathering techniques, non-verbal behaviour, reporting, etc. Westbrook (1994) investigated the canons of qualitative or naturalistic research methods in terms of their original grounding in the basic social sciences and their value to library and information science research. The literature review examined five salient components of qualitative research: the research problem, data gathering, content analysis, theory development, and validity techniques. Hannabuss (1995) in a generalized discussion about library and information science researches, along with other aspects highlighted the distinction between quantitative and qualitative research.

2.1.2 Discourses about Particular QUALs

A few literatures came into the notice at the time of searching different databases, which have discussed about the theoretical and philosophical intricacy of various qualitative research methods.

Hill (1987) has exclusively dealt with 'Methods of analysis of information needs'. In her dissertation, the author identified nine types of useful methods, namely, "ought-to-need" statements, potential need statements; demand studies, goal-oriented analyses, demographic studies, user studies, life style investigations, required output studies, and effectiveness studies.
Gratification theory was applied by Chatman (1991) with the intention that whether it sheds light on the phenomenon of the information seeking behaviour of lower class working population and found that gratification theory provides a means for information researchers to explore questions such as what defines a problematic situation for the poor and what factors influence their choice of information seeking strategies.

Ellis (1993) focused on the employment of the grounded theory approach to derive models of the information seeking patterns of academic researchers and reviewed results obtained in 4 research studies, employing the grounded theory approach and conducted at Sheffield University, UK, into the information seeking patterns of users in the fields of social sciences, sciences and the humanities.

Kerslake and Goulding (1996) considered the role of focus groups in light of their application as the research method to investigate the training of information workers and discussed the role of focus groups as a method of gathering qualitative data and information for use in LIS research. While discussing on the same technique Glitz (1997) highlighted that the information gathered with the help of focus group technique can provide important clues to human attitudes and values and such information can be extremely useful to libraries that are trying to gain a better
understanding of their users' needs and thus make better management
decisions to help satisfy those needs.

2.1.3 Implementation of QUAL Methodologies
With the development of theoretical background for QUALs in LIS
implementation of the same in different research projects have become
evident. Though QUALs have been put into practice in different types and
areas of LIS the following review have concentrated only the researches
related with 'users' studies', 'information seeking behaviour', 'search
behaviour', etc.

In the early stage of implementing QUALs, Tedd, Cook, Guy and Keen
(1977) made qualitative assessment of the various methods of teaching
on-line bibliographic searching to undergraduate and postgraduate
students

Gary (1980) used qualitative methods to study the patterns of information
requests, types of questions asked, time of day, time to complete requests
and to collect demographic and other information about library users and
users making requests.

Tefko, Mokros and Su (1990) conducted observations and experiments
under real-life conditions on the nature, effects and patterns in the
discourse between users and intermediary searchers and in the related
computer commands in the context of on-line searching and responses.
The study involved videotaping interactions between users and
intermediaries. Data are analysed both quantitatively, using standard and innovative statistical techniques, and qualitatively, through a grounded theory approach using micro-analytic and observational methods.

Dotz, Bishop and McClure (1990) studied the use of electronic networks by scientists and engineers to make policy recommendations for the proposed National Research and Education Network. The authors argued that qualitative techniques, such as semi-structured interviews and focus groups, provide data important to the development of user-based policies and that social and behavioural issues must be given more attention by network policy makers.

Reneker (1993) used tape recorder, which was supplemented by interviews to examine the information seeking activities of the Stanford University academic community. Qualitative and quantitative analysis was used to examine the information needs in relation to perceived environment, source use, personal characteristics, and satisfaction with the result of information seeking. Results revealed information seeking to be embedded in day-to-day tasks and relationships and triggered both by articulation of need and availability of information.

The behaviour and motivations of university students were investigated by Jacobs (1996) and delineated an account of the qualitative research methodology employed to look beyond the survey results, which involved
semi-structured interviews with students and tutors. This methodology was found to be a valuable addition to the information gathering strategies of library management, revealing patterns of user attitudes that are difficult if not impossible to access using traditional survey techniques alone.

A team of theoretical physicists was studied by Barry (1997) for over 2 years using a qualitative, context situation, user centred methodology to examine the effects of information technology, the electronic library and the Internet on the information seeking behaviour and research behaviour of academics in higher education and found that electronic resources, primarily electronic bulletin boards and electronic mail, were used to access information in 80 per cent cases.

2.2 REVIEW OF LITERATURE ON VERBAL PROTOCOL

One of the mainstays of this research, the Verbal Protocol technique (alternatively known as 'think aloud', or 'concurrent verbalization' technique), a lately popular qualitative research method, has been be used to collect the data about library users. Verbal protocol method is frequently used in Communications, Psychology and education. Ransdell (1995) pointed out that protocol analysis "is one of the few methods available in cognitive psychology that gathers data with sufficient temporal density to test models of online, second-by-second behaviour".
Ericsson and Simon (1984, 1992) discussed the history of verbal reports and suggested that the method is a very old one. Philosophers such as Aristotle and Plato used introspection to inquire about the nature of man by examining their own cognitive processes. van Someren, Barnard & Sandberg (1994) explained that the main advancement with the method over the years was that verbal reports began to be treated as data instead of conscious processes. It was near the end of the 1960s that the method was revived again. As interest in cognitive processes grew, the interest in methods that could provide information about these processes grew as well. Newell and Simon (1972) used this methodology to build very detailed models of problem-solving processes. The method continued to be accepted, as designing of expert computer systems began to grow. The need to find out about a human expert’s knowledge to create these computer systems made the method more popular.

The Think Aloud method is now accepted by a large part of the scientific community and is being used in a variety of different research areas. Whitney and Budd (1996) used the method to study text comprehension and other researchers have used the method to study reading comprehension strategies (Davey, 1983; Garner, 1982; Kavale & Schreiner, 1979). Cacioppo, von Hippel and Ernst (1997) cite the many uses of verbal protocol research in clinical and counselling psychology.
Hughes, Packard and Pearson (1997) also used the Think Aloud method in a hypertext environment. They introduced the method to the participants using a video of other computer tasks so that the method was demonstrated without "suggesting strategies for using the intended target of research".

According to Cacioppo, von Hippel, & Ernst (1997), the method is "particularly useful when one either has no predetermined ideas about the cognitive dimensions that are relevant or has only a few untested hunches". Pressley and Afflerbach (1995) note that verbal protocol analysis provides a way of gathering data on cognitive processes that, otherwise, could only be studied second hand. The method also allows an insight into affective processes as well as cognitive processes. Wilson (1994) made a point of mentioning the method’s versatility and this can be seen in the variety of research areas in which the method has been used. The method can be used successfully with naïve users as well as experts.

For qualitative researchers interested in getting a rich source of data, the verbal protocol methodology is a wonderful choice. Wilson (1994) emphasized that “people’s conscious thoughts can be an excellent source of inspirations”. Pressley and Afflerbach (1995) expanded the idea by noting that "spoken language is the data used in protocol analysis and the
However, this method has a long history and has experienced much criticism. The first and most often cited criticism states that verbal data is incomplete and that behavioural and performance changes cannot be gathered by the method. For Hayes and Flower (1983), because the method is so idiosyncratic, a participant "may fail to verbalize a considerable part of the information that passes through the short term memory". The researchers added that this type of reporting would cause the distortion of cognitive processes even if a person were to be aware of the processes. Ericsson and Simon (1984) suggested another criticism that they call the epiphenomenality or irrelevance argument. This argument "is that the verbalizations may report an activity that occurs in parallel with, but independent of, the actual thought process, hence provides no reliable information about the latter".

Researchers have suggested that the production of verbal reports may change the cognitive processes being studied. Fawcett (1993) felt that in certain situations the participants will be so focused on the task that they will be either unable to think aloud or the thinking aloud will interfere with the process. Verbal reports have also been criticized as not being generalizable because they are so idiosyncratic. Hayes and Flower
(1983) suggested that verbal reports are not objective and are not scientific. Steinberg (1986) also suggested, that "the presence of the person arranging for the protocol and of the tape recorder and the very nature of the protocol session distort the cognitive processes of the [subject] giving the protocol". These criticisms have been levelled at almost all research involving fieldwork such as observation and interviews. The Think Aloud method has been better received than the 'Think After' method. Many of the concerns about retrospective protocols focus around the problem of forgetting and fabrication. Retrospective protocols may be influenced by a "motivational shift [that] can occur whenever subjects are informed that they will have to generate a subsequent verbal report" (Russo, Johnson, & Stephens, 1989).

Ericsson and Simon (1984) based their work on the constructs of short-term and long-term memory from information processing theory. They require the reader and researcher to accept their hypothesis that all human cognition is information processing. Further, Ericsson and Simon noted "that a cognitive process can be seen as a sequence of internal states successively transformed by a series of information processes". Long-term memory contains a vast amount of knowledge, both procedural and factual, that can be accessed. The way this information is organized is highly individual. Short-term memory, on the other hand, is extremely
limited if the information is not acted upon. External stimulation and associations from long-term memory are the basis of short-term memory. According to Pressley and Afflerbach (1995), “an important property of short-term memory is that people can quickly access the contents of short-term memory and report them”. So it is this short-term memory that verbal reports tap.

2.2.1 Review of Literature on Verbal Protocol in LIS

The use of this method in library and information studies, however, is still very limited. But qualitative researchers interested in getting a rich source of data, the verbal protocol analysis method is an excellent choice.

Few researchers, interested in information-seeking behaviour, have used verbal protocol analysis. Shaw (1995) used Think Aloud method, while conducting a study on search strategies, system interfaces and relevance judgements of CD-ROM based databases searches by 10 graduate students in language and literature. Sullivan and Seiden (1995) assessed the online catalogue user education needs using the method. Nahl and Tenopir (1996) used the Think Aloud method as faculty and graduate students searched a full-text online database of magazines. The researchers were interested in the search strategies and the affective, cognitive and sensori-motor behaviours of the participants. Yang (1997) used verbal protocol analysis and observation to study six cases of
information-seeking behaviour in university students as they accessed information in the Hypertext System. Xie and Cool (1998) used think aloud to study end-user online searching. They found, through the use of this method, "much insight is gained into the problems encountered by searchers and the adaptive strategies they employ in such situations". Hirsh (1999) used the think aloud method to study elementary students' relevance criteria and search strategies during a school project. Her results have implications for how we teach students about information literacy and for the design of systems.

With the aim to create a database of information on the actual behaviours that are involved in using the library, Nahl and James(c 1999), used the technique for the collection of data by self-witnessing report, which consists of micro-descriptions of one's own feelings, thoughts, and actions. This involves tape-recording one's own thinking-aloud protocols while using the library. Tapes were transcribed, annotated, coded and entered into an automated database suitable for testing out hypotheses about the nature of search behaviour. Authors are of the opinion that this study can help psychologists, librarians, and information specialists to better understand the thoughts, feelings, and actions that go along with using a library or database.
Branch (2000) compared and contrasted the analysis of 130 concurrent verbal protocols (Think Alouds) gathered from twelve junior high school students from Inuvik, Canada. These Think Alouds are from a case study of the information-seeking processes of junior high students when accessing information from CD-ROM encyclopaedias.

It may be observed that the verbal protocol method is gaining popularity in LIS research as well, as its inherent nature helps to get rich data about the users' behaviour.

2.3 REVIEW OF LITERATURE ON OPAC STUDIES

Automated Catalogues, in its very rudimentary form, first started to appear in mid-1960s and early 1970s, when few libraries were using computers to produce printed catalogues with the help of 80-column punched cards. This kind of automated catalogues were, however in no way could be searched online, as those day computer systems were running in batch mode. Catalogue output on microforms, like, on microfiche, microfilm, became popular in mid-1970s.

The first-generation of Online Catalogue appeared in the late-1970s and early-1980s. These first generation Online Public Access Catalogues (OPACs) were phrase-indexed or pre-co-ordinate OPACs with access points similar to those of a traditional card, i.e. author, title (as a phrase), class mark or call number (as a phrase) or subject headings (as a phrase).
This generation OPACs were developed to find book holdings of a particular library. Hildreth (1982) has described, in details, about the catalogue designs of early-1980.

OPACs became very popular during 1980s and as a result, by mid and late-1980s, many new integrated library management software with the modules of acquisitions, cataloguing, circulation, serials control, interlibrary lending and OPAC, came into the market. Many of these new software provided the keyword or post-co-ordinate OPACs, or second-generation OPACs, the with the facilities to retrieve and access records with the help of words in titles, in subject headings, in author or other names as well as by search statements using Boolean Operators.

The third-generation OPAC appeared in the 1990s with the features, like, best-match technique or non-Boolean retrieval technique, ordinary language search expressions, displaying the most relevant records first, etc. This generation software provided the architecture of “server-client” model, in which the database are managed in a remotely located server and “client” software, normally loaded on a network-connected computer or workstation, provide the interface to the users to access and search the database.

Today, the library resources are accessible remotely through web-OPAC via graphical browser such as Microsoft Internet Explorer or Netscape
Navigator. This new and fourth-generation OPACs emerged during the late 1990s and is the state-of-the-art, till date. These interactive GUI (Graphical User Interface) based web-OPACs allows the users to access various resources of other libraries connected to Internet. It presents the library catalogues in a hypertext format, which can be linked to the full-text electronic resources.

The advent of the online catalogue provided the opportunity to interact with the users in finding the required item or items. As the number of users grows so do the automation needs of the libraries and their services. With the increase of availability of Library Software and OPAC systems in the market, the libraries introduced the same with the assumption that user usually comes to the OPAC with a particular need for information. However, evaluating the performances of the automated systems, 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. Two major approaches were identified by Lancaster & Sandore (1997), by which evaluation of automated system can be categorised, these are:

1. **User-Free Evaluation**: Though this type of evaluations involved the users inputs, these are concerned with the systems those are yet to be fully operational.
II. User-Involved Evaluation: This type of evaluation involves the fully operating systems by assessing the systems characteristics, how the users communities make use of the systems and with what degree of success. However, as the first category of evaluation focuses on system features rather than on how these are used by the library users, and used for decision-making in software selection, acceptance, etc., therefore, this category of OPAC studies are beyond the purview of this research.

In the second category of OPAC studies, that is, User-Involved Evaluation, users were involved to gain a better understanding of how users interact with systems and the results of those interactions. The goal is to collect and analyse information about how the systems are used and to improve its performance. Manifold (2000) has observed that OPAC users are more and more becoming partners in the use of systems; their involvement is thus increasingly critical to the success of a system implementation. Therefore, emphasis has been given in following section on this category of OPAC studies.

A number of studies have been undertaken over the last couple of decade on users' reactions to OPAC. One of the first major study was by Matthews et al.(1983) of some 8,000 users and 4,000 non-users of OPAC in 31 libraries in the USA. The general results showed that “over 90 per cent of users liked the OPAC” and that 80 per cent were satisfied with the
results of their search. However, it was also found that most users were searching by topic or subject (and not for known items) and that subject searching was difficult. Crawford (1987) provided much practical guidance, with many examples of OPAC screens and suggestions for good OPAC design. The use and effectiveness of online help facilities for subject searching was investigated by Slack (1991). Dyer (1990) outlined the problems that can be caused by poor workstation design and suggests various solutions. The survey by Crawford et al. (1993) revealed a wide variety of access points, namely, author, keyword, corporate name, class number, title, series file, author/title acronym, subject heading, etc. It was revealed by that, “most OPACs were not found to be particularly easy to use and consequently are still dependent on users’ expertise for reasonably successful operation”.

Hancock-Beaulieu and Hancock-Beaulieu (1990) discussed evaluation and methods of evaluation of OPACs in the context of user orientated qualitative research. They suggested the development of more effective diagnostic, monitoring and prototyping tools.

2.4 CONCLUSION

This chapter reviewed the literature on methodological aspects of the Library and Information Science, its development through different phases, the theoretical and implementation aspects and uses in different
perspectives. The above discussion has also included the reviews on literature of Verbal Protocol method and its uses in Library and Information Science. The OPAC studies have also been reviewed. However, it was found the use of Verbal Protocol method in Library and Information Science is rare and till date no study has been conducted to the compare the same with any of the existing quantitative methods.