2.1 INTRODUCTION

The investigator for the current research has conducted a thorough literature review, critically analyzing a large number of investigations directly or indirectly related to the area of information seeking behaviour published in research journals of both national and international repute. Various aspects of information seeking in different contexts have been reviewed and presented under different sub areas. Various aspects included in the review are:

- Information seeking behaviour-Conceptual background
- Information needs and demands of users
- Information seeking and gathering patterns
- Factors affecting information seeking patterns
- Role of libraries in information seeking
- Sources and channels used for gathering information
- Digital information seeking pattern
- Information searching patterns and strategies
- Factors influencing information access and use
- Barriers to information access
2.2 INFORMATION SEEKING BEHAVIOUR - CONCEPTUAL BACKGROUND

Information seeking is a human process that requires adaptive and reflective control over the afferent and efferent actions of the information seeker. The information seeking behaviour essentially refers to locate discrete knowledge elements. It is concerned with the interactive utilization of the three basic resources namely, people, information and information system (Singh & Satija, 2006). It is often understood to embrace three principal components – the recognition of an information need, information-seeking action taken in response and information use, in which material that has been retrieved or otherwise acquired and identified as helpful is applied in such a way as to address the situation demanding the person’s attention. Various other processes such as information exchange, information transfer, information processing, information-sharing, information capture, etc. have also been discussed as additional elements within the phenomenon of information seeking behaviour (Shenton, 2010).

Information seeking has been conceptualized in terms of all the ways in which information comes to people, including much that is absorbed passively. For most people, most of the time, information-related behaviour consists of absorbing and using the learning and information that comes our way during the course of our daily lives. An enormous part of all we know and learn surely comes to us through passive undirected behaviour, or simply being aware (Bates, 2002). The important aspect of information seeking behaviours is that they occur over time. An episode of information seeking may last just a few seconds. However, a complete sequence of information seeking and use may span months or even years (Wildemuth & Case, 2010).

It is also a multidimensional construct and it relates to activities, which can be applied in any context, whether seeking information to solve economic, health or technical problems (Timmers & Glas, 2010). The study of information seeking will never be complete until we integrate the social levels in our study with the underlying biological and anthropological levels. To focus only on the social and humanistic is
simply to be reductionist in the other direction (Bates, 2002). Information searching behaviour is seen as a sub-set of information-seeking behaviour. It focuses on the interactions between information user and computer-based information systems and thereby corresponds to the previously mentioned ICT concept of information skills and operational and formal skills (Timmers & Glas, 2010).

Information seeking behaviour research is an area of active interest among librarians and information scientists. Investigations of those who seek and use information have been an important aspect of information science since its beginnings. It is clear that the explosion of scientific and technical literature during and immediately after World War II created a situation in which attention to information seeking was inevitable. Even the rapid development of computing devices (starting in 1939) and their subsequent application to the storage and manipulation of text were not enough to fully solve the problems of dissemination in the area of scientific and technical information. Hence it was that the first blossoming of information seeking and use studies tended to focus on the behaviours of scientists and engineers (Wildemuth & Case, 2010).

Wilson (2000) reported that the study of human information behaviour is now a well-defined area of research within information science, and research is beginning to show the benefits of accumulated knowledge. The Royal Society Conference was the real beginning of a concern with understanding how people used information in relation to their work and, particularly, how they used it in science and technology. According to Singh & Satija (2006) since 1940 a large number of studies have been carried out particularly in the developed countries on the various aspects of information seeking behaviour, in the field of social sciences, humanities and science and technology.

While the early use studies focused on a particular system or service and its users, the new generation of studies placed the information seeker/user in the center and did not presume the use of a particular resource or set of resources. Early use studies typically used survey methods, interviews or one-time observations of a particular information
behaviour such as entering the library or searching a particular database. They typically focused on variables that provided an overview of people’s information interactions with a particular service or system. During the early 1990s, a number of researchers particularly focused on the concept of relevance and the criteria people use when making relevance judgments. While many studies continue to examine information behaviours in academic settings, incorporating students or faculty as study participants, research on information behaviours within the context of everyday life activities began to gain momentum in the mid-1990s (Wildemuth & Case, 2010).

The concept of information seeking behaviour emerged as a key concept in the last several decades. However, as developments in information and communication technologies make the information tools we use more portable, mobile and accessible at any time, the notion of context is beginning to change. Context is becoming an integrated multiple, rather than a singular and as singular contexts crumble, information behaviour emerges as a visible link that users cling to as they navigate through the landscape of new information worlds with overlapping and constantly intersecting contexts. One possible implication of this trend could be that users may become more aware of the processes they rely on when using information tools across blending contexts (Burnett & Erdelez, 2010).

The extensive research, over the years, in the field of information behaviour of a variety of users in different contexts, has resulted in the evolution of several models for information seeking and searching behaviour. The information-seeking models vary in their emphasis on physiological, cognitive and affective aspects of information-seeking behaviour. The models in the general field of information behaviour are seen as frameworks for thinking about the problem and they usually expressed as statements, often in the form of diagrams, trying to portray an information-seeking activity, its grounds and consequences or the relationships among stages in information-seeking behaviour. Wilson's general information behaviour model of 1981 is considered as a macro-model that led the way for many models (Wilson, 1999).
Based on the general model of information-seeking behaviour and analyzing the extensive literature in the field, Wilson (1997) proposed a revised model of information behaviour to provide a more effective framework for the contemplation of information behaviour in general. The model includes a stage between the person-in-context and the decision to seek information and further expands the concept of intervening variables. Dervin’s (1983) sense-making model explains the information behaviour as cognitive and procedural behaviour reactive to and mandated by situational conditions of an individual in constructing and designing his/her movement through time space.

Ellis’s (1987) behavioural model proposed an approach that the complex prototype of information seeking behaviour consists of a small number of different characteristics that interact in various ways in different information seeking patterns. The Information Search Process Model of Kuhlthau (1991) presents seeking information as a way to realize a goal and presents that there are six stages in the process of information seeking. Leckie et. al’s (1996) model the information seeking behaviour of professionals presented six components of information-seeking process, which can occur simultaneously, thus representing the true complexity of a professional's work life.

Bates (2002) developed an integrated model of information seeking and searching, a four-part model of awareness, monitoring, browsing, and searching. In terms of information seeking as behaviour, people operate in two general modes; active or passive absorption. The issues of network competence in seeking information from the Internet were put in an operational context by developing a social cognitive model by Savolainen (2002). This model also makes it easier to understand the complex settings of interactive factors conditioning information seeking from the internet. Foster’s (2004) Nonlinear Model of Interdisciplinary Information-Seeking Behaviour presents the emergent concepts of interdisciplinary information-seeking and their relationship to each other in clusters of behaviours, intervening factors, and contexts.
From the studies discussed above, it is understood that all the humans seek information; actively or passively, in their daily life. Some of the information seeking episodes occur just for few seconds, while some others may take several months or even years, in some cases. The various ways by which people seek and gather information for various purposes have got the attention of LIS researchers and have advanced as area of active interest in the library and information science field and is termed as the information seeking behavior research. The extensive research in the field of information bahaviour of a variety of users in different contexts has resulted in the evolution of several models and theories of information seeking and searching bahaviour. Consequently, this particular area of research has brought about revolutionary improvements in the realms of information access and retrieval.

2.3 INFORMATION NEEDS AND DEMANDS OF USERS

It is the user needs that motivate the individual to engage in information-related activities and thus are the essential factor in information seeking. There are several levels of user goals ranging from long-term goals (a personal goal over a long time) and leading search goals (a current information task–related goal), to current search goals (specific search results sought), and interactive intentions (sub-goals to be achieved during the seeking process) (Rieh & Hilligoss, 2008). Nycyk (2010) opines that information seeking involves interactions with often complex systems such as library catalogues which hold much information and different ways to obtain it. The ideal goal of a user centered information system is the importance of having an effective understanding of the user’s motives and cognitive abilities when seeking information. Researchers supported such assertions that not only was the user not the centre of many systems being developed, which needed redressing, but that finding out user needs involved more complex research methods to understand user information seeking motives and behaviours.

Bates (2002) argues that intentionally or unintentionally, information seekers often arrange their physical and social environment so as to provide the information they
need when they need it. A person is likely to come across a great deal of useful information just in the process of interacting socially and physically within the relevant milieu. In academic departments, scientific laboratories, as well as at conferences and over listservs, the typical participant in a discipline or work group continually runs into people who have a lot of common areas of knowledge, people who can suggest information or resources of use to the participant.

The differences in needs and demands for information are related to various factors like the kind of employment, work roles and work tasks, type of organization, the discipline, etc. Citizenship information is of value to the citizen either as part of everyday life or in the participation by the citizen in government and policy formulation. With regard to the citizenship information, public need on current affairs such as health issues, state of the education system, state of the economy, unemployment, law and order issues, environmental issues, sports, etc and on survival information including welfare benefits, education, employment, financial matters, housing, health, local planning, traffic problems, legal issues, consumer issues and relationship problems (Marcella & Baxter, 2000).

Investigating the information needs of the academic researchers, Herman (2001) opines that the discipline-rooted differences in research patterns entail corresponding idiosyncrasies in information needs of the researchers. Science and humanities are distinct fields of research and they need different types of information. Since different kinds of mental processing are going on at different stages of scientific research, different kinds of information are required at different stages. During the early stages, researchers need information as an aid in the perception of the research problem in the hand and in the formulation of procedures. In the intermediary stages, they need more specific information and at the final stages their information needs shift to the general body of scientific knowledge. At the other side, humanists are mainly dependent either on fairly well-established data or text or on original thought and interpretation and they need first and foremost the primary sources of information.
Wu, He & Luo (2012) find that academic users are found to be in need of multilingual information for their academic activities. Important multilingual needs of academic users are for writing a review paper, for the literature follow-up for a specific domain, for the literature review for a grant application and for class preparation for teaching. Prabha et al. (2007) reported that faculty members in universities and colleges have both teaching and scholarly or research needs prompting them to seek information and perform thorough searches. Their information needs are associated more with the teaching activities followed by research activities. There are a variety of reasons and situations creating the need to look for information by them. Their study is in line with the studies of Patitungkho & Deshpande (2005), Tahir, Mahmood & Shafique (2008), Tahira & Ameen (2009), Kadli & Kumbar, (2011), Khan & Shafique (2011) and Baby & Kumaravel (2011). These studies also confirm that the important information needs of faculty members include preparing lectures to deliver to students, preparing and delivering presentations for classes, guiding researchers, meeting scholarly and research needs, designing and conducting workshops, writing research papers and articles, books and grant proposals, updating subject as well as general knowledge, participating and presenting papers in seminars/conference, etc. and developing competence keeping up with current developments.

Students’ information needs are different from that of other academic users like teachers and faculty members and they mainly have information needs that relate to their studies. The main information demands that led undergraduate students into seeking for information include course works and assignments, preparation for examinations, tests and class–group discussions, general reading to enhance knowledge, etc. (Kakai, Ikoja–Odongo & Kigongo–Bukenya, 2004). Prabha et al.’s (2007) study on undergraduate and graduate students also draws conclusions consistent with them as they found that situations creating the need to look for information by students are academic tasks like writing research reports or preparing presentations. Another important finding is that
when they find the required number of sources for an assignment, students generally tend to stop looking for information.

Rieh & Hilligoss (2008) categorize the information needs of a typical information-seeking college student into four namely, ‘long-term needs’ related to academic achievement, entertainment, etc., ‘leading needs’ related to preparing for an exam, keeping up with movies, etc., ‘current needs’ concerned with looking for papers, looking for latest releases, etc., and ‘intention needs’ related with activities like reading and evaluating papers, comparing movie reviews, etc. Similar to this, Nwagwu (2012) studying different types task the students perform at postgraduate level reports that students have basically three types of information needs namely scholarly needs, related to learning, knowing, reading, writing etc.; occupational needs, related to employment, working, income business, etc. and popular needs, related to entertainment, travel, shopping, etc. the study also revealed that among students of different disciplines there is no significant difference in respect of occupational needs of students but there exists a significant difference among the students regarding their popular and scholarly needs.

The information needs of professionals like scientists and technologists depend on the many factors. For example, the duties and responsibilities of scientists and technologists in an organization vary in accordance with the organizational needs across the entire gamut and hence their information need as well vary. Scientists and technologists working at the lower and upper level are found to be quite irregular compared to the middle level. The executives working in the middle level cadre need information frequently (Mahapatra, 2006). Kumar, Gautam & Vijayaraghavan (2011) explore three types of information needs of scientists. The first of these needs is to know what other scientists have already done or are doing. This need to keep up-to-date with current progress is known as current needs. The second need arises during the course of work; a need of some specific piece of information. It is directly related with the research work or problem at hand and is called everyday needs. The third need is to find and check through the relevant information system on a given subject for background information
when the scientists start working on their scientific problem and is known as exhaustive needs.

Kumar (2010) investigating Indian agricultural scientists states that scientists are really people who shoulder the responsibility of nation building by exercising their efforts in creating new information and they need information for different purposes like general awareness of new knowledge, professional interest, research work, to meet the need of promotional opportunities, publishing book/article, etc. Most of the scientists need current information, R & D (research and development) information, factual information, statistical information and conceptual information. Murphy (2003) infers that the research needs of the interdisciplinary scientist differ from that of other scientists. The reason is that they have to have an extensive knowledge of at least two subject areas and have to maintain a certain level of knowledge across disciplinary boundaries. Researchers must master a tremendous amount of resources to conduct their research successfully and be familiar with several subject areas as well as possess a sizable vocabulary in several areas just to be able to understand the literature.

It can be brought to a close that information seeking is intrinsic in every human beings and an individual always seek for information from the recognition of some needs. It is information need that actually motivates an individual to hold on with information seeking, gathering and use behaviours. The need of information may be long-term or short term. The needs and wants of information may be different among various types of users depending on a number of factors. like the kind of employment, work roles and work tasks, type of organization, the discipline, etc. For example, the information need of students may be different from that of the researchers and the needs of researchers may be different from teachers even though they are of the same areas of studies.

2.4 INFORMATION SEEKING PATTERNS

Information-seeking processes are always resulted by some need recognized by the user and the methods and patterns vary from user to user and the process may take
quite a few forms such as seeking help of formal information systems like libraries, information centers, on-line services, etc., using systems performing information functions in addition to a primary non-information function, seeking information from other people, rather than from systems, etc. (Wilson, 2006). But it is found that most people invest as absolutely little effort into information seeking as they possibly can. It is only in moments of great urgency or great interest that they spontaneously begin investing seriously in acquiring the information skills needed to satisfy their needs (Bates, 2002).

Shenton (2010) argues that information capture is one stage within a set of processes of information behaviour and it involves the representation of material such as facts, opinions and interpretations in a form that renders them useful for some later activity. In each case, the captured material is either used subsequently by the same individual within the next “information process” or made available to another party to meet their purposes. According to Prekop (2002) many different models of information seeking process have been proposed and in most of them the assumption is that the information seeker is an individual. This has been challenged by some researchers and explored collaborative dimensions of information seeking. In a collaborative information seeking process, three components are important and they are information seeking roles, information seeking patterns and the contexts in which the roles and patterns are performed.

Studying the task-based collaborative information-seeking process in a learning setting, Foster (2009) reports that participants collectively review, interpret, and organize information sought and retrieved as part of a learning activity. The study found that key to effective collaboration on the task was the establishment of a collective focus, and the use in varying degrees of four main discourse functions and four types of collaborative talk: structuring, eliciting, informing, and summarizing functions; and exploratory, coordinating, disputational and cumulative forms of talk. Inferential information seeking method is a concept introduced by Shenton (2009a). According to him, individuals seek
information with a clear and well established information need in the mind but, sometimes, some barrier either deters the person from exploiting what may seem the obvious information sources in accordance with conventional approaches or limits their effective use to such an extent that the end result is unsatisfactory. Consequently, a less direct, inferential information seeking approach is taken by the person.

Another concept in the information seeking process introduced by Shenton (2009b) is the search image concept which is most appropriate to situations where an information-seeker has some prior experience of the specific material being sought. A scholar may pay special attention to a certain paper while seeking information on a topic but, on close inspection, discovers it to be of no more than peripheral relevance to his true territory and his interest in it ceases. Some months later, however, writing another piece on a slightly different topic he appreciates the value to his new study of the work he discarded and sets about locating it. It may be only part of the paper that is important to him, even as little as a single argument or assertion. Nevertheless, through his previous experience, he has developed a search image that is strong in at least one aspect. Whilst he may not recall the journal in which the work appeared, he may be able, for example, to visualize a particular illustration within the paper or remember the “look” on the page of either the first part of the piece or the passage that is of interest.

In most of the developing countries, the deprived economic, social and infrastructural facilities accessible to the information seekers leave the professionals like engineers, scientists, doctors, teachers, etc. unable to have most of their professional information needs met. It results them to adapt an alternative two-step information seeking pattern. The information seekers obtain information from their associates and acquaintances in their contact with higher socio-economic status, who had acquired this information earlier from other sources. This prototype of information seeking process also supports the use of oral sources by the information seekers (Chimah & Udo, 2015). Hariri, Asadi & Mansourian (2014) observe that different cognitive styles among the users cause different information seeking and searching patterns. The search initiation
behavior varies among the verbal and imagery users as imagers suffer from more varied initial behavior than verbalizers. A bottom-up searching pattern is prevalent among the verbal users broadening the search starting from narrow area, whereas, the imagery users start their search from general area and then narrowing down the search following a top-down searching strategy.

Studying the psychological aspects of the information seeking on the internet, Joinson & Banyard (2002) found that the information seeking on the Internet has certain similarities and differences to the off-line information seeking patterns. It is because the act of information seeking is a product of the interaction between the target information, the strategies employed to search, the social environment in which the information is sought and the psychological implications of the information on the seeker. According to Yang & Hsieh (2013), in the online world, different types of people show distinctive information seeking and learning behavior patterns and they categorized the patterns into four user segments; knowledge segment, social participation segment, active segment, occasional segment. People in the ‘knowledge segment’ are well-informed of various internet applications and spend considerable amount of time for their information seeking activities on the internet. Members of the ‘social participation segment’ preferred generally seek online information for their social participation and most of them tend to access public notices and relatively less entertainment related information.

Jiang (2013) found that users of social library systems are found with four all the general human information seeking modes, namely searching, browsing, encountering, and monitoring in their efforts of finding resources. Based on their dominating information seeking modes, the users can be grouped as searchers, catalog/associative/social browsers, encounterers, and monitors. Novel users of the social libraries are used to be seen as encounterers, catalog browsers usually have a large number of tags, and searchers find and view fewer resources per visit than associative browsers. A study by Mansourian et al. (2008) report that while seeking information on the web users usually perceptions of anticipated success, serendipitous success,
unexpected success, unexpected failure, unexplained failure and predicted failure. When users fail to satisfy their information needs they usually employ active and passive strategies to overcome the failure. While active mechanisms require further actions to obtain more satisfactory results such as revising search strategies and help seeking, passive strategies demand the least effort to modify the situation and principally relate to accepting the existing circumstances.

Patitungkho & Deshpande (2005) and Tahir, Mahmood & Shafique (2008) in their study with similar findings also report that teaching community follows different methods for seeking information for teaching and research. They make use of different methods in seeking information for their teaching and research like consulting a knowledgeable person in the field, discussion with colleagues and librarian, making use of books and journals, etc. They prefer consultation with experts. Tahira & Ameen (2009) also confirm this finding by studying the Science & Technology faculty in a university and infer that ICT has greatly influenced their information seeking patterns as it is found that they spent comparatively more time on searching web sources than print sources.

According to Wang et al. (2007) the major information seeking activities proposed by Ellis continue to play important roles in academic researchers. In the present age of Internet, the information and communication behaviours of academic researchers indicates the importance of information seeking using informal channels, such as reciprocal interaction at conferences and contacts with colleagues and subject experts. Similarly, Bitso & Fourie (2012) found that the information-seeking patterns of the secondary school teachers resembles with the process outlined by the Wilson’s onion model starting from the small inner component and develop to the next ring, depending on the complexity of the information need, until the required information is acquired and information need is met. On arising a need, teachers start with their own knowledge and experience, then they move for help of prescribed text books, then colleagues, then other people outside school, and then to other sources like internet and others.
The information seeking habits of computer science and engineering faculty are ahead of other disciplines in the changing information environment and they pursue advanced information-gathering habits giving less importance to printed information materials and more importance to digital information and two different processes are found in them in acquiring information. One group uses the library as their primary gateway to electronic information. Many of the faculty appreciate the information resources available to them from the library and use them remotely. Other faculty members, rather than using the library, work independently acquiring information from previous graduate schools the faculty attended, authors' home pages, databases at nearby university libraries, consulting firms at which the faculties were employed, employers' databases, or pay-for-view (Tucci, 2011). Junior academics make use of internet for maximum, the seniors make little use of it and thus the junior academics are ahead of their seniors in making use of the Internet for scholarly communication as well. Junior academics focus on information on literary publications, educational or research institutions and higher study opportunities while the senior academics search for mainly conference and job vacancy information on the Internet (Nasir Uddin, 2003).

The information seeking behaviour of graduate students is both random and organized. The random motions of information seeking are in effect during the planning stage, when choosing an area of focus, developing a search strategy, or general browsing for background information or a general idea of their field of research. The organized information seeking behaviour includes regular planning sessions with an advisor, planned search strategies and use of citation chaining. The information seeking behaviour of graduate students is iterative and becomes more refined and organized as they become more knowledgeable in their field of research (George et al., 2006). The information seeking behaviours of students group move from novice information seeking pattern to more complex and experienced information seeking behaviours along with their study. With their increased use of a variety of both physical and digital information resources along with their learning and training in colleges and universities, their skills and
experience in their information seeking methods and strategies also evolve to a complex one (He, Wu, Yue, Fu & Vo, 2012).

As the students evolve throughout the course of their studies, not only the knowledge of their discipline but their approach to dealing with different information resources also evolves. The information seeking behaviour of students at different levels of study, and from different disciplines may not be the same as it is found that the behaviour of doctoral students are often as different from those of masters students and that of graduate students from undergraduates. It is also found that students in the soft disciplines were involved in more information seeking activities than those in the hard disciplines. Generally, students are inclined to begin their research more authoritative sources recommended by advisors (Catalano, 2013).

Students and researchers in an academic setting follow different methods of information-seeking processes in various stages of tasks. In the pre-focus stage, users try to identify some information to get started by consulting the instructors of their classes and librarians and browse the internet and libraries to look for information for potential topics. At the formation stage, they are fairly settled with the topics of their research proposals and they focus more on how to formulate the query to represent their topics. Accordingly, they search and browse their selected search topics mainly from online databases, web search engines and OPACs based on their preferences. At the post-focus stage, they either check whether they missed anything or try to add one aspect of the search topic. During this stage, they validate or enhance their searches by checking with human resources, using the pearl-growing strategies, and searching for different formats of documents (Xie, 2009).

Dougan (2012) reports that the bahaviour s and choices of the students while seeking for information are found to be distinct depending on the level of their study and the nature of their assignments. Students at higher level are found to be searching for new materials on their own while lower level students depend more heavily on course reserves
and professors’ recommendations. The older students may also have “work smarter not harder attitude”, using the tools that they perceive to be the easiest and most convenient. Students tend to continue with the behaviour started early in their academic career like using the older catalog. It is also seen that students with different cognitive need levels behave differently in the information seeking environment. For collection relevant information, students with high need for cognition do the effortful processing of information, while those with low NFC process information on a marginal route. For acquiring more trustworthy information, students with high need for cognition spend more time and seek resources subscribed by the library more than the Net, give preference to formal sources over informal ones, opt for resources with high-quality, up-to-date, complex and multidimensional contents and use advanced search options for formulating queries (Mokhtari, Davarpanah, Dayyani & Ahanchian, 2013).

As indicated by Stokes & Urquhart (2011) the information seeking patterns among the students vary depending on their self-belief in achieving their target, their personality and the learning style they follow. The students possessing higher degree of these qualities are found with willingness to explore during their information seeking process and they perform intensive activities like breadth exploration, browsing, sifting, etc. to acquire the required information. On the other hand students possessing lower degree of these qualities depend on others and stick with what they have found before rather than search either for themselves or afresh. A study by Kakai, Ikoja–Odongo & Kigongo–Bukenya (2004) summarizes that the undergraduate students use the pattern like that given by Ellis’ when seeking information: Starting, browsing, chaining, monitoring, and extracting. The strategies are appropriate but the options used in each strategy are inadequate for the students to exhaustively achieve their goals and hence it can be said that the information seeking behaviour of the undergraduate students are therefore quite limited.

Limberg’s (1999) study on the information seeking and use by students found that they mainly seek and use information for formulating research questions. Three major
ways of experiencing information seeking and use by students are fact-finding, balancing information in order to make correct choices and scrutinizing and analyzing. Students’ conceptions of information seeking and use are dependent of the content of the information used and their weak prior knowledge of subtopics rendered information seeking and use more difficult. Heinstrom (2005) grouped information behaviour patterns in the graduate students into three: fast surfing, broad scanning and deep diving. Students who use fast surfing neither search for information very thoroughly nor put much effort into their information seeking and this pattern is seemed somewhat problematic. Broad scanning characterized by wide and thorough information seeking and students seek information from many different sources, retrieved information by chance and found it easy to judge information critically. Students characterized by deep diving pattern use considerable effort to find information, and for them only information of the highest quality is acceptable.

High involvement in cognitive processes and confidence in their inquests are found in the intellectually curious students and thus they are found to be decisively appraising various information sources and choosing unknown topics for their exploration in the information seeking process. Conscientious students are found to be not concerning information seeking as hard work and not investing their usual engagement, they rather choose familiar topics than challenging one while seeking information. At the same time, students having high negative emotionality find searching and understanding retrieved information difficult and observe their learning atmosphere as too troublesome and consequently, adopt a surface study approach (Heinstorm, Sormunen & Kaunisto-Laine, 2014).

Millennial generation students, born after 1982, do not proceed in an orderly fashion while seeking and searching for information. Students are found to be not moving in a manner consistent with the search stages envisage by different information seeking models. Members of the millennial generation have a non-critical view of information found on the Internet and not concerned with the quality, validity, or authority of the
documents selected and hence they do not consider verification of Internet sources important (Taylor, 2012). According to Rieh & Hilligoss (2008), in the digital age college students use a wide array of digital media to achieve their information needs and intentions. They start information seeking at a trusted place, use multiple resources and cross-referencing, and sometimes compromise information credibility for speed and convenience. In using digital media, they are more concerned with credibility when they were looking for information on academic achievement and problem solving. In addition, their concern for credibility increased when they were dealing with goals related to personal information needs such as health and finances.

In the online environment, students follow quite a distinctive form of information seeking process different from other academic community. They conduct many sessions and view many pages but do not penetrate web sites very deeply during their visits. This is what has led to them being called “bouncers” as they bounce in and then bounce out again (Nicholas et al., 2009). Digital Native students, operating within a hyper connected environment, meet their information needs regarding courses and homework assignments and research while utilizing the Internet as primary channel than the libraries and information centers. The use of textbooks is very low in comparison with these information sources. They prefer random access to information via the hypertext functionality of the World Wide Web and prefer electronic media to printed media (Niemand, 2010).

ChanLin (2013) categorized various strategies used by students while seeking electronic information, mainly through e-books, into Use of prior experiences, Comprehension and decision-making, and Self-regulation and self-monitoring. In ‘Use of prior experiences’, students integrate their prior reading knowledge and experiences, linear/non-linear and book-review experiences before actual reading process. In the ‘Comprehension and decision-making’ strategy, they employ approaches that would help decision-making in comprehending electronic content such as using content structures, use of author information, subject domain analysis, notations, graphics, etc. The ‘Self-
regulation and self-monitoring’ strategy helps them achieve specific reading tasks or purposes analyzing task requirements and availability of time and exploring various functions to support their activities.

Nicholas et al. (2010) investigating academic researchers’ information seeking behaviour in the virtual scholarly space report that researchers access electronic resources via a wide variety of routes. They often access by way of a “gateway” site like Google, Pub Med, etc. and, if so, access articles directly by activating a link, bypassing homepages, menus and sometimes abstracts. Thus those accessing databases via a gateway site will have undertaken some of their searching and navigating in the gateway site and arrived at database mainly to pick-up content. Researchers also arrive to the databases via a citation link within an e-journal, electronic services linking online library resources and a referrer link like library or university pages.

Researchers and scientists have developed unique information-gathering habits to seek out relevant research. As they are required to possess a significant command of an extensive scientific background, vocabulary and various subject research tools in two or more scientific subject disciplines, a significant part of the researcher's daily schedule is devoted to information-gathering. As a result, many researchers are doing gathering research in their off-hours or depending on others to assist them and most of them seek supplementary assistance from support staff (Murphy, 2003). Investigating engineers’ information seeking methods, Sridhar (1989) opines that the general picture is that engineers are introvert and depend more on informal sources. It is interesting that the engineers do not always turn to information-sources which reward them most. They try to minimize loss than maximizing the gain in turning to a particular source, exhibiting a sort of conservative attitude probably due to their objective of doing `better things' than `best things'. Apparently irrelevant or non-specific information also plays an important role in the process of problem-solving by engineers. Generally, engineers were found to delegate their information gathering task to others.
Anderson, Glassman, McAfee & Pinelli, (2001) say that scientists and engineers follow an information seeking pattern consistent with the principle of least effort. They prefer personal collections and oral communications within the organization; the next choice is to confer with others outside the organization. A lesser used choice is to refer to the literature, and the last choice is to consult with library intermediaries. As task uncertainty increases, the search widens from oral contacts to literature searches and, then, to consulting with library personnel. Jamali & Asadi (2010) classified scientists’ information-seeking patterns into two broad categories based on the type of the information sought: unspecified information on a specific subject when participants look for general information (in any format) on a particular topic and specific information items when participants know exactly what piece of information they are looking for. They use a range of information-seeking methods for identifying scholarly articles on the web to meet their research-related purposes, such as searching Google, searching general databases, searching specific databases, tracking references at the end of papers, using ToC e-mail alerts, and browsing or searching e-journal web sites.

According to Kumar, Gautam & Vijayaraghavan (2011) scientists depend on different modes for collecting information needed by them. They depend on their own efforts heavily for their information seeking activities. They are more familiar and comfortable with the computerized search facilities and rely significantly rely on these facilities. They also depend on human sources like experts in the field, supervisors, colleagues, research assistants, etc. for seeking scientific information. According to an investigation by Jamali & Nicholas (2008) physicists and astronomers believe that it is important for them to keep up with the developments of their fields and subfields and a range of different methods are used for keeping up-to-date. Word of mouth and colleagues, browsing e-journals, searching, conferences, and meetings are the methods on which, majority of them are quite dependent. The most popular methods turned out to be interpersonal communication methods.
The above observations are confirmed by Sahu & Singh (2013) also reporting that inter-personal discussion, browsing journals, and attending conferences and meetings are the most popular methods of acquiring information by scientists and researchers. However, there are significant differences in their information seeking behaviour with age, education and rank. The seniors having higher academic status depend on personal discussion and inter personal communication for keeping them up-to-date due to their wider network. On the other hand, younger generation depend on the formal resources and are online orientated. Boissin (2005) describes two types of information seeking activities by the general practitioners: ‘routine’ information activity and ‘special’ information activity. The first one concerns the GPs who just want to keep themselves informed and the second is related to the secondary activities of the GPs. For these two types of information activity, GPs use different ways to get information: a mode of information seeking called ‘active’ information and the second one called ‘passive’ information.

Wiberley, Jr. & Jones (1989) opine that the humanists have well developed habits for finding information in their specializations. In addition to use of formal bibliography and librarians, they employ the geographic and the genealogical approaches to information. Barrett (2005) describes that the information-seeking behaviour of humanities researchers is an idiosyncratic process of constant reading, digging, searching, and following leads. Humanists frequently browse through the shelves of libraries and bookstores to locate information on their research topics with no strong feelings of anxiety associated with tracking down research materials. Citation chasing, or ‘books leading to books,’ is by far the most frequently described method of finding materials. The researchers describe citation chasing as a means of dealing with information overload, as one simply cannot read everything on a topic.

Ge (2010) explores that Ellis’s model remains relevant in the age of electronic resources and confirm that the electronic information seeking behaviour of humanities and social science researchers seem to be fairly applicable to six characteristics of the
Ellis model. In addition to the six original characteristics; starting, chaining, browsing, monitoring, differentiation, and extracting, the researchers follow two more characteristics; preparation and planning, and information management. These characteristics do not necessarily occur in the sequence outlined, or can take place concurrently with the other characteristics. As researchers progress from one activity to another and their use of the characteristics will depend on their individual needs and situations.

Four complementary modes of information seeking were observed by Choo & Marton (2003) while studying the women IT professionals’ information seeking patterns from the web. They are: undirected viewing, conditioned viewing, formal search and informal search. In each mode of viewing or searching, they adopt distinctive patterns of browser moves: starting, chaining, browsing, differentiating, monitoring and extracting. The users approach the web as an efficient, one-stop location and scan information from a wide variety of sources to keep up to date. They follow topics of interest by bookmarking valuable sources and periodically returning to these sources to view new contents and track developments. Each mode of information seeking on the web is also distinguished by the type of information needs, information seeking tactics, and the purpose of the information use.

To sum up, based on the above studies, it can be concluded that various patterns of seeking and gathering information are seen among the information users. The methods and patterns may take quite a few forms and may vary from user to user. The information seeking pattern may be different for different information seeking instances such as work related, related to everyday life, individual, collaborative, inferential information seeking, etc. Both random as well as organized information seeking pattern are seen. Users are also seen with conventional methods for information seeking or with advanced information-gathering habits giving less importance to printed information materials and more importance to digital information. Information seekers are also spotted following different methods of information-seeking processes in various stages of tasks.
2.5 FACTORS AFFECTING INFORMATION SEEKING PATTERNS

Information seeking bahaviour is a multifaceted, complicated and complex area and the ways of interacting with information by individuals differ with their different viewpoints. It is very important to explore and improve our knowledge of factors affecting in the process of information search and use behaviour of users especially in the growing importance of information in our society and its increasing complexity and with the materialization of new information technologies. Understanding how various fundamental factors influence the bahaviour of information seekers can help librarians improve users’ effectiveness in the information rich environment (Mokhtari, Davarpanah, Dayyani & Ahanchian, 2013). It is observed that several factors influence the information seeking process by individuals looking for information. These factors include the users’ objectives or motivations for wanting the information, characteristics of the information need, external variables such as setting, context, and situation, internal variables such as motivation and searching skills and phase of the project (Prabha et al., 2007).

According to Xie (2009) goal and task are the leading factors for individuals which influence the information-seeking and retrieving process. He demonstrates three dimensions of work tasks as nature of task like routine, typical, and unusual; stages of task like pre-focus, formulation, and post-focus; and timeframe of task like extremely urgent, urgent, or non-urgent. Different aspects of tasks affect information seeking and retrieving in different ways and play a major role in influencing users’ application of information-seeking strategies. Different cognitive styles of information seekers also affect the information seeking and searching performance of individuals. Information seeking patterns beginning a search, formulating the search query, navigating within the search results, and processing the retrieved information are found to be different among individuals with different cognitive styles (Hariri, Asadi & Mansourian, 2014). Individual’s information seeking tasks is influenced decidedly by the perceived characteristics of the information task, his/her levels of affective state and the temporal demand. In complex and dynamic information seeking situations, an individual’s
perception about the information task acts as trigger in processing and managing multiple information tasks. (Park, 2015).

Mokhtari, Davarpanah, Dayyani & Ahanchian (2013) found that information behaviour is a cognitively effortful activity and Need For Cognition (NFC), which denotes a need to make sense of the world, is a powerful peculiarity that influences individual’s information behaviour. This factor has a vital role in an individual’s performance while seeking information such as stating and formulating information need, seeking and searching related information for satisfying the need, evaluating and criticizing retrieved information items for their relevance and authority and using them within various information-embedded situations. It is seen that individuals with low NFC have quite little motivation for seeking information and thinking can be a chore for them.

Savolainen (2012) suggests that in the process of task-based information seeking, the choices and performance of users are influenced by a complex set of individual and contextual factors. Social and cultural context of information such as the work roles of an organization or the importance of such tasks and individual’s previous experiences about task-based information seeking indirectly affect the seeking choices and performances. The individual’s short-term and long-term goals, personal and social identities as an employee and competence in various domains also affect the information seeking process. Other significant factors comprise efficacy-expectation, outcome expectation, intrinsic enjoyment or interest value, attainment value, utility value, and relative cost.

Savolainen (2002) studied network competence in the context of information seeking and found that the information seeking in the networked environment is influenced by individual's outcome expectations, self-efficacy and network competence. In the case of novice users, the way in which existing competence can be used is significantly dependent on how confident the individual's ability to master on ICT tools, knowledge of what is available on the Internet and to search for relevant information from networked sources. Abdulkareem (2010) notes that there a close relationship
between people’s information seeking behaviour on the Internet and some socioeconomic variables like monthly income, formal education, Internet use experience, etc. Information seeking on the Web increases with monthly income more than other socioeconomic variables. This suggests that the amount of money available might significantly determine the time people spend on the web. Information seeking activities on the Web also increase with formal education people have; the more educated people are, the more they spend on the Internet for seeking information. This might be due to their relatively high propensity to use of the Internet for study and research.

Yang & Hsieh (2013) found that the information seeking activities of individuals on the web are affected by their personal characteristics and regional relationship. Among the personal characteristics, age and access time influence largely on the users’ online seeking probabilities. Comparing the behaviour of younger and older people, it is found that younger ones are more attentive to innovative online applications for acquiring information and good at utilizing them than the older people. Similarly, most of the knowledgeable users spent relatively more time accessing the internet than others, whereas, most of the occasional users had uncertain online access times and were rather unfamiliar with internet applications. The regional relationship of the individuals also has an impact as members of the rural area are found to be using online resources more. Though gender also affects the online information seeking, it has the smallest impact.

Research results in the areas of information need and information-seeking behaviour indicate that the type of information need and information-seeking behaviour of scholars are dependent on their field of research, and vary from one discipline to another (Sheeja, 2010). The character of the assignment influences the variation in students' ways of experiencing information seeking and use and the group patterns have strongly influences both the information seeking and use and learning processes. The information gathered influences how they formulated their questions, which in turn influence how they went on seeking and using information. Differences between students' conceptions of subject content influence how they search for and use information.
Differences as regards students' conceptions of information seeking and use influence both how they search and use information and what they learn about content (Limberg, 1999).

Studies also confirm the assumption that personality and study approach influence students’ information seeking behaviour. Psychological features are shown to have a stronger influence on the students’ information behaviour than their discipline background, or the stage of the thesis process did. Personality traits and study approaches interacted in their influence on general information-seeking patterns, while some information-seeking features solely could be explained by personality traits or approaches to studying. The way in which information is sought and problems with information seeking can be related to personality and approach to studying (Heinstrom, 2005). Various academic tasks and the culture and the country they belong to also form the important contextual factors of students’ information seeking process. The processes adopted by students are different for different types of tasks such as simple tasks and complex tasks. Similarly, students belonging to different countries with different academic cultures show different information behaviours in the choice of information resources, strategies and methods employed, etc. (He, Wu, Yue, Fu & Vo, 2012).

Individual differences in the personality traits and study approaches also have a stronger impact on the information behavior of students. These factors are found to be influencing seriously at various stages of their information tasks related to learning. Personality traits such as intellectual curiosity, conscientiousness, negative emotionality, study approaches like deep approach, strategic approach, surface approach, influence the information seeking (Heinsorm, Sormunen & Kaunisto-Laine, 2014). Al-Muomen, Morris & Maynard (2012) explicate that some micro factors such as individual’s information literacy skills, IT skills, support and training, pedagogy, psychological factors, cultural aspects, discipline and curriculum, academic influence and demographics and macro factors such as information learning technology, information resource design, availability and constraints to access, policies and funding, and organizational knowledge
and culture affect different processes of identifying need, locating sources, searching making use of the information by graduate students studying at a university in a developing country. This is in consistent with Stokes & Urquhart (2011) who report that self-efficacy, the sense of personal mastery in ones competence; personality traits like openness, conscientiousness, extroversion, agreeableness, and neuroticism and the various learning style like deep, surface and strategic learners among the students are highly related to their information seeking bahaviour .

Academic factors analysis by Pinto, Pouliot & Cordon-Garcia (2014) reveal that students’ information seeking patterns on the web seriously depend on the academic disciplines of study. Online information seeking is most common among the students who are familiar with computers or computer is an important tool in their academic works. Students based with experimental and technical disciplines show a positive difference in this regard compared to the rest of academic disciplines. An established practice of using digital technologies such as databases, e-books, e-journals, etc. is found among the students of such disciplines.

It is found that post graduate students at universities are increasingly attracted towards the electronic/online resources for their information seeking and hence computer and web experience, the search experience, perceived ability and frequency of use of e-sources also play an important role in shaping their information seeking bahaviour. Though the personal traits, discipline of study and library instruction programs play some roles, but in a very insignificant manner and the gender has no role in it at all (Malliari, Korobili & Zapounidou, 2011). Academics’ information seeking behaviour on the virtual scholarly space varies with the institution they are affiliated with and their subject and discipline of research. Researchers in research-intensive universities behave very differently from those in less intensive ones: per capita use is highest in the most research intensive institutions; their users spend much less time on each visit; they forsake many of the online facilities provided on the publisher’s platform; and they are much more likely to enter via gateway sites (Nicholas et al., 2010).
The academic rank is an important factor in the frequent use of Internet for collecting information by academics. It is found that there is significant difference in the use of Internet by senior and junior academics, the later making use of Internet more for seeking information (Nasir Uddin, 2003). Perceived behavioural control is also a powerful determinant in determining the information-seeking intention through academic digital library services. Attitude toward information-seeking and the subjective norm also play important roles. Positive perceptions of their behavioural control are critical for users to increase their use of academic digital libraries (Chang et al., 2009).

The methods and strategies employed by professionals are also affected by a number of factors. For example, the gathering habits of engineers differ widely from those of scientists and other R&D workers. The differences in information gathering habits are more strongly related to the kind of employment and type of organization than the discipline (Sridhar, 1989). This is in line with Mahapatra (2006) who states that scientists and technologists make use of different types of information sources for their job related activities and their information gathering behaviour varies from person to person depending on the work roles in the firm and cadres of job. According to Herner (1954), the fields of work and the type of scientific organizations in which they are working are the main factors significantly and definitely affecting the information-gathering habits of the scientists. His study which attempted to analyze and define information-gathering methods among the scientific personnel found that the age has a small effect on the manner and extent to which scientists obtain and use information and the formal education did not appear to influence the information gathering habits.

The suppositions of the above investigations make it clear that the process of seeking information take quite a few forms and there are several factors that influence the information seeking patterns and procedures being adopted by information seekers. The ways of interacting with information by individuals differ with their different viewpoints and various individual and contextual factors also affect the process of information seeking. The key factors that affect an individual’s information seeking pattern include
task, need for cognition, social and cultural context, network competence, regional relationship, conceptions of subject content, personality and study approach, information literacy skills, IT skills, support and training, academic rank, the kind of employment, type of organization, educational qualification, working experience, etc.

2.6 ROLE OF LIBRARIES IN INFORMATION SEEKING ACTIVITIES

Library and information centers have been considered as the heart of any institution for centuries for the reason that the role the library and librarians carrying out to meet the information and research needs of users. They play significantly important role in meeting the information requirements of its clientele (Knight, 2013). Libraries are regarded as the ‘nerve centre of knowledge’ and the centre of intellectual life and as centre of learning they play an important role in sustaining and satisfying the information requirements of parent institutions (Kannapanavar & Manjunatha, 2010). The frequency of users’ visit to a library for meeting their information needs depends heavily upon the resources, organization, maintenance and value added services that provides and hence it is very important that libraries develop their collection in different formats with a variety of resources (Kadli & Kumbar, 2011). In the past, library used to be was an obvious first port of call when seeking information and reference services had always been a significant role in the meeting the information need of users. In the digital age, where technology has leveraged the ways to seek information, the value of libraries is deliberated by the benefits of the effective and precise services that they put forward to their remote patrons (Chang & Yang, 2012).

An academic library is the control centre or the central hub around which scholarship revolves. It is an indispensable instrument for intellectual development. A well stocked academic library is a storehouse of information, or a record of human experience to which users may turn to for data or information (Yusuf & Iwu, 2010). A library of an educational institute has a very good role in the provision of adequate education and research. In a big institute with larger number of library members, library
and information service are rendered through departmental libraries and suitable and quick access to information resources are made through them. The collection of departmental libraries may be very small compared to the central library, but the resources in them specialize exclusively in the core areas of study, teaching and research of the department. Hence, the members of the department prefer the departmental library for their information seeking activities regarding teaching, learning, research, etc. (Chandra, 2011).

Academic libraries, in today’s environment with advancements in ICT along with its unprecedented applications provide a variety of information resources management and delivery services that brought the libraries to be closer to the research communities for answering their respective information needs. Services include the new genre of online services that expands the services beyond the physical premises within a distributed environment to reach off-campus users, library web portal providing several options to search and provide a dynamic seamless access to a variety of e-resources, virtual reference interacting with the library patrons through synchronous and asynchronous channels, etc. Library plays important role in the users’ information seeking by helping to locate and retrieve relevant information from different e-resources, to assess information quality and help in synthesis of scholarly work, as well as to for improve efficiency of information delivery, to cumulate and compile related information in ease-to-read fashion and to assist in promoting e-literacy among users community (Taha, 2012).

It is observed from the information seeking behaviour of faculty members that they are frequent library users. Almost all the academics use their institutional libraries regarding their information requirements and in addition, many of them use other libraries as well. It is also found that majority of academics use the libraries more extensively when they undertake research work. Academics are found with fairly positive library skills as they rarely seek assistance of library staff to find information sources and services or to utilize the automated library catalogue, etc. (Wickramanayake, 2010).
Studying the information seeking behaviour of users of an engineering college library in India, Kannapavar & Manjunatha (2010) and Sankari, Chinnasamy, & Venkatachalam (2011), also validate the results of this study, stating that faculty members are serious users of college library. They visit college library frequently and spend a good portion of their information gathering activities in their libraries to solve immediate practical problems and keeping up to date, for study and research needs, etc.. They make use of both print as well as electronic resources in the library such books, periodicals, reference sources and services, reprographic services and internet/online services. Using library catalogue/OPAC and consulting librarian/library staff are their preferred methods for locating library materials.

Studies by Baby & Kumaravel (2011) and Khan & Shafique (2011) on college faculty also produced findings in line with these studies which report that even though the ICT has affected their information seeking and gathering habits immensely, consider the college library as an important part in fulfilling their information needs to some extent and they seriously make use of it. Study by Yusuf & Iwu (2010) reveal that a university library is a storehouse of information to which users, mainly students and faculty turn to for data or information. It is found that both students and faculty in a university depend a lot on university library for their information needs, but students use the library more than faculty. While the students mainly utilize library for consulting reference materials, reading newspapers, availing reprographic facilities and as a general reading place, the faculty’s visit to library is generally for consulting journals, reading newspapers and consulting books and reference materials.

In the changing information environment, the library use is diminishing in importance, fastest amongst faculty members in many disciplines especially in computer science and engineering disciplines. There is a definite trend away from the library as a central information gateway, toward one that combines what the library has to offer as an information source with other Internet resources. They rarely go to the library to use the library collection, either circulating or reference. The library books and the online catalog
are not heavily used and it appears that only a small percentage of faculty still use the hard copy book collection and there is migration from hard copy journals to online journals. Some have developed alternative ways to secure digital information including subscribing to online resources via a personal membership in a professional society (Tucci, 2011). In this ICT based era, Internet is considered as the backbone of the information superhighway and thus the frequency of faculty members to college library is not frequent. Majority of them visit library for using the computer based services available in library such as internet and email facility, CD ROM databases, etc. (Kadli & Kumbar, 2011).

As the role of the academic libraries have take on a different twist in an online environment, to deal with the newest generation of “tech-savvy” users and to remain a vibrant and important part of the university, as in the past, librarians had to find creative ways to support their patrons. Libraries still have important position in the users information seeking habits as they have embraced change offering innovative library services and other cutting edge electronic resources like e-library, digital library, etc. (Knight, 2013). Among the innovative library services to provide better research services to their users is the real-time reference service through instant messaging (IM) that has had an undeniable effect on the ways that patrons seek information. IM services allow reference librarians to provide short and sometimes detailed reference assistance to patrons in real time. Users find the easy to use IM services to be useful in their tasks and utilize it in a great deal for information retrieval. Therefore, the research results suggest that for an IM service to be successful, libraries need to focus their attention on designing both useful and easy to use systems (Chang & Yang, 2012).

Science and social science researchers in universities also make use of their university library, sometimes other libraries as well, for keeping up to date in their research areas. They mainly utilize the library to access e-journals, databases, print journals and conference proceedings. Although they utilize the library collection and services, scholars, especially in developing countries like India, are not fully satisfied
with the effectiveness of the library in keeping them up to date with latest developments (Sheeja, 2010). Humanists also rely partially or totally on library collections for their research but without assistance to find books and journals they needed for research. The humanists do not obtain valuable assistance from reference librarians. While fellows gave little or no evidence of consulting librarians in general reference departments, almost all who used archives or other special collections said they worked very closely with repository staff (Wiberley, Jr. & Jones, 1989).

The ways and methods by which the students make use of library resources make it clear that libraries are central to the users’ academic information needs. The success factors of students are much correlated with their library use successful users are always those who find value in the library. A higher percentage of students make use of their institute library in a measurable way for both digital as well as conventional resources. Among the students, it is found that graduate students generally use the library more than undergraduates (Fransen, 2013). The learning process and the information-seeking behaviour s of students are socially constructed through interactions with others including librarians. Librarians have a positive role of coaches in recognizing student needs and using their skills to influence the information seeking. They must relentlessly be student-focused, reckoning what is the most useful library content for their students to experience and learn next. Students may vary in educational backgrounds, learning abilities, culture, and may have different learning goals. Through the liaison consultation process librarians have to make themselves accessible and indispensable without underestimating student abilities and motivations (Suarez, 2013).

Mavodza (2011) also suggests that one of the best ways to motivate students in the educational setting is to use practices that help make the learning real and meaningful to them and admits that it is important to encourage continuously the widespread use of the library by the students so for satisfying given assignments. Librarians through their information literacy instruction role can help students carry out successful information searches. The impact of information literacy classes really reflect in the patterns of
information seeking, searching and using. According to Pinto, Pouliot & Cordon-Garcia (2014), in the support and learning point of view, libraries play unconditional role for meeting the information requirements of students. In the new upbringing of learning and research in the present digital environment, the libraries reaffirm their role by presenting solutions to the students needs providing direct access to information at anywhere and anytime. Libraries raise users’ awareness about the new technologies and train them to be familiar with the new tools.

A study on the information seeking behaviour of students in an Indian university reports that university library is a place they profoundly depend to meet their information needs and most of the students and researchers are satisfied with the collection and services of and it (Mahajan, 2009). Library and information centre supplemented with variety of information sources and services to support learning, teaching and research is the heart of the university setting and has a central role in the information seeking activities of students. Students regularly visit library to make use of its resources and services to acquire knowledge regarding enhancing general as well as subject knowledge, preparing for examinations, thesis, dissertation and project works, etc. (Prabhavathi, 2011). University library is noted as the well–established institutional information source by the undergraduate students for seeking information. Students visit the university library with different objectives, majority of them for utilizing library books first, followed by to use it as a quiet study space to read their books, then those who borrow library materials (Kakai, Ikoja–Odongo & Kigongo–Bukenya, 2004).

In a similar study, Callinan (2005) also affirms that library plays a very important role in the information seeking behaviour of undergraduate students and primarily they use the library as a place to study. Borrowing is one of the main reasons for visiting the university library. Students differ in the extent to which they carried out other activities in the library depending on which year group they were in. A much higher percentage of final year students indicate carrying out all of the activities compared to first year students. Seeking assistance from librarian by students is very low as they are more likely
to ask their peers for assistance in using the library and its resources rather than ask library staff.

It is a general picture that even though the non-library Internet resources are strongly evident in graduate students' research process, still they use some type of library resources and the university library remains a key element and plays an important role in meeting their learning and research related information requirements. Although most of the graduate students prefer to use library for online resources, a vast majority reported using the physical resources in the university library for books, textbooks and reference materials. Graduate students also come to the library for print journals, periodicals and magazines and this is more evident for students in the sciences and humanities. The university library is also important for DVDs, video-tapes and services. When needed resources are not available in the university libraries, graduate students supplement by using the libraries' interlibrary loan services to borrow from other libraries (George et al., 2006).

According to Wasike & Munene (2012), like the traditional students, the non-traditional university students who usually attend classes less than full time also consider the library as an important constituent for acquiring their information resources for learning purposes. Enhancing the existing library services to accommodate the non-traditional student needs through extending opening schedules to the evenings and weekends, making the materials tailored made to specific user needs of the non-traditional students, allocating designated librarian to specifically handle non-traditional students’ issues, taking requests for interlibrary loan, reservation and renewal by non-traditional students by post, fax or phone, to save them a journey to the library, subscription to electronic databases, etc., libraries play an imperative role in their information seeking. Subscription to electronic resources and databases by libraries help them overcoming geographical barriers.
In today’s ICT driven era, a diminishing use of library services is evident among the student community for their information requirements. Inspite of the fact that libraries have been established to facilitate students’ academic pursuits and provide extensive library services for its clientele, many students do not find the university library and its services helpful to them and rarely do they discuss their information needs with the librarian. There are students who use the library, not to get information but as a good reading or study place (Saad & Zainab, 2009). Similar view is expressed by Sahu, Swain & Rout (2012) who report that presently, students, by simply searching on the web with their laptops anywhere on campus, were able to find plenty of supporting resources and hence they need not feel like going to the library in pursuit of information and there is a diminishing use of library services by the student community for their information requirements. Hence academic libraries need to reconsider their services frequently to ensure they meet students’ needs.

As evident from the above reviews on the role of libraries in the information seeking activities, it is true say that libraries and information centers supposed to play an important role in the information seeking activities of its members. They have been considered as the heart of any institution for centuries for the reason that the role the library and librarians carrying out to meet the information and research needs of users. Different types of libraries like public library, academic library, special libraries, etc. are made use of their patrons for their information collecting activities. At the same time, it is also observed that, in today’s ICT driven era, where people increasingly depending the Internet for everything and a plethora of information sources are available on fingertips, a diminishing use of library services is evident among the user community for their information requirements.

2.7 SOURCES AND CHANNELS USED FOR GATHERING INFORMATION

Studies on the information seeking behaviour reveal that users seek help of various formal and informal sources of information to meet the information-needs. The
sources and channels used by information seeker vary from user to users. Various studies on the information bahaviour of academic users including students, researchers and faculty members reveal that the sources and channels utilized by academics may vary in different contexts. According to Mahajan (2009) students and researchers in a university make use of both formal as well as informal sources to meet their information requirements. In formal sources, students rely more on books than other sources, whereas researchers rely more on journals, conference proceedings, and databases. Students also consult informal channels like their professors, experts, librarians, peers, etc. and most of them feel that friends and teachers direct them to various sources of information that may be useful and discussion with teachers is preferred as an informal source. Studies confirm that printed sources of information such as textbooks in general and handouts from the lecturer are the two main sources of information used by undergraduate students (Callinan, 2005).

Books, monographs, journal articles, government publications, encyclopedias and other reference materials had been the mostly sought sources by majority of students (Suarez, 2013). Even though textbooks are the most heavily used information sources by the undergraduate students, they also make very little use of other information resources like journals, Theses/Dissertations, Reference materials, Newspapers, CD–ROMs, online databases, Conference Literature Proceedings. This could be as a result of not knowing their value and how to use them or not knowing of their existence (Kakai, Ikoja–Odongo & Kigongo–Bukenya, 2004).

Undergraduates, when undertaking their course projects and assignments, use various sources of information within and outside the libraries. Though the undergraduates in the field of IT mostly make use of Internet and the past year project reports, books are high on the list of information sources utilized highly while journal articles are found among the least used source. They agree that the books are definitely the most reliable and authoritative source of information and the more books they have, the better they feel (Saad & Zainab, 2009). Undergraduate students’ information use
habits are more for need or practicality than choice or preference. Therefore, it is found that even though the digital generation of the students is adapting easily to digital contents, most of them are still linked stoutly to the traditional analog environment and majority of the students prefer printed information resources to digital resources. For study related information, they generally make use of hand-written notes, printed textbooks, newspapers and journals (Pinto, Pouliot & Cordon-Garcia, 2014).

It is observed that for graduate students traditional resources actually still play equal or more important roles than popular online resources in some specific academic tasks. When the tasks are looking for books and looking for answers to questions, traditional library resources such as library catalogs and face-to-face reference are the most important resources. Also for the task of looking for articles they are still highly-ranked (He, Wu, Yue, Fu & Vo, 2012). For meeting their research information requirements, most graduate students use print resources that are available through the university libraries. They search university library databases and indexes, online journals and other online resources for articles, conference proceedings, reference materials, images and other materials. They also use the libraries' print resources such as books, print journals and other materials (George et al., 2006).

The information sources and channels used by graduate students while seeking information vary depending on the needs and tasks for which the information is sought. When looking for scholarly information related with their learning and study, students are most likely to search for textbooks, search engines, web sites, OPAC and online databases. However, when their information needs were related to occupational tasks like employment, they resort to their friends, newspapers, internet and websites. For popular information related to entertainment, the internet, colleagues, friends, experts and newspapers are used comparatively more heavily than they use for other purposes (Nwagwu, 2012).
Today’s ICT based information infrastructure has had an impact on the information seeking pattern of students as well and has caused more exposure of students to electronic sources of information. As a result they are able to access a vast amount of electronic resources in addition to the print sources (Mahajan, 2009). Since the early 2000s a change was evident in the format of the sources as the e-versions of sources emerged. Since then students preferred to access the e-version of a book or journal article. Students are still relying heavily on print journals and books, however, they wanted more e-journals (Catalano, 2013). As a result, in this internet age, Google has become the first choice for information and even when Google Scholar is available, general Google searching is the preferred choice. Specific subject encyclopedias are usually unknown and/or seldom used, whereas, Wikipedia is a popular source (Suarez, 2013).

With the use of web technologies, reading is increasingly moving toward electronic format and e-books have become a vital source of information among the users. Interactive characteristic provided by e-book platforms, such as editing tools, hyperlinks, and search capabilities result the choice of e-books by users over print books. The availability of reading devices, e-book publishers, and various e-book databases has made e-book services more diversified. Recent e-book technology has devoted great development effort to creating a user-friendly electronic reading environment for the reading society (ChanLin, 2013).

Sandhu & Jalandhar (2012) admit that in the present time, students are increasingly seeking online resources in general and open access resources in particular. While many of the users consider open access resources alongside paid resources, others feel that open access resources such as journals and institutional repositories lead to easier accessibility of research papers. Most of them access these resources for finding a dissertation or work by a specific author of their institution. They report that open access materials on the Web are useful when researchers need immediate access to research. According to Callinan (2005), despite the fact that majority of the undergraduates prefer
printed textbooks, yet, some students, mainly first year students, use websites as a source of information for their course-work than library books specifically. But, subject-specific electronic sources of information provided by the library were underused by students due to lack of awareness.

Researchers based in the social science discipline are found to be using a variety of formal as well as informal sources to satisfy their teaching purposes, research needs and keeping up to date, certain sources more important than others, and use these with varying frequencies. Overall dependence of the social science faculty on informal sources of information is less than the formal sources and the scholars have a preference for print sources over the electronic sources. Among the formal sources, they heavily depend on books and journals for teaching purposes whereas their research needs are met by a variety of information sources with an emphasis on unpublished research, journals, books, and papers delivered at conferences. They use newspapers and magazines, journals, and conference papers, in that order, for keeping up to date. They depend on their colleagues and librarians for class preparation more than other informal sources. As far as research activity is concerned, they depend more on conferences, librarians, and subject experts (Marouf & Anwar, 2010).

Although similarities exist between social science and science academic researchers in India with regard to information-seeking behaviour, there are significant differences as well. Researchers in both fields depend on e-journals for keeping up to date with their research. The use of internet and conference proceedings for current information is most prominent among science researchers, while social science researchers prefer print journals with little dependence on conference proceedings (Sheeja, 2010). Humanities scholars heavily emphasize primary sources as information sources to find required research information. They feel primary sources as essential to validating their theories and hypotheses. Types of primary sources used by humanists include contemporary journals, recordings, individual recollections, museum artifacts, original manuscripts, and books. It is also found that several forms of interpersonal
contact such as supervisors, specialists outside of their institutions, incidental conversations with fellow researchers, librarians, conferences, etc. as sources providing ongoing support, guidance, and feedback in research (Barrett, 2005).

Academics make an enormous effort to gain current information and depend on different types of information sources to keep them up to date providing information on current developments related to their fields. They prefer printed and electronic journals, newsletters, sources of current contents, etc. as their priority information sources while the other sources even printed and electronic books are given least priority (Wickramanayake, 2010). University teachers mainly make use of textbooks and periodicals for their teaching related activities. Still they use other types of information sources, textbooks and periodicals are frequently used by them (Patitungkhoo & Deshpande, 2005). Majority of the faculty members make use of printed information resources to a greater extent than other sources and they prefer books and journals for gathering information in teaching and administrative activities (Korobili, Tilikidou & Delistavrou, 2006). Similar to these findings, Khan & Shafique (2011) and Baby & Kumaravel (2011) also found that college teachers acquire the information needed by them through both formal as well as informal channels and they seek mainly by reading papers and articles in journals and periodicals, textbooks, hand books, reference books, etc. and communicating with associates at institutions and other experts outside institutes. For getting the useful resources, they mainly depend on the institute library and the personal collection of resources.

Tahira & Ameen (2009) studying the Science and Technology teachers in Pakistan state that general web, academic libraries and digital libraries and databases are the channels the teachers find important to meet their information needs. They also feel personal library and colleagues/ personnel contacts important. To find the required information they prefer to begin with the general web resources followed by making use of library resources and searching online databases and digital libraries. While, Tahir, Mahmood & Shafique (2008) state that humanities teachers depend their departmental
library followed by personal collections or personal libraries for acquiring information sources and they prefer print sources to electronic and audiovisual materials sources. The teachers give differed importance to information sources for their teaching and research. Reference books are ranked as the most important resource for teaching followed by consultation with knowledgeable persons or experts in the subject field and discussion with colleagues. While general books and textbooks are considered as important, journals, research reports, bibliographies, newspapers, proceedings, and theses and dissertations are considered less important.

According to Kadli & Kumbar (2011) college teachers keep track of developments in their field through reading current issues of journals or magazine and reading latest books in the field. Faculties have mixed feelings of using print as well as in electronic resources. But, in this changing ICT environment, there is a shift in the format of preference as more number of users are seen browsing current issues of electronic journals and books. Interaction with colleagues and experts and attending conferences, workshops, etc. are also important means of getting abreast with current developments. Bhatt (2014) observes that faculty members make use of a wide range of information sources to pursue their teaching, research and other academic works including books, reference sources and journals. It is interesting to note that even though the faculty members feel the institute library has a good role in meeting their information needs, they prefer their personal collection first to the library resources.

In a problem-solving and decision-making situation, an engineer, first, turns most probably to intra-personal reserve supplies, next, failing which or finding it in-sufficient, to informal channels and then proceeds to formal information system (Sridhar, 1989). Bigdeli (2007) also finds similar to this study and states that for meeting their information needs, engineers make use of both formal and informal information channels, but they use informal channels first and then formal ones. Consultation with friends and colleagues and participation in seminars and conferences are the important informal channels used by them and use of personal library, institute’s Information Centre as well
as other libraries are the most preferred informal channels. Books, periodicals, technical reports and technical plans are information sources engineers make heavily use of.

Mahapatra (2006) studying the information resources used by scientists and technologists for meeting their information requirements, states that in an organization executives working in lower and top level make use of limited types of resources while those in the middle level make use of almost all types of sources. The technologists are quite influenced by the electronic information sources as well. In-house report of the organization is the source mainly utilized by the technologists. Other important sources include current periodical, annual reports, standards and specifications and published reports. According to Kumar (2010), agricultural scientists are much diversified in the information they seek, the sources they access and the use they make of the information. Journals are the most preferred formal sources by the agricultural scientists to meet their information needs. They also rely seriously on books, monographs, thesis and dissertations, indexing and abstracting journals and conference and seminar proceedings for gaining important information. They also widely make use of electronic source of information like e-journals and online databases.

Studies indicate that the sources and channels used by information seekers vary depending on the nature of the organization and the disciplines of study. Yitzhaki & Hammershlag (2004) comparing the use of information sources by computer scientists and software engineers in academy and industry found that the printed textbooks and professional journals as well as oral discussions with colleagues/experts in the organization are common information sources preferred by both the groups. Printed professional journals as well as printed and electronic conference/meeting papers, are consistently more accessible to and used by the academic scientists, while the industry group has greater access to and use of electronic textbooks and trade/promotional literature. The respondents are mentally attached to traditional information-seeking patterns, not yet fully adjusted to the Internet, finding it easier and more convenient to
consult printed textbooks in their office, laboratory, or next-door library, rather than using an Internet version.

Herner (1954) found that, the information sources used by the workers in pure and applied science are different and the difference in the extent to which they use technical literature lies in the fact that the pure scientist is generally given the opportunity to seek the best and most original answer to his problem, while the applied scientist is usually in search of a workable solution—not necessarily the best or most original solution but one that will make whatever he is trying to develop work. For gathering information, pure scientists survey the scientific literature critically and exhaustively, while applied scientists give a relatively small amount of their time to the literature, leaning more on verbal sources of information. Among all fields, pure and applied, the five most useful direct sources were advanced textbooks and monographs, research journals, handbooks, mathematical and physical tables, and unclassified research reports. The pure scientists appeared to make greater use of foreign periodicals than the applied scientists. Five indirect sources appeared to have great significance among the scientists and are: personal recommendations; consulting references cited in books and papers; regularly perusing the literature; indexes and abstracts; and bibliographies. For the vast majority of the scientists, informal conversations, both in and out of their own research organizations, constituted the most fruitful of the verbal sources of information.

Various studies, reviewed above, on the information seeking behaviour reveal that users seek help of various formal as well as informal sources to meet the information-needs. The sources and channels used by information seeker may vary from user to user. Information sources like books, journals, reference sources, experts, librarians, peers, etc. are the important sources of information as far as the information seeking activities of academic information seekers are concerned. It includes both traditional as well as digital resources. Today’s ICT based information infrastructure has brought a paradigm shift in the format of information sources used for gathering information and users have now
more exposure to electronic sources of information. As a result they are able to access a vast amount of electronic resources in addition to the print sources.

2.8 DIGITAL INFORMATION SEEKING PATTERN

Information and Communication Technology (ICT) and the Internet have leveraged both new and old ways to seek resources to provide better services to their users. Users are now offered a variety of resources with different forms of interactivity and with different levels of media richness. They can obtain research data and publications as needed without the massive investment of capital and infrastructure to house vast physical collections. Information-seeking through the digital media has become an indispensable tool and their personal use is increasing every day (Chang et al., 2009). With the escalating influence of the digital environment in people’s daily lives, their typical information seeking has been transformed into online based activities. People started spending hours on the internet for their information seeking and learning researching general information, browsing news, searching for product information, for entertainment purposes, searching for job information, searching for public notices, information related to current events and social participation, etc. (Yang & Hsieh, 2013).

Although there has sometimes been alarm that the internet will replace libraries, the sources sought for recreational information have not really changed since the advent of the internet but the internet has expedited the information-seeking process. It has changed the access to those sources. Whereas past information seekers often had to travel to an organization or agency to gather information, or had to contact them by postal mail, much information is now available online (Ernest, Level & Culbertson, 2005). The use of the Web and Internet service is frequent even among the visually impaired users. With the use of screen readers, a visually impaired person can also operate a computer like any normal person and as a result. A study on the VIPs’ information seeking behaviour confirms that WWW and Internet service is emerging as an important resource of information among them. Although the number of VIPs using the web and Internet
service is less it is quite popular among the visually impaired users who are computer literate (Singh & Moirangthem, 2010).

The Internet and the Web have made the information seeking activities and the information access much easier, faster and more cost-effective for the intellectual community in academic institutions. The Internet has revolutionized the potential of academics to satisfy deeply felt information and communication need for scholarly communication (Nasir Uddin, 2003). The Web technology is driving changes in information searching and that the Web search culture has altered academics’ interaction with information. Access to the vast amounts of useful, easily accessible, free academic information on the open web has transformed the literature search and academic information retrieval process. Academics have incorporated the open Web as an everyday tool into their lifestyle and daily or weekly activities and are found increasingly self-sufficient in locating, accessing and using open Web information (Naude, Rensleigh & du Toit, 2010).

The emerging digital technology has transformed not only the way information is packaged, processed, stored and disseminated, but also how users seek and access information in the developing countries like Nigeria also. Electronic resources have become progressively more invaluable asset in the information seeking scenario of academics for their education, research, teaching and learning allowing faculty members to access a wide range of accurate and timely information on various subjects. Therefore, faculty members in developing countries also have embraced these sources of information in order to catch with the rest of the world (Owolabi & Ajiboye, 2012).

The Internet is becoming more and more central to academic research information seeking and majority of the researchers heavily rely on digital resources like databases, digital libraries, e-journals, etc. Researchers now can identify field experts in the world and reach them via email. The lines between formal and informal domains of information are blurred as technology and resources are converging and being integrated into Web-
based systems (Wang et al., 2007). Though the faculty members make use of printed sources to a greater extent and they also use e-sources quite frequently in their information gathering activities. Use of e-sources is higher among those who hold a PhD degree and among younger members of the faculty. Furthermore, use of e-sources is positively influenced by the respondents’ perceived usefulness of sources, the convenience of access to the sources and their academic productivity (Korobili, Tilikidou & Delistavrou, 2006).

Adapting to the changing information environment, computer science and engineering faculty are migrating away from the print resources to other information sources via the Internet replacing print books and journals with their online-only versions. Many of the faculty express the desire for more resources online and more accessibility from their offices and to them library is their prime gateway to electronic information and they appreciate the electronic information resources available to them from the library and use them remotely. They make use of specialized databases as well as the Google Scholar for accessing full text of the journal article (Tucci, 2011).

In the recent years e-books seems to have become an imperative part of the information seeking patterns of academics as they have gained widespread acceptance and increase among faculties in higher institutions of learning worldwide. E-books offer creative possibilities for expanding access as well as changing learning behaviour and academic research by their always accessible content regardless of time or space, facilities of quick searching and retrieving of relevant information, easy downloading, etc. (Posigha, 2012). E-journals proved to be very popular with academic researchers and they have shown a high uptake of e-journals for meeting their information needs since early 2000s. The study reveals that nearly all journals available to the institutions are used by the academics (Nicholas et al., 2010).

An investigation in an Indian university found that the academic community makes use of e-resources heavily in their information gathering activities regarding
research and general information and majority of them spend at least two hours a day to access internet. They believe that qualitative information is accessible via the electronic information sources with no wastage of time and majority of them prefer online journals (Nazim & Saraf, 2006). In the modern media-rich environment, digital libraries have been playing important roles in the information seeking scenario of academic users by connecting users to the information they want on a global scale and providing multilingual capabilities to their users. Academic users have many multilingual information needs centered on their academic activities and they are increasingly relying on digital libraries with multilingual capabilities and interactive multilingual search interfaces which mostly focus on domain-specific and language-specific translation functions (Wu, He & Luo, 2012).

All the faculty members including Lecturers, Assistant Professors, Associate Professors and Professors consider direct e-access to information very important in their search of relevant information for their research and development activities. They highly depend on e-resources, both open access and subscribed resources, for acquiring required information (Tahira, Alias & Ameen, 2011). The latest and innovative digital technologies of present world have affected the information seeking and gathering behaviour of college teachers. Digital facilities like websites, Internet search engines, e-mail, online chatting, online access to resources, etc. made information seeking and gathering process effortless for them and comparing to the past, now they are increasingly using these facilities for information seeking (Khan & Shafique, 2011).

Sahu & Singh (2013) illustrate that people engaged in teaching and research in scientific disciplines including researchers, teachers and scientists in India are very familiar with the innovative IT based digital information infrastructure and they extensively make use of these facilities for collecting information concerned with their education, teaching and research works in professional life. The users feel that the digital information infrastructure has an affirmative effect on their scholarly communication and collaborative research activities. According to a study by Naude, Rensleigh & du Toit
(2010) there is a high rate of participation in Web activities by the academic community and they increasingly use Web search engines to find academic and research information. The academics feel that Web search engines are important search and retrieval tools used regularly. It is clear that academics have integrated Web-based search services like Web search engines into their information seeking for academic and research purposes.

The emphasis of humanities scholarship is on diverse, primary and secondary sources; much of the literature points to the supremacy of print and conventional resources, but non-print media are also used. The emergence of information and communications technologies has profoundly impacted the work of humanists and an enhanced use of electronic text and text analysis in e-humanists’ research is reported. E-texts are typically located through a general web or online library search (Toms & O’Brien, 2008). Though many of the humanities academics are not explicitly aware of the concept of digital libraries, they use digital libraries in one form or other for their information gathering activities. Actual use of digital libraries varied; some of them making much use of them and others less. When they were new to an area of research or teaching, their DL use soared, especially when they were at an early stage of their career but it gear up later (Buchanan et al., 2005).

The widespread influence of the Internet has caused a fairly dramatic shift in humanist disciplines and that electronic information technology is now much more commonly used as a tool for research information seeking. The stereotype that humanists ‘fear’ technology appears to have little grounding. Humanists frequently make use of a variety of electronic information tools including online journals, OPACs, discipline specific CD-ROMs, Internet search engines, and Web sites, etc. for seeking information (Barrett, 2005). Ge (2010) notes that the modern modes of technology have changed the information environment in which social sciences and humanities researchers work. Mainly through the vast expansion of data accessible via the Internet, electronic information resources affect the information-seeking processes in the social sciences and humanities. E-resources play an essential role in these researchers’ information seeking
pursuits and their use of electronic sources is increasing as they have easy access to information anytime and anywhere. The Web, databases, and e-journals are found to be the mostly utilized resources for their research activities.

Technology enables the modern information supply chain in the innovative information environment of the twenty-first century and it is evident that web-based resources play pivotal role in the information seeking scenario, the web being one of the numerous features influencing information seeking. Hence it is very important that students need to be attentive of proficiently evaluating and using such web-based resources as Google and other databases subscribed by their library (Mavodza, 2011). It is found that the habit of utilizing digital media for acquiring information declines as academic status increase as students constitute the biggest user group than the professors and teachers in actively using electronic resources. Studies point to generational changes in the digital information seeking process as quite a distinctive form of information seeking behaviour is associated with students and quite appreciable differences between them and other members of the academic community and the scholarly user community outside academe (Nicholas et al., 2009).

The changeover from print to electronic medium in the past several years resulting in expansion of electronic information has provided students with new tools and applications for information seeking and retrieval that take their unconventional behaviour into account. With the massive opportunities offered by the web and the internet towards access to global information, students have responded proactively by changing their information bahaviour into more online oriented to meet their needs in the emerging electronic environment. But it is unfortunate that most of the students use general search engines to meet their information needs for their study and research work as they are not much acquainted with e-services provided by libraries like databases, digital library, etc. (Anaraki & Babalhavaeji, 2013).
According to the Hahn (2010) mobile computing devices are also considered to be important gateways which connect students with information resources in a convenient, timely, and easy to use manner. These devices and information seeking apps like the Wikipedia app are significant socio-technical forces which are shaping and shaped by the interconnected information seeking landscape. It is found that within mobile information seeking apps students search for both recreational and for short factual information. These apps are integrated into the student’s research process as they feel these tools as helping to become more efficient in their research.

The emergence of communication and information era has resulted in a situation where all users of higher education levels have achieved near perfection in the use of and full dependency on the digital technologies for their information needs. They conduct internet searches and are familiar with and make use of online journals, encyclopedias and electronic books to a greater extend (Negahban, 2010). Higher education students at post graduate and research level are progressively more attracted by the electronic resources for meeting their information needs of study and research. Though it has not completely substituted using the printed resources, irrespective of their gender and degree, higher education students make much use or e-resources in almost all areas of study and the trend is much higher among the technical and engineering disciplines. They prefer electronic resources due to the options of speedy as well as remote access to information, not having to personally visit the library, and saving time (Shabani, Naderikharaji & Abedi, 2011).

Nearly all graduate students search the university library intranet or the Internet for their information resources and majority of them describe the Internet as extremely useful, their primary choice of information searching, or the next step after meeting with advisers. They prefer the online journals and full text databases and often search for research papers, technical papers, online articles, journal articles and conference proceedings, indexes, reference materials (encyclopedias, dictionaries), music, images, etc. (George et al., 2006). In the present day competitive academic environment,
undergraduate college students also find the digital resources an easy source of accessing information pertaining to their study and learning. Burdened with assignments and learning and the limited resources and services available in the college library has resulted the undergraduate students increasingly attracting towards the Internet for the challenging task of gathering required information (Bhatia & Rao, 2011).

Like other academic users, online information resources have become one of the crucial tools for information seeking and gathering for undergraduate students in a great deal and they too depend on the web resources including the digital resources in library, Web 1.0 resources, and Web 2.0 resources for information. Depending on the academic tasks, the types of resources vary as it is found that students make of Web 1.0 resources such as online search engines, online book search engines, e-mail, instant messaging and Web 2.0 resources such as community-based encyclopedias for simple academic tasks equally, while students in individual complex tasks use only digital resources in library and Web 1.0 resources with more emphasis on digital resources in libraries (He, Wu, Yue, Fu & Vo, 2012).

It is also found that undergraduate students make less use of digital resources for examination related purposes, but are increasingly making use of the web to search and find information for their tasks of preparing projects and assignments and paper presentation. They generally try to access information through general search engines and majority of them depend on Google. Comparing the information seeking on web among students of various disciplines, engineering students overwhelm the Arts & Science students in their usage of internet to collect information pertaining to their academic performance (Ravichandran, Sivakumaren, Jeyaprakash & Swaminathan, 2013).

Confirming these findings, Saad & Zainab (2009) also reveal that undergraduates in the field of IT feel that Internet is a quick way of getting information and they rely heavily on the Internet to find information regarding their studies. They feel that the Internet is the ultimate source of information and that information obtained from the
Internet is sufficient to meet their information needs. Niemand (2010) also identified that the most suitable source of information as being the Internet for Digital Native students. They use search engines, mainly Google, to source relevant information, needed for course work and research, from the Internet. Though majority of them feel that the search engines only partially satisfy their need for information many of them feel that the results obtained from the search engines completely satisfy their need for information. Study by Pinto, Pouliot & Cordon-Garcia (2014) also lights into the fact that the undergraduates of the present time have absorbed the digital environment of information access and a raising smooth transition from printed books to e-books is clearly visible among

From the above discussed investigations it is quite implicit that the present day’s digital revolution with the Information and Communication Technology and the Internet has greatly influenced the ways to seek information. Users are now offered a diversity of resources with different forms of interactivity and with different levels of media richness. Both open access and subscribed resources, like databases, digital libraries, e-books, e-journals, Wikipedia, Web 1.0 resources, and Web 2.0 resources are actively used by users for information. Users with the help of digital media obtain required information without the massive investment of time, capital and infrastructure. As a result, Information-seeking through the digital means has become indispensable and their personal use for gathering information is increasing day by day.

2.9 INFORMATION SEARCHING PATTERNS AND STRATEGIES

In the present era, where people are increasingly depending the web and the internet for acquiring information, different literacy skills and higher-order thinking skills are needed for manipulating the Internet. The ability to effectively search for and locate specific information is perhaps the most critical factor as far as the online information seeking is concerned. One of the most important skills that online information seekers need to build up is the ability to navigate and locate right and relevant information. Without this skill, users spend an enormous amount of time trying to obtain specific
information on the Internet but resulting in never accessing what one set out to locate (Henry, 2005).

Web-based information environments are connected with information sites worldwide and thus web-based information seeking and gathering activities habitually involve information searching tasks. However, it appears to be difficult for Internet novice users to search information effectively and efficiently through the web and hence it is very important to gain better online information searching strategies to acquire relevant and fruitful information from the web. Different strategies include ‘control’ and ‘disorientation’ strategies, ‘trial and error’ and ‘problem solving’ strategies, ‘purposeful thinking’, ‘selecting main idea’ and ‘evaluating information’ strategies. Higher Internet self-efficacy could enhance users’ better strategies for searching information (Tsai & Tsai, 2003).

Most of the automated systems like databases provide a number of search options and these options are most powerful feature of most of them. The search functionality of systems is through two broad approaches- the basic search and advance search. Using the basic search a user can select a single search field like keyword and enter the term that he/she wishes to search for. The advance search or guided search help the users to broaden or narrow the search results as per the requirements of users thereby enhancing the precision and recall of the results (Ahmad, Mushtaq & Imran, 2012).

While seeking web information, IT professionals perform both formal and informal searches. In the informal search, the users go directly to specific sites where they expect to find the needed information and conduct simple, quick and easy searches using general search engines. Driven by the specific requirements of the task or problem, the professionals carry out formal searches using multiple search engines. In both types of searches, they employ basic searching strategies. Search formulations are relatively simple and advanced features like Boolean operators, word truncation or proximity operators are rarely utilized. Formal searches are carried out mainly by users at large IT
firms and informal searches are common to users in all types of organizations (Choo & Marton, 2003).

Majority of academic community in university searches information on the Internet using general search engines though many of them access information directly from the specific websites. Google and Altavista are the most popular and widely used search engines by the academic community for searching information (Nazim & Saraf, 2006). Information seeking behaviour studies of academic researchers in the virtual scholarly space point to the fact that researchers do not tend to make much use of advanced searching facilities in databases and basic search facility is used more times. With regard to browsing and searching, viewing menus (tables of content, lists of journals etc.) are by far the most popular means of navigating toward content (Nicholas et al., 2010).

This study is validated by Ahmad, Mushtaq & Imran (2012) also who report that eventhough databases and OPACs provide some simple search as well as other advance search options to enhance the user’s satisfaction in search and retrieval of relevant information resources, simple search options using keywords like author, subject, title, etc. are the most preferred search strategy among the academic users and advance search options such as Boolean operators, phrase search, truncation search, field specific search, range search, proximity search, limit searches, etc., yet, these search options are very rarely used by the users. Boolean operators are often used by some of the users.

The academic users, while searching for academic information online, mostly make use of the Google as the preferred search engine and most of them perform the quick search. The advanced search facilities are very rarely made use of as only a few are aware of the advanced search. Even among the users knowing the advanced search, majority of them tend to be not using them (Hariri, Asadi & Mansourian, 2014). It is unfortunate that the search assisting features, for instance, query suggestions, related searches, refining results by categories, topic based search functions, etc. provided by the
search engines and databases are used only minimally. These features are found to be using very rarely by the beginners and usually used by those who have previous experience of using them. The least usage of such features is because of the fact that most of the users are quick to judge the usefulness of them without utilizing them and perceive these features to be unfavorable and unnecessary (Inthiran, Alhashmi & Ahmed, 2015).

Students make use of the electronic databases and digital libraries in a great deal for their information needs and believe that the searching facility helps them to increase retrieving relevant information and to increase the retrieving precision coefficient, and in due course increases the information immensity (Anaraki & Babalhavaeji, 2013). Students are found to be the most likely users of library links to access scholarly databases and they rely on various searching facilities for retrieving required information. Students get better at searching as they gain searching skills and employ various strategies as they progress to the higher stages of their studies (Nicholas et al., 2009). The methods of search vary from general, open-ended searches to specific, known searches among graduate students. Students who know very little about their topic might start with a general keyword search usually with Google. At other times, students might use a known search. Known searches often begin with citation chaining, a method of following references. Students use these techniques on the open Web or on the university library intranet (George et al., 2006).

Postgraduate students at university level prefer e-resources to all other sources while seeking information and often they search the materials by single keyword. But, on the same time, they regularly use more than one keyword in their effort to obtain relevant information when they had complex information needs. Some of the students also use search techniques, such as Boolean operators, proximity operators, truncation, searching within results, finding similar results, and searching within time range. It is also found that if found with satisfactory results in the initial search, they modify the search by choosing another source and or changing the search strategy. Usage of advanced search
techniques and the search modification strategies are relatively employed by students having got some instruction programs (Malliari, Korobili, & Zapounidou, 2011).

It is also found that undergraduate students while seeking information for assignment, project works make widespread use of web based resources mainly through Google. But they seem to rely on basic searches to find the answers to their questions and that they find it difficult to identify terms or keywords and indicate a lack of applying search strategies. Large percentages of the students ‘rarely or never’ use advanced search options or limit their searches when seeking information for their study assignments (Timmers & Glas, 2010). Studying the information behaviour of students, Suarez (2013) also criticizes that most of the students do not have a systematically planned search strategy and employ trial and error method to search for information. Majority of them start their search arbitrarily, by and large with Google, and experiment with keywords given in their assignments. They very rarely use advanced search features and subject searches within a database and consult the help guides until and unless pointed out by librarians.

These finding are also supported by Anaraki & Babalhavaeji (2013) who admit that majority of undergraduates possess fewer skills and abilities in using features such as word truncation, federated searching and the selected keywords for searching. Consequently the students moderately use the existing searching limiters in various databases. On the other hand, in contrary to these studies, Saad & Zainab (2009) find that when using the Internet for information, undergraduates students based to IT fields use various search engines and they find it at ease when searching the Internet. Most of them tend to use both simple searches as well as advanced searches like wild cards, Boolean and keywords/subjects or phrases when searching.

It can be concluded that in the present era of people increasingly depending on the web and the internet for acquiring information, in order to control over the electronic information, different searching skills are needed. In the electronic information
environment, it is the ability of the information seeker to effectively search for and locate specific information that is the most critical factor for acquiring right information. Most of the electronic information systems like search engines and databases provide a number of powerful search features. The search functionality of systems is through two broad approaches- the basic search and advanced search. However, above studies confirm that most of the users do not tend to make use of advanced search features and rather they do keyword based simple searches.

2.10 FACTORS INFLUENCING INFORMATION ACCESS AND USE

Information is valuable only if it is accessed at the right time and in a form it is needed and the key to unleash the benefits of information is useful access to it. Each time they search for information, users go through a systematic process of determining best possible resources provided by libraries and databases for their needs on a topic. Reasonably, a complex blend of factors such as convenience, recommendations by librarians, availability for remote access, etc. are more likely to influence the preference of information resources (Tenopir, 1999). Faculty members are found to be accessing information resources based on their coverage, relevance to their areas or teaching and research and their immediate accessibility. For them, coverage and relevance are not as important as accessibility. Given the amount of information available today they rationalize that if one article was not easily accessible, then another article that was readily available would be found and used (Tucci, 2011). Tahira, Alias & Ameen (2011) also report finding similar to this study. They report that faculty members in universities prefer to access the resources which are easy to access and need least effort in terms of time, money and energy.

Access to and utilization of information has significant positive relationship to motivational factors like perceived usefulness and ease of use. People tend to use information that is perceived to be useful and easy to use. The easier to use, the more use of resources is expected as less effort is needed to access them. Consequently, it is found
that people increasingly go for internet based resources which are readily available with less time. People tend to use web pages that are easily accessible, appealing and readable and decline to use those which are not attractive, and difficult to navigate through. The easiness to navigate the web of internet based information resources create a feeling of self competence among the users and this leads to enjoyment and increased use of the resources (Ajuwon & Popoola, 2015).

Availability, accessibility, usability, source quality, disciplinary and research topic specificity, perceived ease of use and efficacy are the important factors that affect the use of electronic information resources by the social sciences and humanities researchers (Ge, 2010). At the same time, Toms & O’Brien (2008) categorize the factors that affect the access to e-resources by humanists to three themes: access, features and cost. The humanists emphasize the importance of e-texts that were legally accessible, available in a stable form via the internet and from reliable publishers and institutions. A number of features of e-texts judged as significant being peer reviewed, obtainable from established editions, accompanied by documentation and containing references to authoritative editions.

Among student community, ease of use, reliability, accuracy, currency, availability, and cost of the information sources are the important factors which influence the use of sources by students. Other factors such as trust, quality, credibility, validity, completeness, and comprehensiveness are also considered to be important but these are secondary to the group (Weiler, 2005). George et al. (2006) state that accessibility is the key factor that affects graduate students’ choice of resources and services. Other factors include convenience and speed. Catalano (2013) reports that speed is the most important factor in selecting an information source by students and they even accept materials of lower quality or reliability if it can save them time. Familiarity with sources is also a contributing factor to source preference.
Chapter 2  Review of Related Literature

Studying the *Digital Native* students’ information seeking behavior, Niemand (2010) observes that easy access, relevancy, being up-to-date, being complete and well directed and accuracy and certainty are the important factors that affect the choice and access to information by them. According to Taylor (2012) millennial generation students, born after 1982 have come of age in a digital world with ubiquitous information sources and the libraries with their strong mediated search support are no longer the primary sources of information for them. But these students, while seeking for information, are generally found to be selecting information resources not on the quality, validity, or authority of the documents rather they want to simply retrieve some quantity of information on their topic. Hence, factors such as structure, amount of information, currency and depth are consistently found to be more important to them than source quality.

The factors which decide the choice of a source of information by an engineer apart from task and purpose of seeking information are physical proximity, accessibility, perceived quality and utility, ease of use and previous experience about the source or acquaintance with the source. These factors are very much inter-related. It is found that accessibility and ease of use are stronger factors than perceived quality and the amount of information expected to yield by a source (Sridhar, 1989). Anderson, Glassman, McAfee & Pinelli (2001) studied the factors affecting engineers’ and scientists’ information patterns and found that perceived importance to their work is the primary factor in the decision to use an information source. This variable is the most consistent and primary reason for choice, more so than accessibility, prior use of a source, source quality, and task characteristics of complexity and uncertainty. According to Mahapatra (2006) the primary factors that affect the use and access to information resources by the scientists, engineers and technologists are the knowledge about the sources and the accessibility to the sources.

Information is for use and every user must get the information he/she seeks for. It is valuable only if it is accessed at the right time and in a form it is needed. If information
is accessed and used then only it can be said that particular information is beneficial. Studies confirm that there are many factors that influence the access and use of information by its consumers. Each time they search for information, users go through a systematic process of determining best possible resources provided by libraries and databases for their needs on a topic. Convenience, availability for distant access, immediate accessibility, coverage and relevance, usability, source quality, disciplinary and research topic specificity, perceived ease of use, etc. are some important factors affecting the selection of information for use.

2.11 BARRIERS TO INFORMATION ACCESS

Many hindrances or barriers stop the information seeker from progressing further making their information seeking and gathering activities awkward. What stops the information seeker from going forward must be considered and noted for future improvement of a system. In the case of complex systems with massive data, such as the library catalogue, these hindrances are vital to overcome. Researchers have used many types of research methods to identify and eliminate hindrances in systems to finding information efficiently with emphasis on user behaviour. It is up to research practitioners, system designers and the library community to pay attention to the user’s comments in order to lay claims to their system being ‘user friendly’ and fulfilling the goals of finding accurate information quickly (Nycyk, 2010).

The people of the developing regions of the world find information as of strategic important to for their road to development. But in the course of accessing qualitative information to meet their needs, they face a number of economic, social, environmental and infrastructural interruptions as compared to the people of the developed regions. Majority of the developing countries are information poor and information starved. They lack well developed information access systems, their authorities show less commitment to provide effective information infrastructure and they suffer lack of skilled information professionals to handle information efficiently. People face with out-right unavailability
of qualitative information resources, availability of inappropriate information, unawareness of available information, scarcity of information infrastructure and retrieval devices, etc. (Chimah & Udo, 2015).

While seeking information for teaching and research, the university teachers face a number of difficulties. Unavailability of the required information and lack of time to locate and find information are the main difficulties they face (Patitung kho & Deshpande, 2005). Tahir, Mahmood & Shafique (2008) also report that unavailability of the required information is the number one among problems the teaching community faces in acquiring information for teaching and research. Other barriers are scattering of information in too many sources and very expensive information sources. According to Bitso & Fourie (2012) teachers in a developing country with high unemployment rate, poverty, limited information services and poor information infrastructure face a large number of problems for meeting their information needs. They face with problems like heavy work load, lack of finances and teaching materials, lack of facilities such as libraries and qualified librarians, outdated information resources, shortage of information resources etc.

Marouf & Anwar (2010) found that the social scientists, as all other scholars do, also face a number of obstacles and problems in their information-seeking activities. The top ranking problems are the lack time to search information due to their academic and related activities and the inadequate experience of library staff shows why their consultation of the librarians and use of the library is low. Out of date resources, difficulty in accessing international resources are also major problems faced by users especially from developing countries. Another important obstacle which constrains them from their information seeking activity is the lack adequate information searching skills.

It is observed that, in present day’s ICT based information environment, majority of the teachers prefer online resources to meet their needs and they face many problems in effectively using the online resources. Too much information on internet scattered on
too many sources, lack of information searching skills often faced by users, and slow speed of Internet are important among the problems they face. It is found that many of the teachers make efforts to learn internet search skills and to learn how to use electronic resources to overcome these problems (Kadli & Kumbar, 2011).

Posigha (2012) acknowledge that E-books, as an information source, have gained widespread acceptance worldwide and increase use among academic staff in higher institutions of learning and e-books usage in academic institutions will double in the future. Though the fact still remains that e-books have open a myriad of opportunities for researchers, the case is not healthy in the developing countries as people encounter some constraints in their course of using e-books for their information needs. The highest ranked barrier is the lack of e-reader devices due to their inability to purchase them because of their exorbitant prices. The other barriers include the problem of accessibility, the problem of reading long text in computer screen and the lack of awareness.

Undergraduate students mainly depend on the university library for their information requirements and it is therefore assumed that their information seeking problems are inclined to the library’s procedures of use. Major factors limiting the students’ appropriate utilization of the University Library are limited borrowing of the most relevant books, insufficient copies of the relevant information materials, out–dated information materials, poorly conducting user education, reliance on manual information retrieval tools and limited sensitization of the library information resources and services (Kakai, Ikoja–Odongo & Kigongo–Bukenya, 2004).

Callinan’s (2005) study of undergraduate students found that technical and mechanical barriers to accessing information in the electronic environment as well as difficulty in obtaining core textbooks at peak times are the main difficulties faced by them in their information gathering activities. Weiler (2005) opines that whereas obstacle to the obtaining of information in the past was simply not having physical access to the information, “infoglut” and questionable validity were cited as the most common current
obstacles faced by new generation students to finding information. Not being able to determine where a website comes from or whether or not it is accurate is also of primary concern to students.

Wasike & Munene (2012) report that information needs and study behaviour of non-traditional students are generally the same as those of students undergoing studies through the regular mode of learning. But they face a number of problems in getting their required information. Most important is the shortage of time as most of them are working and they have to rush to class or to read on their own after leaving their offices. They also face a lot of challenges in accessing library services as most of the university library policies do not consider their interest of use and access to information services.

Various constraints which influence the integration and use of new information seeking technologies by medical practitioners as administrative constraints, professional constraints, technical constraints, family constraints and financial constraint (Boissin, 2005) Time, cost and inadequate information skills and training were regarded as the main barriers to information use faced by medical practitioners. Time barriers were twice as significant for respondents as cost barriers as they are always busy in their duties (Wales, 2000). Davies (2007) and Younger (2010) also report that lack of time and poor searching or navigating skills are main barriers that affect the information gathering activities of clinicians. Another issue that can negatively affect information seeking is information overload. The biomedical research information doubles every 20 years and the hardest task now is to actually locate the information required from the flood of information received.

Dawes & Sampson (2003) emphasize on the fact that the lack of time as the major barrier that impedes the search for information by the medical practitioners. This underscores the need for available, accessible and applicable information resources at point-of-care settings. Likewise, the perception that information may not be found if sought is also a paramount issue. Like medical professionals engineers in industry are
required to work overtime constantly and hence length of daily working hours and lack of time are the most important barriers the constrained them from moving towards their information goals (Bigdeli, 2007).

Above studies point out that an individual faces a number of barriers that embarrass his/her information seeking and gathering activities and prevent him/her from acquiring required information. Although people have access to millions of information through a variety sources and services in the present age of information revolution, access to right information at the right time is a distant dream for a good number of people because of these barriers. They include unavailability of the required information, lack of time, limited information services, poor information infrastructure, heavy work load, lack of finances, lack of information searching skills, etc.

2.12 CONCLUSION

Investigations of peoples’ information seeking and using patterns have been an important aspect of information science since its beginnings and, over the years, information bahaviour of a variety of users in different contexts and settings have been thoroughly investigated by LIS researchers. Studies report that information seeking bahaviour is a multifaceted, complicated and complex area of people interacting with information. Information seeking processes are always resulted by some need recognized by the user and the methods and patterns of interacting with information by individuals differ with their different viewpoints. Information behaviour researchers carry out highly dynamic and complex researches creating maps guided by methods and approaches that can take on the challenges applicable to the design of information systems and services. A careful examination of the literature on the information seeking behaviour of academic community exposes that no comprehensive study focusing on the information seeking pattern of academic community specializing the field of Information Technology has been taken up by any researcher in India.
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