INFORMATION NEEDS AND INFORMATION SEEKING BEHAVIOUR AT THE COLLEGE OF MEDICINE, THE SULTAN QABOOS UNIVERSITY, OMAN

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2005

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A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Master in Library and Information Science at the Faculty of Computer Science and Information Technology University of Malaya Kuala Lumpur

2005

ABSTRACT

This study investigated information needs and information seeking behavior of students and academic staff at the Faculty of Medicine, the Sultan Qaboos University, Oman. The study also investigated the perceptions of respondents towards the performance of medical librarians, adequacy of the library collection, equipment and facilities. A questionnaire-based survey method was used for data collection. The instrument was adapted form previous studies on similar topics. The sample of respondents comprised 390 randomly selected undergraduate students, all 28 postgraduate students, and all 74 academic staff. The response rate was 63.4% (i.e. 241 questionnaires). The findings showed that more than 72.5% of the respondents were skilled in computer use. At least 34% of respondents preferred the Internet as source of information, followed by 30% who preferred journal articles, and 25% who preferred conference papers. A majority (54.7%) of the respondents considered the World Wide Web to be the most useful information source. All the academic staff sought information to conduct research and publish, while students respondents were seeking information for class assignments. A large majority (80.9%) of the respondents frequently used "subject" as access point. Librarians were "sometimes" consulted for help in seeking information, and 76.8% of the respondents rated librarians' performance as being good. Similarly, 79.6% of the respondents preferred visiting the library personally when they needed information, and more than 90% of them were satisfied with the library. The findings are useful in understanding the information needs and information seeking behaviour and developing strategic plans for the library and information services at the College of Medicine, the Sultan Qaboos University, Oman.

ACKNOWLEDGEMENTS

The researcher would like to acknowledge the efforts of some individuals and organizations for the successful completion of this study. I would like to express my deep appreciation to Associate Professor Dr. Diljit Singh, who served as supervisor for this research, and provided valuable guidance, assistance, and strong encouragement throughout this research project.

I would like also to thank other members of Faculty of Computer Science and Information Technology, University of Malaya. Special thanks are dedicated to Prof. Dr. Zainab Awang Ngah, Dean, Faculty of Computer Science and Information Technology. I would also like to thank the staff of University of Malaya Library for their guidance, and their promptness of action in the face of time constraints.

Special thanks are due to all members of my family for their encouragement and support throughout my studies.

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CHAPTER ONE

INTRODUCTION

The human need for information is boundless and endless. People need information for different purposes and objectives. They need information for making decisions, career development, conducting research, gaining more knowledge, confirming or refuting issues, and the list goes on. Thus, satisfying information needs plays a vital role in shaping human thinking, attitudes, behaviours, communications, and teaching process.

One group of people for whom information is critical, is health-care employees. Well-informed health care employees are capable of making better decisions related to everyday health care and management of patients needs. The information technologies enable health care information specialists to search, retrieve, request, receive, and download information from sources scattered all over the world. This advancement in health care and information technology has led many researchers (e.g. Urquhart and Crane, 1994; Grand, 1997; Cogdill, 1998) to observe a necessity for including information seeking skills as a constituent of education for the health care professions.

An understanding of health care professionals' information needs is fundamental to the development of information resources and educational programmes to promote information seeking skills. Health professionals need to be provided with the necessary training to obtain the qualifications that allow them to do their work. These training programmes should include knowledge and skills on how to utilize IT-based information resources effectively and efficiently.

Though there have been many technological advances in the information resources accessible to health care workers, little consideration has been given to the nature of the information needs these resources are proposed to offer. The expansion

and the implementation of resources to maintain the needs of health care workers necessitates an understanding of the information needs that take place at some point in the course of patient care. A better understanding of health care workers existing practices of information needs and seeking would guide in upgrading information systems and assist in the development of information resources to meet their needs.

As different people have different information needs, information specialists rely on a variety of tools and information sources that help them in providing relevant information to the users. These include printed sources such as monographs, dictionaries, encyclopedias, reports, yearbooks, etc. and information technology (IT) based sources like the Internet, CD-ROM databases, and online databases.

Medical libraries are responsible for providing knowledge and information sources to the students, faculties, administrators and staff of the academic institutions. They collect a variety of materials to support teaching, research and learning activities. Thus, medical library administrators need to know what to offer to the library users and how to satisfy their information needs and facilitate the process of information seeking. This information on the needs is necessary for the library to be effective and efficient in providing services and facilities to the users.

Like other libraries and information centers, the Medical Library at the College of Medicine, the Sultan Qaboos University, Oman, should study the information needs and seeking behaviour of its users (students and academic staff). This would help library employees to be more effective and efficient in providing information services to the users. Before we discuss about the Medical Library, it is important to have an overview of the Sultanate of Oman and the Sultan Qaboos University.

1.1 Background to the Study

Sultanate of Oman

The Sultanate of Oman is located on the southern angle of the Arabian Peninsula and is bordered by the green waters of the Arabian Gulf to the East and the Indian Ocean to the South. Oman borders Saudi Arabia and the United Arab Emirates in the west, and Yemen in the south. The countryside is varied, with rugged mountains and rocky deepwater inlets to the north, the mountain and green hills of Dhofar to the south and the spectacular dunes of the Wahbiah Sands in the Centre. It occupies an area of 309,500 sq. kms (Directorate General of Tourism, Ministry of Commerce and Industry, n.d.).

Higher Education

The first institution of higher education in Oman, the Sultan Qaboos University, was established in 1986. Students were enrolled in 1986 in one of five colleges, namely Medicine, Engineering, Agriculture, Education and Science. The College of Arts was opened in 1987, and a College of Commerce and Economics was opened in 1993.

Since its establishment in 1986, the College of Medicine has undergone remarkable expansion and growth. The academic and organizational expansion has been accompanied by a continuing process of establishment and revision of academic policies, rules and regulations, and of administrative procedures. The M.D. degree offered by this University is recognized by the WHO and is accredited by the General Medical Council of the United Kingdom (See Sultan Qaboos University, College of Medicine Website at: www.squ.edu.om/med/home0/html).

College of Medicine Programmes

The College of Medicine at the Sultan Qaboos University offers both undergraduate and postgraduate programmes. The undergraduate programmes are in (a) Medical Laboratory Sciences and (b) Health Sciences. The Medical Laboratory Sciences programme prepares students for a career in Medical Laboratory Sciences specializing in microbiology, hematology, cellular pathology or clinical chemistry. It is a joint venture between the College of Science, College of Medicine and the University Hospital.

The Health Sciences degree is in general and basic medical sciences. The degree is awarded to the students after successful completion of 120 credit hours at the end of Semester 8. Subsequently, the majority of the students follow a three-year clinical training programme resulting in an MD degree.

In addition, the College of Medicine, in collaboration with the College of Science, runs a five year undergraduate programme leading to a Bachelors Degree in Medical Laboratory Sciences with a current intake (in 2004) of 16 students per year (Sultan Qaboos University, College of Medicine Website at:
www.squ.edu.om/med/home0/html).

M.D. Programme

The Doctor of Medicine (M.D.) is a three-year (year 5 to 7) undergraduate program, in which the knowledge obtained during the basic medical sciences is applied to the clinical practice of medicine. Upon completion of this stage, an M.D. is awarded.

Postgraduate Programmes

Education and research at College of Medicine have arrived at a stage at which they should add to the needs of society by establishing a Masters programme in

Biomedical Sciences. This programme will supply students with better-quality information, technical and communication skills in the different areas that comprise the basics of clinical medicine, such as anatomy, physiology, biochemistry, epidemiology and others (Sultan Qaboos University, College of Medicine Website at: www.squ.edu.om/med/home0/html).

The proposed Masters program in Biomedical Sciences will consist of two years of advanced course work and a research project. In the Masters programme, students will explore in-depth and wider perspective of biomedical sciences for teaching and research. They will be also exposed to the methodology of communication and teaching, to prepare them for future positions as academic teaching staff in academic and non-academic institutions.

The Sultanate of Oman, a fast developing state, has a growing demand for a cadre of well-trained scientists, capable of functioning effectively with least control in a site of undergraduate education in biomedical sciences, or as an ingredient of a multidisciplinary investigation group. The establishment of the Masters program in Biomedical Sciences at the Sultan Qaboos University to meet this demand is very timely. There is a particular demand for graduates with specialized knowledge and practical expertise in the area of Biomedical Sciences, and the number and variety of job opportunities for such well-qualified personnel is steadily expanding, both in the public service and in the private sector.

A range of medical and didactic organizations in Oman provide work for graduates with a strong background in Biomedical Sciences. For the College of Medicine, the planned Masters Programme in Biomedical Sciences is a step onward toward in-house preparation of employees. The earliest division to commence the programme would be a role model for others (Sultan Qaboos University, College of Medicine Website at: www.squ.edu.om/med/home0/html).

Oman Medical Specialty Board

As part of the mission of the University to continue upgrading the level of the students, the University established the Oman Medical Specialty Board (OMSB) in June 1994. This Board continued to fulfill its purpose of educating high-caliber and internationally acknowledged Omani medical specialists in different disciplines. These specialists are to provide strong and purposeful leadership in clinical, research and service endeavors in the medical fields in Oman. Additionally, they are to boost the manpower requirements of the Sultanate and contribute, towards translating the national health plan and policy into concrete reality.

The Board has representatives from Sultan Qaboos University, the Ministry of Health, and the Medical Services of the Sultan's Armed Forces and the Royal Oman Police. All the residents being trained by the Board are sponsored by one of these four government agencies. OMSB supervises and coordinates the postgraduate training programmes of ten specialties. Specialty Committees comprising highly qualified and committed professionals run these programmes on day-to-day basis. (Sultan Qaboos University, College of Medicine Website at: www.squ.edu.om/med/home0/html).

College of Medicine Computer Laboratory

The College of Medicine has a well-furnished computer laboratory, which can be utilized by the learners throughout their course studies. This laboratory is linked to the Internet and has printers and scanners

The University Hospital

The Sultan Qaboos University Hospital presents a good quality atmosphere for demonstration, investigation and case studies. The services accessible may also be utilized to support students in medical application and practice (Sultan Qaboos University, College of Medicine Website at: www.squ.edu.om/med/home0/html).

The Medical Library

The Sultan Qaboos University Medical Library is the leading health sciences library in the Sultanate of Oman. In 2000, the library staff comprised 16 members including 14 Omanis (Sultan Qaboos University, 2000). The library maintains a substantial collection of current and retrospective medical literature in various media to support the academic programmes of the College of Medicine, University Hospital and health care community in the Sultanate of Oman (Sultan Qaboos University, College of Medicine Website at: www.squ.edu.om/med/home0/html).

The library established in 1986, is located in an independent two-storey building adjacent to the College of Medicine, the Hospital, Faculty Club and the Administration Block of the University. It has the capacity of accommodating 350 seats, 194 study carrels and 16 cubicles for individual study.

The public services departments are located on both two floors of the Library. Circulation, reserves, newspapers and photocopying facilities are on the ground floor. Audiovisual materials, located behind the circulation desk, are viewed in the viewing areas on the first floor. Reference, interlibrary loan, Medline on CD-ROM literature searching, Internet service, periodicals, microforms and special collections are on the first floor, where the library administration office is located on this floor.

Reference Services

The Reference section is located on the first floor. Its collection consists of encyclopedias, dictionaries, manuals, microforms, statistical sources, sourcebooks, bibliographies related to health and the Oman Collection. The Reference Desk provides access to the Internet, MEDLINE and CINAHL (Cumulative Index to Nursing and Allied Health Literature) on CD-ROM, Current database and Clinical Medicine in printed form. However, in addition to routine guidance, the desk provides reference assistance, bibliographic verification, and MEDLINE and Internet searches when

requested. MEDLINE search request forms are present at the desk. Six personal computers are provided for independent searching. It should be noted that in 2000, the reference desk performed 196 searches for the users compared to 195 searches in 1999. The largest numbers of searches were requested by the students (70), followed by the faculty (48) and University Hospital (30) respectively (Sultan Qaboos University, 2000).

The Circulation Desk is located on the ground floor. The University ID Card or Membership Card serves as the borrowing card. It must be presented each time the borrower borrows library materials, or when requested by the Circulation staff. Those who wish to borrow materials must first register at the Circulation Desk. A bar coded valid University Identification Card or Membership Card (for non-SQU health card personnel) must be presented before completing the registration form. By signing the form, the borrower agrees to observe the by-laws, policies and regulations of the Medical Library. Students can request for journal articles not available in the library through interlibrary loans. The library recorded 611 interlibrary loans in the year 2000 as compared to 637 in the year before (Sultan Qaboos University, 2000).

It is with this context of a developing medical library in a dynamic information world that this study was undertaken.

1.2 Statement of the Problem

Health research is an intricate part of health practice. Health workers who read research findings improve their performance and become motivated to expand their knowledge and aim to improve patient situations. Millions of lives depend on health science. Health science should be a continuous activity investigating new diseases and

their remedies. Heath workers are expected to practice their career according to the current standards and therefore they should be consumers of information.

Based on the researcher's experience at Sultan Qaboos University, the use of current information by health care workers in developing nations, like Oman, remains low. It is noticeable that most of the developing countries are finding it difficult to accumulate and disseminate a good system for propagating research results to health care professionals. To a certain degree, this is a consequence of underprivileged information infrastructure and financial limitations. On the other hand, it is also partly true that little is known about information needs and information sources used by health care professionals in the developing countries (Zawawi, 2000).

Quality research is meaningless if the findings are not efficiently transmitted to the target population. It is thus necessary for information suppliers to reach the people and study their information needs and information seeking behaviour to provide information intended to answer their specific problems and meet their needs. Despite the universal consensus that biomedical research can steer quick progress in the health of people, the facts demonstrate that in developing countries the dissemination of research findings for productive use by health care experts has not been successful, and continues to be a worrying issue (Grand, 1997). Not many libraries in the developing world pay attention to the importance of user information need and information seeking behaviour. The review of literature showed few studies that draw attention to information-seeking state of affairs of hospital-based workers in developing countries and the information sources available to meet their information needs (Zawawi, 2000; Grand, 1997). A shocking finding is the obvious lack of ability of information suppliers in these countries to devise an improved and more suitable information delivery scheme that will be beneficial to all health care workers (Moahi, 2000).

A sufficient understanding of information needs and information-seeking behaviour of biomedical scientists is essential for appropriate development and improving the collections of medical libraries. Without this knowledge, medical libraries cannot successfully ensure utilization of library collections and services and they cannot meet the requests of their customers. To understand this need, many studies on this subject matter have been carried out in the developed countries. However there is a lack of such studies in the developing world, particularly in Oman. As discussed in the above paragraphs, this study contributed to the understanding of user information need and information seeking behaviour at the Medical Library, the Sultan Qaboos University, Oman.

This study thus attempts to overcome the problem of a lack of understanding the user information needs and information seeking behaviour at the Medical Library, the Sultan Qaboos University, Oman.

1.3 Objectives of the Study

This study examined the information needs and information-seeking behaviour of Medical students and academic staff, the Sultan Qaboos University, Oman. The specific objectives of the study were:

(1) To investigate information needs and seeking behaviour of students and academic staff at the College of Medicine at Sultan Qaboos University, Oman.

(2) To identify the main methods used by the students and academic staff in order to obtain information.

(3) To find out the purpose for information searching among students and academic staff.

(4) To investigate user's perceptions on the performance of medical librarians in assisting them to identify information sources.

(5) To investigate user's perceptions on the adequacy of collections, equipment and facilities at the Medical Library, Sultan Qaboos University, Oman.

1.4 Research Questions

The specific research questions addressed in this study were:

(1) What is the nature of information needs and information seeking behaviour among students and academic staff at the College of Medicine, Sultan Qaboos University?

(2) What methods do the students and academic staff at College of Medicine, Sultan Qaboos University use to search for information?

(3) What are the purposes of information searching among students and academic staff at the College of Medicine library of Sultan Qaboos University?

(4) How do the students and academic staff perceive the performance of medical librarians at the College of Medicine library?

(5) How do students and academic staff perceive the adequacy of collections, equipment and facilities available to them at the College of Medicine library at Sultan Qaboos University?

1.5 Significance of the Study

One of the primary goals of any library is to satisfy users' information needs. In a university library, a thorough understanding of the information needs and seeking behaviour of students and academic staff is fundamental for effectively supporting their

academic and research activities. Such an understanding is expected to help develop library collections and services that are more likely to satisfy their information needs. This study helps provide such an understanding.

Based on the literature review, very few studies had been carried out to investigate information needs and seeking behaviour of medical students and academic staff in developing countries. In the case of Oman, no such study could be located. As the Sultan Qaboos University is moving toward the implementation of several Masters and Ph.D. programmes, there is a critical need to evaluate the information needs and seeking behaviour of medical students and academic staff in order to support these programmes.

The significance of this study may be perceived as both theoretical and practical at the same time. From a theoretical perspective, the findings of this study would contribute to the existing body of knowledge in the areas of information needs and seeking behaviour of students and academic staff, and the adequacy of library collections and facilities. While there are a few studies on these areas, the dynamic nature of collections and changing services necessitates more and regular studies.

The study is also valuable for Arab countries, considering that their literature on these topics is scanty, scattered, fragmented and not well documented. The findings of this study may be compared with the results of earlier studies in other countries to reveal similarities and dissimilarities. This investigation may also encourage researchers in Oman and other developing countries to replicate this study in other academic environment.

From a practical perspective, it is hoped that this study will benefit the Sultan Qabooos University in general and the College of Medicine in particular to upgrade library services for its students and faculty. This can contribute to the Sultan Qaboos University's vision and mission to be a leading institution by providing quality library

services and academic excellence in Oman. The study will also useful for academic libraries in Oman to re-orient their resources, services and facilities, and to synchronize them with the information needs and seeking behaviour of their users. Academic libraries in the Middle-East region may also benefit from this study as most of the countries in this region share several common factors such as stable economic situation, social infrastructure, and a comparable educational system.

The answers to the five research questions are significant in that they help us to achieve both theoretical and practical perspectives. The responses also are useful in understanding students and faculty information needs and information seeking behaviour, purposes for seeking information, and the key methods of searching information, adequacy of collections and equipment and facilities at the Medical Library.

1.6 Limitations of the Study

This study has a number of limitations. The subjects involved in this study were full time medical students and academic staff attached to the Medical College of the Sultan Qaboos University in Oman, during the third semester of the 2003 academic year. Part-time students and part time lecturers were excluded from the study. The study also excluded students and lecturers attached to other colleges.

Another limitation is that the study was also conducted using a questionnaire, for reasons explained in Chapter 3. The responses given were accepted as valid, and no independent verification was carried out.

1.7 Assumptions

Several assumptions are made throughout the collection and reporting the data of this study. Following are the statements of important assumptions:

a. Users' information needs and seeking behaviour can be investigated through survey questionnaire as done by many studies on similar topics (e.g. Powell et. aI. 2002; Cogdill, 1998).

b. The questionnaire consisted of appropriate questions that could provide accurate answers to the research questions.

c. Users understood the questions properly and responded truthfully, thoughtfully, accurately and frankly as possible.

d. Anonymity in the survey questionnaire removed the fear that responses could reflect negatively on the users' activities.

e. Users' responses were statistically analyzed and interpreted appropriately to achieve research objectives.

f. Findings reflect respondents' information needs and seeking behaviour, and could be used to improve services and facilities of the Medical library.

1.8 Definition of Terms

The following definitions are used in this study:

Information Needs: is the state of needing anything that the person perceives as information. On the other hand, a condition or a situation that exists when the internal sense runs out. In this condition, the person does not have enough knowledge or conceptual congruity to perform tasks, resolve problems, or resolve uncertainty (Metoyer-Duran, 1991:320).

Information Seeking: is a process in which humans engage to purposefully change their state of knowledge. The process requires an information seeker's direct attention, to accept and adapt to the stimuli, reflect on progress, and evaluate the efficacy of continuing. It is a cybernetic process in which knowledge state is changed through inputs, purposive outputs, and feedback (Marchionini & Komlodi, 1993:97) .

Information-Seeking Behaviour: refers to the practices information users articulate their information needs, communicative and use information that they believe valuable for them (Zawawi, 2000: 10).

Information Resources: refers to colleagues, agencies and sources, whether printed or in an electronic format, that are utilized as a medium for meeting information needs (Zawawi, 2000: 10).

Biomedical Research: refers to scientists who are involved with the medical field pertaining to those aspects of natural sciences. This is confined to the research of diseases due to bacterial and viral infection (Zawawi, 2000: 10).

1.9 Summary

This chapter has presented brief introductory information about the study. It has provided some information on the background of the institution under examination- the College of Medicine, the Sultan Qaboos University. It has also discussed the importance of studying information needs and information seeking behaviour of different specialized group in general and the College of Medicine, the Sultan Qaboos University, in particular. In addition, the study presents the statement of the problem, objectives of the study, research questions, and significance of the study. The next chapter will present a review of literature on the major topics covered in this study.

CHAPTER TWO

REVIEW OF LITERATURE

2.1 Introduction

The previous chapter discussed the background of the study, including the statement of the problem, objectives of the study, research questions, and significance of the study. This chapter reviews selected studies dealing with information needs, information seeking behaviour, information use, the role of health libraries.

The personal experience of the researcher indicates that the use of recent information by the faculty in Oman remains low. It is obvious that developing countries, like Oman, are finding it increasingly complex to build up a sufficient mechanism for propagating research findings to staff A few studies (Grand, 1997; Zawawi, 2000; Al Hosaini, 2002) have been carried out in the developing countries to investigate information needs and information-seeking behaviour. This study aimed to examine the information needs and information-seeking behaviour of the students and academic staff at the College of Medicine, the Sultan Qaboos University, Oman.

The researcher utilized a number of specialized journals, databases, and library online resources such as LISA (Library Information Science Abstracts), the Emerald Database, and MEDLINE. The researcher also made use of the Internet search engines, such as Yahoo and Google, for identifying further reading materials. In order to find other dissertations and theses written in this area, the researcher made use of the UMI Pro Quest Digital Dissertations. These sites were accessed through the University of Malaya Library and the International Islamic University Library links. The key search terms employed to gather the data were *information, behaviour, faculty, practitioners, users, needs, methods, library, information needs, information seeking, information technology, end-user, resources, online, retrieval skills,* and *health or medical information needs*, or combinations of these terms.

2.2 Health Science Librarians

Many researchers have considered health science librarians as skillful information providers. Gruppen (1990) found that reference medical librarians were in an excellent position to gather data on users information needs.

Veenstra (1992) conducted a study to analyze the clinical medical librarian's (CML) current impact and thereby determine if a change of duties in favor of instruction was warranted. The study used a questionnaire to evaluate the current impact of the CML in Hartford Hospital, Connecticut. The study revealed that CML provided house officers with information that affected patient care between 40% and 59% of the time. Veenstra reported that the role of CML in finding and providing patient-specific information to physicians had been questioned due to the rise in direct end user searching.

Creth (1993) explored the institutional changes, new delivery modes and services, learning and development, and strategies needed for health sciences librarians to succeed and flourish in the changing medical information conditions. Creth asserted that if medical libraries were to have a crucial role in the future of health services, they should find means to articulate and act upon a vision that involves them more in the work of the faculty, researchers, and medical practitioners. Moreover, they must be willing to take risks with new services while relinquishing past practices that no longer serve user needs.

In an effort to gain an improved understanding of the information needs and information-seeking behaviour of medical oncologists, Lomax (1999) investigated a number of areas related to the acquisition, retrieval, and use of information by a population of medical oncologists with practices in the metropolitan area of Pittsburgh, Pennsylvania. The respondents were found to consult a variety of types of information resources and information technologies when seeking information needed for patient

care, with the information contained in Computer Assisted Tomography scans, Magnetic Resonance Images, and X-ray images an essential component of their clinical practice. In addition, the oncologists who were observed were found to have frequent communication and collaboration with both healthcare providers and patients as part of the information seeking process. The interview respondents made it clear that familiarity, ease-of-use, and accessibility were key components in their selection of information resources. For these respondents, emerging information systems and technology such as networked databases, multimedia clinical information systems, and computer-aided decision support tools would be both welcome and useful supplements to their clinical practice.

Jerome *et al* (2001) examined the types of questions received by the Clinical Informatics Consult Service (CICS) librarians. The study sought to analyze opinions or viewpoints of librarian's response to a particular clinical question. The study demonstrated the role of information specialist as an integral member of the patient care team. Jerome *et al* asserted that the information specialist is uniquely positioned to assist clinicians in bridging the gap between the medical literature and medical care.

2.3 Models of Information Needs

The conceptual framework for most of the information-seeking behavior reviews was initially developed by Paisley (1968) and subsequently refined by Allen (1969) and others. They sought more unity and consistency in the field of communications research. Their conceptual paradigm positioned the individual scientist or technologist as an information processor who progressed through a series of concentric information systems. The user's behavior was analyzed in relation to the information systems available to, and used by, that person's research group, organization, professional society, invisible college, and formal information system (Allen, 1969). The traditional

paradigm of information seeking and use focused on the retrieval of information systems and processing. Two early methodological departures from this paradigm were the critical-incident method used by Allen (1969) and the situational analysis techniques adopted by Dervin (1976a, 1976b). These investigators asked: "How do people define needs in different situations, how do they present these needs to systems and how they make use of what systems offer them?" (Dervin & Nilan, 1986, p. 16). Initially, these methodologies did not focus on systems use or resource utility, but rather on how individuals go about fulfilling a need. Chen and Hernon (1982) commented on the utility of these and other techniques, and noted that "an information need cannot be separated from the situation which created it and the individual who perceived it" (p. 9).

Dervin and Nilan (1986) explored the paradigmatic shift information needs and use studies. They identified three alternative needs-assessment approaches, each containing a set of related assumptions, theses, and techniques for analyzing and interpreting data from information studies considering different user groups. Taylor (1968) defined a progressive question negotiation technique for matching the inquirer's real information need to the available and appropriate information resources. Krikelas (1983) similarly proposed an information-seeking behavior model based on hierarchy preferences. In contrast to Chen and Hernon (1982), these and other approaches equate information needs as unformulated questions framed by personal history and the external environment.

A variation of these approaches draws from the fields of cognitive learning and organizational psychology. This variation shifts attention from system performance measures (such as recall and precision) to other measures describing the impact of information on changing user attitudes and revolving problems. Jakobovits and Nahl-Jakobovits (1987), who adapted the learning model of Bloom (1956) and Krathwohl, Bloom, and Masia (1964), considered the cognitive and affective aspects of library-

based information seeking behavior of students. Their taxonomy tracked students who moved from simple to complex activities in the affective and cognitive domains. Kuhlthau (1988) and Kuhlthau, Turock, George, and Belvin (1990) demonstrated that at least some types of library users can increase acquisition and use of information by enhancing their knowledge of affective orientations towards the library.

Dervin (1973, 1976a, 1976b) was one of the first researchers to formulate the sense making approach and apply it to the needs of the "average citizen." Dervin's approach consisted of a set of conceptual premises and methodologies for assessing how people make sense out of their work; and how they use resources for problem resolution. This approach led to the development and utilization of a taxonomy of information needs based on the situational analysis of the needs of "everyday" citizens. Dervin's conceptual framework and taxonomy have since been applied in a number of community and non-work-based studies, including those on the urban dwellers (Duran & Monroe, 1977; Warner, Murray, & Palmour, 1973).

Belkin (1978) and Belkin, Oddy, and Brooks (1982a, 1982b), who offered another approach, analyzed situations where the user experiences anomalous states of knowledge (ASK) and finds it difficult to articulate or recognize what is wrong. Belkin's ASK approach focused on the nature of the problematic situation and ways to make "best matches" between the ASK situation and the resources available through information retrieval systems.

Each of these approaches shifts the traditional emphasis away from measures of the information system to one on users and their ability to construct, rather than passively process information. In the most recent review of "Information Need and Use Studies," Hewins (1990) expanded on Dervin and Nilan's (1986) thesis that a new paradigm for user studies is emerging which questions the traditional assumptions made about user interactions with information provision systems. Hewins commented that

"past assumptions place the user in the passive position of having to adapt to the information provision mechanism rather than the mechanism's adapting to the user's particular characteristics" (p. 146).

A common thread in the new paradigm is the effort to understand the real nature of the information request and relate the request to the user's value system and social environment. An application of this and other approaches identified by Dervin and Nilan (1986) to culturally diverse communities have been limited to a few studies (Childers, 1975; Cochrane & Atherton, 1980; Dervin, 1976a, 1976b, 1980; Gomes, 1987; Hsia, 1973; Louie, 1976; Warner et al., 1973). A need exists to adapt these models, and test new methodologies understand the information-seeking behavior of culturally diverse groups.

2.4 Theoretical Frameworks

A growing body of research has focused on information needs and information seeking. Consequently, a number of theoretical frameworks have emerged to steer research in this field. Cogdill (1998) observes that Taylor (1968) has the precedence of creating a theoretical framework for understanding information needs known as Taylor's (1968) hierarchy of needs. According to Taylor (1968), information needs exist at four levels:

- a visceral awareness of a need for information,
- a conscious need,
- a formalized need (a qualified and rational statement), and
- a need that has been compromised in an attempt to make optimal use of a specific information resource.

Taylor (1968) believes that the environment not only directs the flow of information but also determines its value. Krikelas (1983) (in Cogdill, 1998) pointed out bigger

problems that effect information needs. Krikelas (1983) suggested a distinction between information seeking for need and stemming from a specific problem, and information gathering that is not in response to a specific problem but may be in anticipation of future needs.

Meho and Haas (2001) observed that Ellis (1986, 1989, & 1993) carried out a few studies and his research resulted in a pattern of information-seeking behaviour among social and physical scientists that included eight generic features of research activities:

- Starting: activities characteristic of the initial research for information, for example, identifying references, often by asking colleagues or consulting literature reviews and indexes and abstracts;
- Chaining: following chains of citations or other forms of referential connection between materials;
- Browsing: casually looking for information in areas of potential interest. It not only includes scanning of published journals and tables of contents but also of references and abstracts of printouts from retrospective literature searches;
- Differentiating: using known differences (e.g., author and journal hierarchies) between sources as a way of filtering the amount and nature of information obtained;
- Monitoring: maintaining awareness of developments in an area through regularly following particular sources;
- Extracting: selectively identifying relevant material in an information source;
- Verifying: activities associated with checking the accuracy of information; and
- Ending: activities characteristic of information seeking at the end of the topic or project, for example, during the preparation of papers for publication (p.7).

Meho and Haas (2001) found that Ellis' model failed to spot one particular category,

which is, accessing. Their study found that participants accounted access problem barriers to using government information. They suggested that accessing should be located between starting and chaining.

Based on in-depth, semi-structured interviews with seven tenured and seven tenure-track faculty members at Angelo State University, Fortin (2000) developed an Internet Information Seeking Activities Model to describe the information seeking activities on the Internet by faculty members at Angelo State University. The model consisted of four basic stages of activities: gathering; validating; linking; and monitoring. There were two parallel stages included in the model, namely Communicating and Mentoring. The Internet Information Seeking Activities Model was compared to the behavioural model of information seeking by faculty members developed by Ellis. The Internet Model placed a greater emphasis on validating information retrieved from the Internet. Otherwise there were no other substantive changes to Ellis' model.

Using in-depth qualitative interviews, Given (2002) investigated the information seeking behaviour of 25 mature undergraduates in the light of Reijo Savolainen's framework of everyday life information seeking. She found that the social and cultural capital these students accumulated in their daily lives played an important role in their academic information-seeking. She suggested that researchers and information professionals should understand and examine the diverse life contexts in order to support individuals with meaningful information.

Whitmire (2002) applied the Biglan model to distinguish disciplinary differences and undergraduates' information-seeking behaviour. The results provided support for the utility of Biglan's model because there were statistically significant differences in the undergraduates' information-seeking behaviour. Whitmire concluded that undergraduate majoring in the soft, pure, and life disciplines engaged in more information-seeking activities than undergraduates majoring in the hard, applied, and

nonlife disciplines.

Baker and Pettigrew (1999) discussed two important theories for studying consumer health information-seeking behaviour. The theories were Miller's psychological theory of blunting and monitoring behaviour, and Granovetter's sociological theory of the strength and weak ties. Baker and Pettigrew (1999) concluded that both theories have the potential to explain phenomena relevant to information-seeking and information-sharing activities that are of interest for library information science practitioners.

Wilson (1999) presented an outline of models of information seeking and other aspects of information behaviour, showing the relationship between communication and information behaviour in general, with information seeking and information searching in information retrieval systems. The study suggested that these models address issues at various levels of information behaviour and that they can be related by envisaging a 'nesting' of models. It was also suggested that, within both information seeking research and information searching research, alternative models address similar issues in related ways and that the models are complementary rather than conflicting. Finally, an alternative, problem-solving model is presented, which, it is suggested, provides a basis for relating the models in appropriate research strategies. Figure 1 below shows Wilson's model of information behaviour.

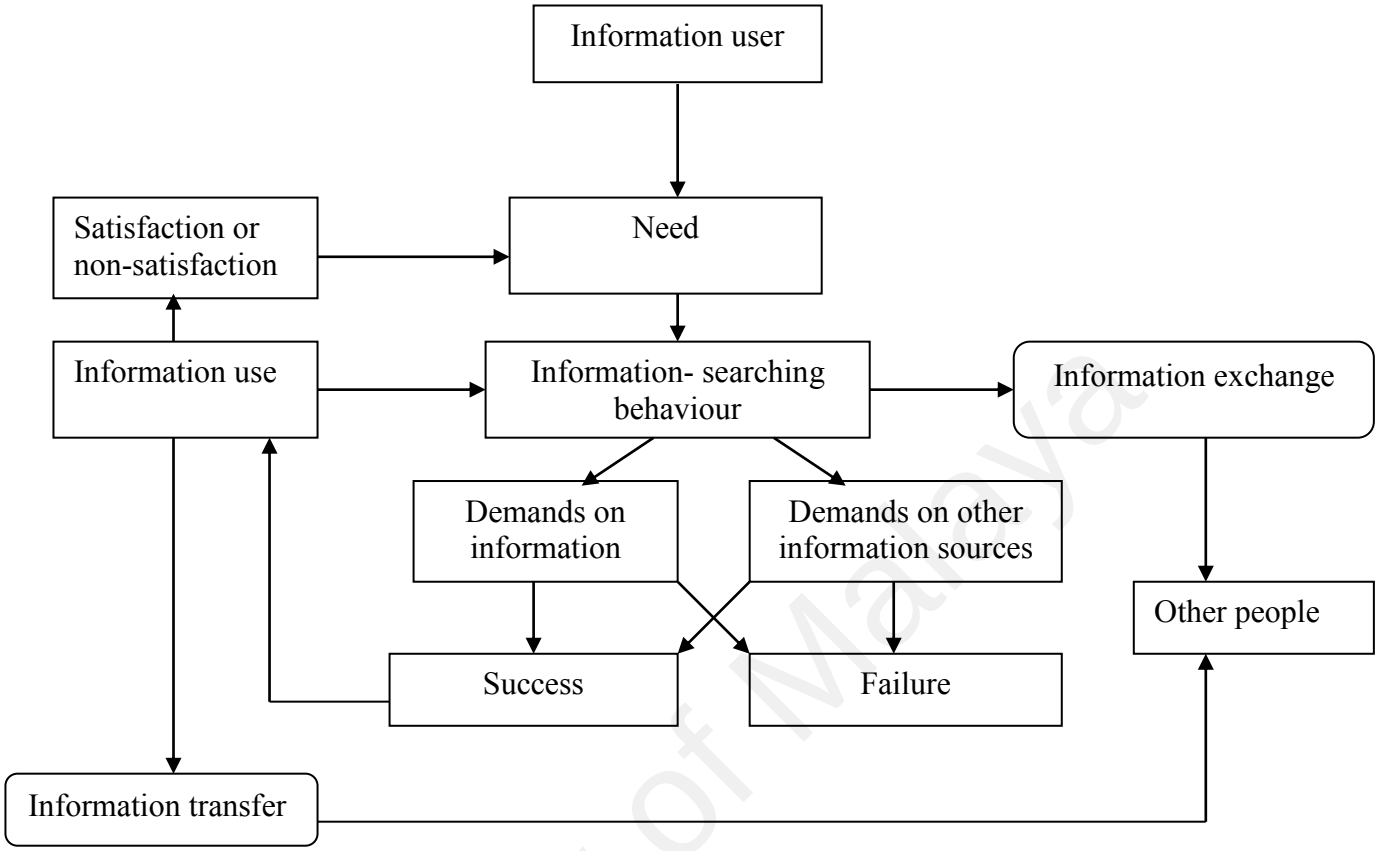


Figure 2.1 Wilson's model of information behaviour
Source: Wilson 1999: 251.

2.5 Information Explosion

Societies are experiencing unprecedented growth in the number and variety of data collected as computer technology, network connectivity and disk storage space become increasingly affordable. Data holders operating autonomously and with limited knowledge are left with the difficulty of releasing information that does not compromise privacy, confidentiality or national interests. In many cases the survival of the database itself depends on the data holder's ability to produce anonymous data because not releasing such information at all may obstruct the goals for which the data were collected, while on the other hand, failing to provide proper protection within a release may create circumstances that harm the public or others. Ironically, the broad availability of public information makes it increasingly difficult to provide data that are effectively anonymous (Sweeney, 2001).

Progress in information technologies has offered information seekers with access to information resources in an increasing array of formats. The quantity and flow of information is exploding at an amazing rate as reported by Lyman and Hal (2003) from the School of Information Management and Systems at University of California-Berkeley. Lyman and Hal (2003) found the amount of new information stored on paper, film, magnetic and optical media roughly doubled in the last three years. Five exabytes of new information, or approximately five billion gigabytes, was created in 2002 alone. Each year almost 800 MB of recorded information was produced per person. If stored on paper would take about 30 feet of books. However, 92% of all that new information was stored on magnetic media, mostly hard disks, rather than on paper, film or optical media. Information flowing through electronic channels, telephone (both cellular and landline), radio, TV and the Internet was far larger. Almost 18 exabytes of - new information was generated in 2002, three and a half times more than the amount stored. Five billion instant messages per day produced 274 terabytes of information a

year. About 31 billion e-mails were sent daily, a figure which is expected to double by 2006. E-mail ranked second behind the telephone as the largest source of information flow. E-mail users included 35% of the total U.S. population and accounted for over 35% of time spent on the Internet. The report estimated that about one-third of all e-mail was spam.

Sweeney (2001) examined growth in information being collected on individuals. The author provided examples of behavioral tendencies in the collection of person-specific data. These tendencies were: (1) given an existing person-specific data collection, expand the number of fields being collected; (2) replace an existing aggregate data collection with a person-specific one; and (3) given a question or problem to solve or merely provided the opportunity, gather information by starting a new person-specific data collection related to the question, problem or opportunity. The three tendencies resulted in more and more information being collected on individuals. Having so much sensitive information available makes it even more difficult for other organizations to release information that are effectively anonymous.

2.6 Electronic Environment

One of the major developments in libraries and information systems in the last 20 years has been the introduction and spread of electronic information resources. The change is principally of physical structure where information is increasingly being captured, processed, stored and disseminated in electronic forms. The commonly available electronic resources, such as CD-ROMs, online databases, OPACs, and the Internet and other networked information sources, are competing with, and on a number of occasions, substituting the traditional print-based information sources. Listservs and online discussion groups have allowed information seekers to pose questions and receive opinions from geographically dispersed colleagues. Johnson (in Kebede, 2002)

stated that in order for users to properly utilize the electronic information sources (EISs), they should have the following requirements.

- availability and accessibility of appropriate computer hardware and other related equipment; availability and accessibility of appropriate software which include quality and ease of use of interface and retrieval or search engines, and
- adequate user knowledge and skills in order for users to interact with and manipulate the hardware, software, and the different EISs as well as to identify and define their needs in electronic environments (Johnson 1997, p.95; cited by Kebede, 2002, p.17).

Kebede (2002) also pointed out that research has revealed that without these central requirements in place, access and utilization of content form EISs are held back. He added that most of the difficulties to the complete exploitation of electronic resources linked specifically to the local setting, such as printing problems and campus computing difficulties.

According to Kebede (2002), even if the data and information are rightly handled, this is of minimal importance if human resources are deficient in the skills to utilize the information that is made accessible to them. He suggested the following steps in order to continue identifying and meeting users' needs in electronic environments:

- keeping informed of requirements of EISs;
- assessing existing capabilities of users, both personal and environmental on a continuous basis;
- determining the difference between users' capabilities and the requirements of EISs; and
- determining the nature of EISs to be provided so that they are accessible and usable within the capabilities of the users (p. 20).

2.7 Information Needs and Information-Seeking Behaviour

Research has recognized that factors like the information seeker and his or her personality, the physical setting, the types of information sought, task complexity, and the source of information and the outcomes, influence people's information seeking behaviour. The better educated health care professionals are, in terms of medical information, able to advance upon their decision making associated day-to-day healing of the patients. Countless health care professionals have acknowledged this trend and are beginning to better exploit the fruits of research and information delivery structures to the benefit of the patients. Consequently, many researchers believe that there is a direct relationship between health research and health improvement.

With regard to government information in particular, many studies (Caswell, 1997; Postema & Weech, 1991) have identified a number of factors that influence social sciences faculties' seeking behaviour and the use of such information. These factors include: (1) the relevance of government information to one's research; (2) the importance of government information to one's research; (3) the researchers' familiarity or unfamiliarity with the arrangement of government publications in libraries; (4) the amount of time expended in searching for such materials; (5) the researchers' belief that governments publish little or nothing of value in their subject specialization; (6) the researchers' unawareness of the existence of relevant information in government publications; and (7) the unavailability of such publications to the scholars, a reason primarily found in studies conducted outside the US (Meho and Haas, 2001).

Rozic-Hristovski *et al*. (2002) investigated users' information-seeking behavior at the Central Medical Library (CMK) at the Faculty of Medicine, University of Ljubljana, Slovenia. The analysis of the CMK Web site, established in 1997, was carried out by analyzing the Web server log files. These files contained information on all user access to the Website and provided a great opportunity to learn more about the

behaviour of visitors to the Web site. The majority of the available tools for Web log file analysis provide a predefined set of reports showing the access count and the transferred bytes grouped along several dimensions. Findings showed that content of the Website doubled, patrons became more aware of its importance, and users' computer literacy, computer equipment, and Internet connections have improved significantly. Meanwhile, concrete data about visits revealed that the number of visitors and bytes transferred per visit increased more than the number of visits. Visitors most frequently started and ended their visits on the CMK home page. Reference pages with lists of print and electronic information resources were also significant starting and ending points in exploring the Web site. The analysis of Web site usage behavior revealed groups of visitors with similar needs and interests. The authors believe that concrete knowledge about the way that visitors navigate the Website can improve its design and content to increase efficiency and effectiveness.

2.8 Reasons for Seeking Information

Human beings seek information for a variety of reasons and purposes. They also seek information from different sources and places for undertaking a variety of jobs and tasks. They seek information for effective decision making, problem solving or fill gap, to be able to interact or communicate with our surroundings, etc. In fact, the process of information seeking is inherently interactive as information seekers direct attention, accept and adapt to stimuli, reflect on progress, and evaluate the efficacy of information (Marchionini & Komlodi, 1993).

Earlier studies of information seeking behaviour demonstrated that user's progress through different stages as they recognize and articulate and information need. Dervin (1977) looked at the communication of needs as the essential motive behind information seeking, while Belkin (1980) focused on the information seeker's initial

state of mind by proposing his anomalous state of knowledge framework. Belkin's approach is based on the hypothesis that an information need arises from an anomaly in the individual's knowledge state (Belkin, 1980, 1982b). As individuals cannot easily express what they do not know or what is missing, questions submitted to information systems based on the individual's request will not adequately represent what is needed. However, Kuhlthau (1993) found "uncertainty" as a major motivator for students when they are unclear about their topic and when they have a gap or lack of clarity in their understanding.

In their literature review, Ettema and Kline (1977) summarized the two major causes of knowledge gap. As indicated in the preceding paragraphs, these were ceiling effects and audience related factors. A significant contribution these authors made was a useful description to explain idiosyncratic traits; for example, communication skills, predisposition for a particular medium, and motivation to acquire information. In particular, Ettema and Kline concluded that a knowledge gap will always widen when only socioeconomic traits are considered. Whereas, an examination of situation specific differences is a better predictor of knowledge gaps. Because this approach considers the interest, motivation level and importance of information to the person.

Other researchers also support the notion of linking motivation and functional information as predictors of knowledge gaps. For example, Dervin (1980) proposed specific conditions in which individuals might seek information: decision situations; worry situations; barrier situations; and in problematic situations. Dervin's model is particularly appreciated because it indicates the urgency in which people approach information sources. Moreover, she does not hesitate to suggest barriers to the information-seeking process. Dervin, on the other hand, places the context or situation that brought about the information-seeking behavior as paramount to the total process.

Borgman (1984) explained user information seeking behavior by examining

users' mental models for the retrieval system and knowledge domain, and Kuhlthau (1988) extended the model of information seeking as a cognitive process with an affective dimension all embedded in a task context. In a series of information seeking studies, Saracevic et al. (1988) mentioned four reasons that motivate users to seek information:

1. Problem underlying the question (or more accurately, perception of the problem by the user).
2. Intent for use of the information by the user.
3. Internal knowledge state of the user in respect to the problem at hand
4. Public knowledge expectations or estimate by the user.

Williamson (1990), cited by Urquhart and Sophie (1994), found that the main reasons for his participants to seek information were a clinical nursing problem, teaching problem, or an administration problem. Assessing information needs of journalists, Nicholas (1997) noted that five reasons, for which journalist seek information, *viz*. fact-checking, current awareness, researching, to obtain a context, and stimulus.

Ocholla (1999) also mentioned career development, enlightening others, professional and need occupation, confirming or refuting issues, personal ego or prestige, justifying the existence, and to announce the ownership and priority on intellectual property, as reasons for people to seek information. He also noted other reasons such as pleasure, simple interest in the subject, to improve teaching material, to gain general knowledge, supervision of postgraduate students, to conduct research and publish (Ocholla, p.238-139).

2.9 Information Seeking on the Web

Catledge and Pitkow (1995) modified the source code for a version of XMosaic to generate a client-side log file that showed user navigation strategies and interface selections. They determined session boundaries by measuring the time between each event for all events, and adopted the heuristic that a lapse of 25.5 minutes or greater indicated the end of a "session." This heuristic is currently the most commonly used for delimiting sessions. The study found that Web pages users bookmarked did not match the most popular sites visited as a whole from the group. Only 2 percent of Web pages were either saved locally or printed. Catledge and Pitkow (1995) also found that users in their study categorized as "browsers" spent less time on a Web page than "searchers."

Tauscher and Greenberg (1997a, b) focused on the history mechanisms that Web browsers use to manage recently requested Web pages, and also modified the XMosaic browser to collect web browsing data for over six weeks from 23 participants. They found that 58 percent of the pages visited during a web browsing session were re-visits. Users not only accessed a few pages frequently (60 percent once, and 19 percent twice), they also browsed in very small clusters of pages. Thus, web browsing is a "recurring system... where users predominantly repeat activities they had invoked before, while still selecting new actions from the many that are possible" (Tauscher and Greenberg, 1997b, p. 400). The respondents explained that they revisited web pages because "the information contained by them changes; they wish to explore the page further; the page has a special purpose (e.g. search engine, home page); they are authoring a page; or the page is on a path to another revisited page" (Tauscher and Greenberg, 1997b, p. 400). In a well known study, Huberman et at. (1998) analyzed AOL (America Online) usage data collected over a five-day period, and found a mathematical law of surfing that determines the probability distribution of the depth - that is, the number of pages a user visits within a Web site (Huberman et at., 1998, p. 95). They started with a probabilistic

model of the number of links a user might follow on a Web site. Next they calculated a value for the current page and related this to the value of the next page to be accessed. When the cost of moving to the next Web page is more than its expected value, the user stops Web surfing. Huberman et at. (1998) also examined Web server logs of the Xerox external Web site in order to obtain a bounded set of Web page requests. Cookies were used to track the paths of individual users as they surfed the site. By applying the surfing model with a spreading activation algorithm, they were able to predict the number of requests for each Web page in a Web site.

Holscher and Strube (2000) investigated the effects of domain knowledge and Web knowledge on searching behavior and outcomes. Through two experiments, they found that participants who could rely on both types of expertise were overall most successful in their searches. Participants strong in domain knowledge but lacking in Web searching knowledge relied heavily on terminology and avoided the use of search operators and modifiers. Participants with lower levels of knowledge were less flexible in their search strategies and tended to return to earlier stages of their searches rather than trying new approaches. Cockburn and McKenzie (2001) analyzed four months of client side log data that recorded user actions with Netscape Navigator, including page title, URL and time of each page visit, how often they visited each page, how long they spent at each page, the growth and content of bookmark collections, and other aspects of user interaction. The results showed that:

- revisiting Web pages is a much more prevalent activity than previously reported (approximately 81 percent of pages have been previously visited by the user);
- most pages are visited for a surprisingly short period of time;
- users maintain large (and possibly overwhelming) bookmark collections; and
- there is a marked lack of commonality in the pages visited by different users.

Cothey (2002) analyzed the real world web information searching behavior of 206 college students over a ten-month period. The study used a longitudinal transaction log analysis of the URLs accessed during 5,431 user days of web information searching to detect changes in information searching behavior associated with increased experience of using the web. Contrary to expectations, the study found that as users became more experienced, they adopted a more passive or browsing approach to web information searching, and grew more eclectic in their selection of web hosts.

Kim and Allen (2002) investigated the effects of task, cognitive style, and search engine on searching activities and outcomes. Two experiments generated nearly 160 completed searches by 80 individuals. The study found that of the three variables, only task showed a significant main effect (participants were assigned to a 'known-item' search task and a 'subject' search task.) Moreover, task interacted significantly with both search engine and cognitive abilities to influence how users searched the Web. Thus, although the flexibility of the Web search engines allows different users to complete different search tasks successfully, search activities and outcomes were strongly influenced by task effects, and the techniques used and the efficiency of searches depend on how well the individual searcher fits with the specific task.

Ohles and Walton (1996) demonstrated that the Internet is a valuable source for the hospital librarian. They stated that the Internet is a catalyst that is changing the librarian from an information caretaker to information navigator and educator. Their study revealed that the Internet project was judged successful both by the National Networks of Libraries of Medicine, New England Region (NN/ LM NER) staff members, who met project objectives, and by participants, who indicated that they would continue to use the Internet after the project year. The participants also reported that learning the Internet applications strengthened their professional positions as they became competent with current online information resources.

Shamo-Esmaeel (2001) investigated university students' information needs and seeking behaviours on the Internet. A Web-based survey was administered one time. The study examined several issues related to the usability, preferences and activities of the Internet, such as searching tools, e-mail, search engines, and preferred primary sources of everyday-life information needs. The study probed the perceptions of the students toward the Internet and the traditional library. The study utilized two qualitative research works in order to develop the Web survey questionnaire, one by Kuhlthau and the other by Presno. Two hundred responses were received from the target sample within the two-week period of the study. Data was analyzed with descriptive statistics, factor analysis, and graphical representation. The author did some modifications to Kulthau's model in both content and design of the instrument. With regard to Kuhlthau's six stages of model (Stage 1: task initiation, Stage 2: topic selection, Stage 3: prefocus exploration, Stage 4: focus formulation, Stage 5: information collection, Stage 6: search closure) the greater portion of the respondents experienced stage 5 of information gathering; stage 3 had the next highest number of respondents. Very few respondents experienced stages 1 and 2. There was a systematic pattern in which, the earlier the stages the respondents were in, the more negative adjectives they selected, and vice versa. The feelings adjectives section showed a difference in the behaviour between males and females. The results indicated that most students had Internet time delay anxiety. In general, the study found that students had a great interest in the Internet and considered it a primary source of information for their personal, educational, and communication, activities.

Fuller (1995) pointed out that access to Internet resources and communication has become vital for hospitals. She concluded that medical librarians can play a vital role in the newly emerging national health information landscape through the wealth of information resources and communication capabilities of the Internet. Along the same

lines, Rauch et al. (1994) concluded that high-quality, cost effective health care will not be available unless integrated information management and the access to information that the Internet be possible.

Tannery et al. (2002) studied the use of Web-based library resources by medical students. The purpose of the study was to evaluate the use of Web-based library resources by third-year medical students. The students (147) were in a twelve-week multidisciplinary care rotation in community and ambulatory settings. The authors used individual user surveys and log file analysis of Website for data collection. Twenty resource topics were compiled into a Web site to provide students with access to electronic library resources from any community-based clerkship location. These resource topics, covering subjects such as hypertension and back pain, linked to curriculum training problems, full-text journal articles, MEDLINE searches, electronic book chapters, and relevant Web sites. More than half of the students accessed the Website on a daily or weekly basis. Over 80% thought the Web site was a valuable addition to their clerkship. The author concluded that Web-based information resources can provide curriculum support to students for whom access to the library is difficult and time consuming.

Meho and Haas (2001) investigated information-seeking behavior and use of social science faculty studying stateless nations. The study addressed two specific questions: How the faculty locate relevant government information and what factors influence their seeking behaviour and use of such information. Findings showed that besides using traditional methods for locating relevant government information, faculty studying stateless nations used the World Wide Web (Web) and electronic mail for the purpose. Results also showed that the information-seeking behaviour of social science faculty studying stateless nations were influenced by factors similar to those influencing other social science faculty.

Goodrum and Spink (2001) examined visual information needs as expressed in users' Web image queries. The examined data consisted of 1,025,908 sequential queries from 211,058 users of Excite, a major Internet search service. Twenty-eight terms were used to identify queries for both still and moving images, resulting in a subset of 33,149 image queries by 9855 users. The authors provided data on image queries, image search sessions and image terms. Findings revealed many intriguing insights into image searching by Web users. The most frequently occurring image related terms appeared less than 10% of the time, with most terms occurring only once.

2.10 Information Seeking Barriers

A number of barriers are constantly obvious from the reviewed studies: lack of time, isolation, lack of library, technological illiteracy, lack of academic structure and support, subject indexing, lack of equipment and cost, and the political situation in some nations.

Ericson (1989) indicated that control has an influence on the communication process. The closer the affinities and involvement people have with each other, the greater their need to protect their secretive life-worlds. Most of the studies considered continuing health education as an important factor for seeking information. Access to library resources, time, financial resources, geographical barriers, political constraints, and demographic variables such as rank, age, and educational degree are among the factors considered of great importance to access information.

Hollander (2000) conducted a survey of current practices in academic health sciences libraries in order to determine the level of access and services of health information available to the general public. Several respondents in the study commented that lack of time, staff, or resources were barriers to offering a full range of services to all persons wishing to use the library. Nevertheless, results of this study revealed that

academic health sciences libraries were aware of their role as information providers and were housing a collection of consumer-oriented materials. Moreover, results of this study revealed that most of the respondents were enthusiastic about helping the health seeking public.

Dorsch (2000) identified the lack of Internet skills as one of the barriers to information use. Meho and Haas (2001) also found access to online catalog, size of collection and classification scheme as factors that influence information seeking behaviour and use.

Mendes and Meadows (1997) conducted a comparative study to investigate the ways in which health professionals in Brazilian and British hospitals use libraries and information resources to see whether their patterns were similar and if so to determine whether they were differences in the information environment affected them. The study went through two stages. In the first stage, the role of library was examined. The second stage examined information activities that did not involve the library. The results indicated that both groups in the two countries showed similar patterns. However, UK health professionals clearly have better access to publications than their Brazilian counterparts, due to the problem of acquiring foreign publications, the language barrier, poorer access to electronic information resources, and greater difficulty in attending conferences. Mendes and Meadows highlighted the point that deprivation affects negative expectations. According to the authors, greater use of online communication should be practised in the teaching hospitals in Brazil, particularly for acquiring information from abroad.

Bowden et al. (1994) evaluated physicians' needs in five Texas counties. The study compared two groups of physicians in terms of demographic differences, professional practice information, and patient characteristics with the aim to determine differences between physicians who have access to established medical libraries and

physicians who practice in remote areas with limited access to medical information and educational resources. The study also investigated the reasons of the participants' use of information, with special emphasis on MEDLINE database. The participants showed consistency in their responses regarding MEDLINE non-use and that they did not know how to do MEDLINE searches by themselves. More than 40% of the respondents in each group reported that they never used the MEDLINE database. The participants were requested to explain the inadequacy in the information services they used. The study revealed that there were major differences between the two areas in health care profiles and health information resources but this did no affect the information usage.

Dee and Blazek (1993) described the information needs and the information seeking behavior of twelve rural physicians. The participants were divided into two groups according to their access to a qualifying hospital library and those without such access. The study revealed that the primary source to be relied on was colleagues since they were familiar, reliable, immediately available and inexpensive while attending meetings, subscribing to periodicals, and accessing textbooks were considered as a secondary information source in affecting the information need. The study revealed that most physicians attended local and national medical meetings, nine subscribed to medical journals, and nine owned medical textbooks. The study revealed that lack of time and accessibility of information was a major obstacle to all information retrieval. The study recommended that the National Library of Medicine (NLM) develop a computerized expert system containing concise medical information to answer the rural physicians' information needs and medical problems.

Dorsch (2000) reviewed the literature related to information needs of rural health professionals to see whether this information varied from those of other health professionals. The analysis of nine studies revealed that rural health practitioners appeared to have similar basic needs for patient-care information as their urban

counterparts. The study revealed also that both groups depended on colleagues and personal libraries as major references. However, the study revealed diversity between rural and urban health professionals due to demographic factors and barriers to information use such as charge, time, isolation, lack of Internet skills, and insufficient library access. Dorsch highlighted the need for ample financial and human support from academic centers, public agencies, and other organizations. In addition, Dorsch called upon continued research to focus on understanding information-seeking behaviours of rural health professionals to establish better tools and health services to overcome barriers encountered by this misfortunate population.

Moahi (2000) studied the information behaviour of health care planners, managers and administrators in Botswana and implications for the design of a national health information system. The study considered the tasks and roles of the managers, planners and administrators, information requirements for those tasks, what motivates information seeking, the sources and channels, the problems and barriers managers faced in information seeking, how information is used, and finally, how the information behavior impacts the design of a national health information system. Data were collected through observation, interview and document analysis. Findings showed that the information behavior of health care planners, managers and administrators in Botswana was similar to that of managers in general. However, the study identified that the information behavior was affected by the information environment of the respondents, the level and type of planner or manager, the nature of government work, and the functions of the entity that the respondents were heading.

Ngcbo (1994) investigated the health information seeking behaviour of women who reside and work in the rural communities in Swaziland. Data was collected through questionnaires and structured interview protocol from a sample of ten health workers and ninety women. The study found that women and health care workers who reside

and work within the target communities had different health information needs such as the cause of illness, directional/advisory needs, finance, and cure/preventive measures to take in order to avoid recurrence of the illness. The majority of the women obtained health information from different information resourses. The public library was not used to obtain health information. One of the reasons for non-use of the public library was lack of awareness about the library services and the perception that the library is a service exclusively designed to serve the educated. The women reported that they face several barriers in their health information seeking process, such as level of education which limits their access to print based sources; cost of batteries and lack of electricity limit their use of radio and television; poor communication between health provider and patient was another barrier which limits their access to health information.

Gollop (1993) investigated the ways which urban, older, black women get health information and some of the factors that influence such activity. Data was collected utilizing a 50 item interview instrument and in-person structured interviews were conducted with a selected group of forty-five African American women over the age of sixty-five. The study utilized 'Health Belief Model,' a theoretical framework used to indicate individuals' responses to health concerns, and had the subjects analyze proverbs or 'old sayings' as a means of observing the level of internal/external locus of control, individualism, and cooperativeness among the sample. The study revealed that respondents obtain health information from their physicians, the mass media, and from members of their social networks. Demographic variables such as age, education, self reported literacy, and accessibility influenced reading activities and library use. More than 97 percent thought it likely that the public library had health information that could help them, but only 24 percent were regular library users.

2.11 Use of Information Sources by Health Science Community

The use of information resources by health professionals has been the focus of many studies. The studies examined a number of aspects and tried to determine whether there are adequate and appropriate library collections that meet the demands of the health science community.

In the first descriptive study of its kind in Saudi Arabia, Al-Ogla (1998) examined the state of affairs of hospital and medical libraries in Riyadh. In particular, he investigated the hospital libraries, their sponsoring organizations, staffing, the academic credentials of the head of the library, collection size, available space and buildings, and services. The study revealed that the majority of the hospitals were under the government support.

Tsay (1998) examined the relationship between library journal use and citation use in the medical sciences in the hope of providing a basis for information about worldwide journal citations, or vice versa. Data on the rate of use, citation frequency, and impact factor for 835 journals was analyzed. The data was compiled from Journal Citation Report, 1993 Microfiche Edition. The author examined the use, citation and impact factor data, particularly for heavily used, highly cited journals. The author also examined the correlation between frequency of use and citation frequency, as well as frequency of use and impact factor. The study revealed that there was a significant correlation between frequency of use and citation frequency, and between frequency of use and impact factor for all titles. The study also revealed that there was a significant correlation between frequency of use and impact factor for journals that publish either clinical medicine or life sciences articles.

Bawden (2002) examined the continuing relevance of Karl Poppers' 'three world' epistemology to health-care information and knowledge: the applicability, validity and usefulness. He wanted to show that the model may be of pragmatic utility in

understanding a complex information environment. Bawden argued that pragmatic analyses are 'always possible, often useful and sometimes inevitable' (p.51). He observed that the medical domain shows the 'autonomous' attribute, which has been emphasized by Popper, with 'undiscovered' and 'rediscovered' knowledge accessible from public sources. Bawden concluded that his survey on some aspects of the nature of knowledge offers an excellent way of understanding this domain and provides support for Poppers' model as valid and can stand as a philosophical basis for the information sciences.

In a meta-analytic study, Haug (1997) reviewed twelve studies that had addressed issues about the preferences of physicians for information resources between 1978 to 1992 in the United States and Canada. The results revealed that physicians preferred obtaining information from journals and books and also conferring with colleagues to get answers to clinical and research questions.

Hurd et al. (1999) examined the formats and disciplines of materials cited in published articles to determine the nature of information utilized in their research. They discussed the implications for library information services, collection development, and management, and the potential for online services to the targeted population. They found that of the ten journals most cited by molecular biologists, five were available online, three directly from the publisher, and three from a third-party provider. Moreover, they found that molecular biologists depended heavily on scientific journals published within the last five years for meeting their information needs. The ranking of scientific journals revealed that biology journals were the most preferred, followed by journals in general science and medicine.

In a prospective cross-sectional study, D' Alessandro et. al. (1998) tried to determine the user demographics of a digital health sciences library (DHSL), the motives for use, the nature of users information requests, and success rate in finding the

desired information. The content of 500 consecutively received e-mail messages was analyzed. Females comprised 40% of the senders and males comprised 37% with the gender of 22% not being identifiable. The largest sender category was patients and laypersons followed by students, and by physicians. The study found that certain areas had more frequent information requests. Answers to the desired information were found 54% of the time and the users felt that DHSL was valuable.

In a longitudinal study, Yuan (1997) investigated the effects of end-user search experience on searching behaviour in the use of an online information retrieval system over an extended period of time for the purpose of understanding end user behaviour with different levels of experience. The findings revealed that search experience affected some aspects of end-user searching behaviour, but no general statement had been made regarding end-user long-term searching behaviour, as Yuan concluded.

McCray (1999) investigated the impact of The Arizona Health Information Network (AZHIN) on its member institutions. The findings of the study revealed that AZHIN members have access to a wider range of electronic resources than they would on their own. The library had greater credibility with the institution's information services and was seen as the primary source of Internet and other knowledge-based information. Moreover, the availability of MEDLINE and other AZHIN resources had encouraged the institution to install Internet connectivity more quickly.

Powell et al (2002) observed the need to create new knowledge and thereby to contribute to the growth of library and information science (LIS) as a profession in order to improve problem solving and decision making in the workplace. They conducted a study to investigate to what extent LIS practitioners read the research literature and whether they apply the results of research to their practice. Moreover, the study aimed to investigate how LIS practitioners assess their research skills. The study revealed that over 89% of the participants reported that they read at least one research

journal on regular basis. The authors found that the amount of reading was not found to be significantly related to how well the respondents' master degree program had prepared them. The main obstacles, in the opinion of the respondents, were that they did not find articles related to their jobs and the lack of time to read them. Half of the respondents reported that they do occasionally apply research results to their practice. Approximately 15% of those who gave no reasons for not reading research-based articles checked that they did not have enough expertise in research methods.

Hsieh-Yee (1993) examined the effects of subject knowledge and experience on novices' and experienced searchers' use of search tactics in online searches. Data on the effects of search experience indicated that novice and experienced searchers differed mainly in term selection, inclusion of synonyms, and manipulation of search items. The most interesting finding about subject knowledge was the lack of effort on novice searchers. Findings on the role of subject knowledge revealed that experienced searchers knew how to cope with deficiency and how to take advantage of the thesaurus structure for term suggestions.

2.12 Sources Used to Locate Information

Innovative information technologies have stretched the collection of resources that physicians can utilize when finding new information. This swift development of medical practices and information technologies has directed many (e.g. Urquhart and Sophie, 1994; Cogdill, 1998; Grand (1997) to observe a need for including information seeking behaviour as a constituent of education for the health professionals. Recent computer-based resources such as MEDLINE have become directly available to users who in the past may have had to depend on help from health librarians. The information resources formerly accessible only in print are increasingly available through CD-ROMs and the Internet. An understanding of physicians and their information

requirements is crucial for the growth of constructive information resources and educational programs planned to promote information-seeking skills. The revolution driving health care has encouraged consumer order for expert responsibility for excellence and cost-effective service. To meet the demands, the users need access to contemporary and high quality information for clinical decision-making. The power that technology has on the institutions, access, and rate of information trade requires the staff to be skillful at managing information in an electronic environment.

Urquhart and Sophie (1994) investigated information seeking skills of nurses and their perceptions of information sources. The study supported other studies when the nurses confirmed their reliance on informal sources of information, particularly colleagues. About one-third of the sample showed little evidence of information seeking skills. Urquhart and Sophie found that nurses tend to seek help, and lack confidence in information retrieval.

Cogdill (1998) investigated nurse practitioners' (NPs) information needs and information seeking. Results of these studies have provided a better understanding of the types of needs that arise in the minds of nurses as well as the sources of information consulted in efforts to meet these needs. The findings revealed that NPs most commonly require information linked to drug therapy and diagnosis. NPs with a master's degree were found to experience information needs more frequently than their colleagues who had not received a master's degree. The information resources NPs used most frequently were discussions with colleagues, drug reference manuals and textbooks, and protocol manuals. NPs were more likely to pursue needs related to drug therapy with a print resource, and needs related to diagnosis with a colleague. The study found that the urgency of a need to be a significant positive predictor of information seeking. The generalizability of information related to a need, however, was a significant negative predictor of information seeking. The implications of this research are relevant to

practicing NPs, NP educators and health sciences information professionals. The results of this study emphasized the importance of access to information resources in the clinical setting.

In a case study Meho and Haas (2001) described and analyzed the information needs and information-seeking behaviour of social science faculty studying stateless nations and examined the possible value of electronic mail interviewing for qualitative research. The study concentrated on developing a model that best describes the information-seeking behaviour of this user group. This model builds on David Ellis' model of information-seeking behaviour of social scientists. The findings of the study revealed that there were some clear and unique patterns of information used by social science faculty studying stateless nations. For example, fieldwork data, archival materials, and grey literature were among the most frequently used and relied on sources of information. Informal sources of information (e.g., colleagues, librarians, and friends) were found to be important as well. Government restrictions were considered the most significant barriers to information gathering. Other factors that influenced the information-seeking behaviour of the faculty were also identified.

In a study conducted by Grand (1997), nurses reported that informal information sources were the most frequently relied on for satisfying information needs that were regarded as urgent. On the other side, nurses rarely used the library because they were regarded as being not readily available or conveniently accessible.

Respondents in Dee and Blazek (1993) study considered colleagues as the primary information source. According to them, colleagues were familiar, reliable, immediately available and inexpensive. Attending meetings, subscribing to journals, and accessing textbooks were considered as secondary information sources in meeting the information needs. Very few physicians were found using a hospital library.

Ocholla (1996) provided his participants a long list of information resources to

choose from. The list included: journals, patents, conference literature, dissertations and theses, research reports, bibliographical literature, dictionaries, thesauri, yearbooks, handbooks, reviews, encyclopedias, translations, current trends and prospects, indexes, abstracts, tables, almanacs, monographs, textbooks, research reports, annual reports, online databases, professional associations, mass media, casual conversation, standards, guides, pre-prints and others (Ocholla, p.349). It is noticed that he did not include e-mail communication and group discussions on the Internet. This is not a surprise since the Internet was not widespread at the time of the study. The study revealed that the participants ranked the information sources they use in the following order of frequency: Journals, textbooks, research reports and conference literature. Others were: theses and dissertations, monographs, casual conversations, encyclopedias, reviews, dictionaries, professional associations, bibliographic literature, manuals, thesauri, handbooks, current trends and abstracts. The study found that the other sources were not used. Ocholla pointed out that this is because either they were not available or they were not directly relevant.

2.13 Methods of Seeking Information among the Health Science Community

Various studies have examined methods of information-seeking behaviour to determine the importance and usefulness of libraries in meeting the information needs among the health science community. This section reviews a number of studies that discussed means or practices utilized to collect information for clinical purposes. The focus of the reviews will be presenting the findings of these studies. The studies generally show that the health professionals utilize a variety of methods and practices to achieve their information needs.

Using both a quantitative and qualitative methodology, Fortin (2000) studied faculty members' use of and their information seeking behaviours and activities on the

Internet at Angelo State University. Differences were found between tenured and tenure track faculty on the apparent value of the Internet to meet their research and classroom information needs. Similar differences were also found among staff members in the wide ranging discipline areas of the humanities, social sciences, and sciences. Tenure-track faculty members accounted a higher average Internet use per week than tenured faculty members.

Ocholla (1999) investigated the information-seeking behaviour of academics in relation to the productivity of academics in South African Universities. The study revealed that the nature of the discipline and the rank of the academic played a vital role in determining the information-seeking behaviour. Based on the selection of information sources by the academics in the study, universities that may currently be facing budget cuts on acquisition still play a role as a source of information access by the academics.

Gorman et al (1994) investigated whether primary-care physicians' questions can be answered using the medical journal literature. The study was carried out in three stages: office interviews, online searches, and clinical feedback about the relevance and usefulness of the information retrieved. Gorman et al. found that the majority of the surveyed primary-care physicians used MEDLINE databases to search for the information they needed. The study revealed that about 88% of the respondents reported that these databases enabled them to retrieve more than 75% of the needed citations.

Wildemuth et al (1994) conducted a study to describe the types of question-asking behaviours by medical students in the context of medical education when they encounter clinical problems in the domain of toxicology. The participants were asked to generate two questions for each scenario assuming that they had access to a medical reference librarian and an internist specializing in toxicology. The study examined the frequency for each category of questions, and revealed that students often asked for the

identification of the toxin(s). Identification of references or articles related to the case was also a common question, as well as questions related to the effects of the toxin(s), an explanation of the patient's symptoms and prognosis. and a description of the appropriate treatment for a hypothetical physician. The study had two limitations: the research design did not take into consideration the variation in the number of questions generated by each participant and the restriction of the study to one domain -toxicology- and to educational setting. Nevertheless, the findings of the study support the traditional library role of providing references pertinent to clinical cases. The results give an insight for future design of other information systems supporting medical education.

Rankin (1989) compared library and information-seeking competencies, behaviours, and perceptions in students in the problem-based and traditional medical education curricula. Data on library use were gathered from four medical schools, two with two curricular tracks (one problem-based and one traditional), one school entirely problem-based, and one entirely traditional. The fourth school served as the comparable institution for the third school. The results revealed certain significant differences between the curricular groups, with students in the problem-based curricula preferring information resources supporting more independent learning, perceiving fewer barriers to information use, and overall being the more frequent library users. Students in the problem-based curricula used self-selected resources more frequently. Also, these students reported having acquired information-seeking skills at an earlier stage in their medical education. No statistically significant differences were found in information seeking competencies or in the number of different types of resources used. The study suggests that students in the problem-based curricula are more frequent library users, use information resources that support the independent learning process, acquire information seeking skills at an earlier stage in their medical education, and report greater ease in using these skills.

Tanner (2000) assessed the information literacy of nurses in the southern states of United States of America. Information literacy included information-seeking strategies, particularly electronic database searching, information needs, access, and resources. The theoretical framework made use of Rogers's Diffusion of Innovation Theory with Moore's revised Technology Adoption Life Cycle, and the process framework was a needs assessment. The study revealed that 46% of nurses read nursing research articles less than once a month. No nurses subscribed to a nursing research journal; several subscribed to professional journals that include research.

Pierce (2000) conducted a needs assessment of the nursing education environment, specifically exploring Information Literacy (IL) as a measure of readiness for using Evidence-Based Practice as a teaching/learning tool. The collaborative study investigated the same questions among practicing registered nurses and advanced practice registered nurses (Tanner, 2000). Library professionals had undertaken most of the studies on Information Literacy. Studies of Information Literacy about nurses were not found, nor was any previous study linking Information Literacy to Evidence-Based Practice. The findings of the study indicated gaps in awareness of information need, identification of information need, knowledge of electronic resource use, and application of research to practice. Pierce concluded that Information Literacy skills building should be improved among faculty and students and Information Literacy instructional programs should be incorporated into program curricula across levels.

Rozic-Hristovski et al. (2002) investigated users' information-seeking behaviour on a medical library web site. The analysis of web site usage revealed groups of visitors who have mutual needs and interests. The authors believed that concrete knowledge about the way the visitors navigate the Web site can upgrade its design and content to ensure efficiency and effectiveness.

Ortego (2001) described research on health information-seeking behaviour by rural consumers in the Big Bend region of the West Texas borderlands. The Big Bend region consists of three meagerly populated but large counties: Brewster, Presidio, and Jeff Davis. Inhabitants in this area have been known to be medically at-risk because of geographic remoteness, scarcity of medical professionals and services, and demographic characteristics generally associated with unfortunate health status. Data collected was used to find out apparent efficacy of crucial health information sources (useful or not useful in satisfying health information needs); to discover social, familial, or medical networks utilized by Big Bend consumers regarding health concerns; and to ascertain if residents perceived a need for a Health Information Center in the Big Bend region. The study revealed that, contrary to Ortego's expectations, the medical doctor was the most utilized health information source for Big Bend people who participated in this study. Segmentation analysis exposed that diverse information seeking patterns existed between population segments. For instance, even though the medical physician was the most commonly cited health information source used, the degree of use varied extensively by population group. Respondents in this study established that they were heavily engaged in information-seeking behaviour as evidenced by the high average number of sources apparently used in satisfying health information needs. As a whole, respondents indicated a need for a Health Information Center in the Big Bend area. Segmentation analysis revealed a mixture and complexity of health information seeking behaviour among the rural society in the Big Bend.

Xie (2001) specified the hierarchical levels of users' goals, and investigated the micro-level goal labeled interactive intention in relation to information seeking strategies. The study showed that users do engage in multiple types of information-seeking strategies in their information-seeking process, and these information-seeking strategies can be identified. Most importantly, the findings of the study presented how

eight types of interactive intentions (identify, learn, find, locate, keep record, access, evaluate and obtain), four types of entities (specific, common, area/location, general), eight types of methods (scanning, searching, tracking, selecting, comparing, acquiring, consulting, trial and error), and six types of resources (meta-information, part of an item/specific information, a whole item, a series of items/one location, one system/multiple databases, and human) constitute the patterns of interactive intentions and information-seeking strategies.

Thompson (1997) highlighted some of the characteristics of information resources preferred by primary-care physicians to maintain and increase their knowledge base. According to her, the kind of information physicians seek can be categorized as patient data, medical knowledge, logistic information, and population statistics.

Eskola (1998) investigated Finnish University students' information seeking behaviour in a changing learning environment. Specifically, he investigated how students' information needs, seeking and use is affected by new teaching methods. A model for information behaviour of university students was supposed to be the result of this study. The model was supposed to be developed on the basis of existing theories of information behaviour, learning and empirical studies. Until the date of publishing his article on the Internet, there were no formal findings for this study.

Kim (2001) investigated how students with different cognitive and problem solving styles navigate the WWW (World Wide Web) differently for searching information. Forty-eight undergraduate students participated in this study. They were asked to complete two different kinds of information search tasks: search for specific (factual) information and search for topical information. While searching information on the Web, the subjects' information-seeking behaviours were recorded. Their navigation patterns and information search strategies were examined in order to find

relations between cognitive and problem-solving styles and the information-seeking behaviour on the Web. The study found that online search experience and cognitive style interacted and influenced search performance, as well as navigational style and the number of nodes visited. The author concluded by calling for more research on users' information seeking in different contexts and on studies on the taxonomy of information tasks.

2.14 Factors that Influence the Information Seeking Behavior and Information Use

Many factors influence information seeking. These include accessibility, availability, uses, satisfaction, challenges facing the individual, organization, uncertainty, cost to the user, and searching and retrieval time (Ocholla, 1999).

Kim (1988) examined the health service utilization among rural population in Korea. The study analyzed the National Health Survey data collected in 1981 to examine the nature and extent of the determinants of the differential use of the available formal health services, and in the choice of a specific health service facility among other alternatives. The use of formal health services is frequently clarified by the amount of need and the ability to pay for the services. Personal characteristics partly account for the variations in the health behaviour. However, the results revealed that special attention to the personal factors should be given when these characteristics become important in social structural context. Second, to get a additional helpful information for the development of health care structure particularly in Asian rural areas where a variety of health services exist simultaneously, this study took one step further from the dichotomous differentials to the choice of health service facilities among four kinds of formal health services available in rural Korea: hospital, pharmacy, government health center, and Chinese Medicine practice. The result of this health service choice model validated that health utilization behaviour is created in the context of social systems in

general and under health care system in particular. Due to the costs involved in various health facilities of the formal health service system, the financial ability becomes an insignificant cause in choosing one capacity from available health services. On the other hand, health insurance appears to play a significant role in the choice of hospitals and health centers for the same reason. Likewise, physical ease of access to the services becomes vital when choice of health services is taken into consideration.

Grand (1997) found that nurses were frustrated in their search for information by factors such as disjointed information systems; lack of knowledge of available information sources; practice demands; and lack of information retrieval skills. He suggested promoting information access by development of information systems; information retrieval education; and national information policies to facilitate better organization of the indigenous health information.

Moahi (2000) found that the information behaviour is impacted by a number of factors: the information environment of the respondents, the level and type of planner or manager, the nature of government work, and the functions of the entity that the respondents were heading. Kebede (2002) argued that the physical form in which information content is made accessible for users' use is one of the main factors that shape information needs of users.

2.15 Summary

This chapter has reviewed several areas related to the present study. It has covered studies related to the information needs and information seeking behaviour, use of information sources by health sciences community, sources used to locate information, methods of information seeking among the health science community, factors that influence the information seeking behaviour and use, information seeking barriers, and reasons for seeking information. The next chapter will discuss research methodology.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The previous chapter reviewed the literature on key issues related to this study. It was noted that most of the studies had used the survey technique of the questionnaire to investigate human information needs and seeking behaviour. This chapter describes the aim of the study, the research design, population and sampling, instrumentation, data collection procedures, and the methods for the analysis of data.

3.2 Aim of the Study

The aim of this study was to investigate information needs and information seeking behaviour of medical students and academic staff at the College of Medicine, Sultan Qaboos University, Oman. It was also aimed to investigate the adequacy of Medical library collection, facilities, as well as librarians' performance in assisting users to meet their information needs.

The following were the research questions addressed in this study:

1) What is the nature of information needs and information seeking behaviour of students and academic staff at the College of Medicine, Sultan Qaboos University?
2) What methods do the students and academic staff at College of Medicine, Sultan Qaboos University use to search for information?
3) What are the purposes of information searching among students and academic staff at the College of Medicine library of Sultan Qaboos University?
4) How do the students and academic staff perceive the performance of medical librarians at the College of Medicine library at Sultan Qaboos University?

5) How do students and academic staff perceive the adequacy of collections, equipment and physical facilities available to them at the College of Medicine library at Sultan Qaboos University?

These research questions were answered through a research design as described below.

3.3 Research Design

This study used the survey research method for data collection. Several studies (Ellis 1986, 1989, & 1993; Grand, 1997; Zawawi, 2000; AI-Hosaini, 2002) that investigated human information needs and seeking behaviour and the related issues used survey research method for data collection. According to Busha and Harter (1980), "Survey research is characterized by the selection of random samples from large and small populations to obtain empirical knowledge of a contemporary nature. This knowledge allows generalizations to be made about characteristics, opinions, beliefs, attitudes, and so on, of the entire population being studied" (p.54).

Survey research method was preferred as it was less time consuming and economical. According to Mitchell and Jolley (1992), "self-administered surveys are easily distributed to a large number of people, inexpensive to conduct and allow anonymity" (p. 456). Similarly, the paper-based questionnaire was preferred as it could be distributed personally to the respondents without worrying about receiving and accessibility of the files as in the case of the electronic-based questionnaire. Also, the respondents could answer the questions at their convenience.

Moreover, survey research can be conducted through interview and questionnaire. Earlier studies investigating human information needs and information seeking behaviour have used one of these techniques or a combination of them. Since this study was designed to investigate similar issues covered by other studies, the methodology used by them (survey method) was considered suitable for this research.

3.4 Population and Sampling

The study population consisted of students and academic staff in the College of Medicine at the Sultan Qaboos University, Oman. For the students' sample, 390 undergraduate students were randomly selected through "convenience sampling" technique. These students were from 4th, 5th, 6th and 7th year student population. Students from 1st to 3rd year levels were excluded because at these levels the students are under the College of Science, taking basic requirements courses such as English and science related courses. Although the students from 1st to 3rd year levels need information, they seldom use the medical library due to the nature of assignments given to them. As the focus of this study was on the medical library, they were excluded from this study.

For the postgraduate students and academic staff, since there was a limited number only, no sampling was conducted and all the postgraduate students (28) and academic staff (74) were included in the study. Hence, the total number of respondents targeted in this study was 492.

3.5 Instrumentation

During the process of instrument development, a careful consideration was needed in order to express information needs and information seeking behaviour of the respondents appropriately. For this purpose, the researcher reviewed several empirical studies related to the topic of this study. Finally, two important instruments were identified. The first instrument was used by Al-Hosaini (2002) and the second by Zawawi (2000).

Al-Hosaini (2002) investigated information needs and information seeking behaviour of the postgraduate students at the main library of Sultan Qaboos University. Zawawi (2000), on the other hand, studied information needs and information seeking behaviour of biomedical scientists at the Institute for Medical Research (IMR),

Malaysia. Like the current study, the two previous studies (AI-Hosaini, 2002; Zawawi, 2000) were conducted in the developing countries. Although Al-Hosaini's study targeted postgraduate students and the main library, it has a strong link with the current study in terms of location (Sultan Qaboos University, Oman) and respondents (postgraduate students). Similar to the present study, Zawawi also targeted a medical library and its users. Further similarities were found among the two studies in regard to the research objectives and research questions. Finally, the researcher adapted the two questionnaires for developing an instrument.

The instrument development started by listing items in the order of their priority or importance to the users. It was necessary then, to translate the information needs and information seeking behaviour into the survey topic. This provided fairly clear indications for the instrumentation, including the composition of the survey questionnaire, cover letter and the administration of the questionnaires.

Next was the classification of items. This classification allowed the researcher to group items similar to one another into the same topic categories. The categories suggested the type of questions and scales needed to obtain information. As a result, the entire task of inquiry was expressed in terms that are more appropriate and meaningful to the research questions. The process also assembled the items into groups, so that items that require the same kind of task from the respondents are listed together. This was necessary for facilitating responses and thus ensuring reliable and accurate data.

Each question specified in the questionnaire was identified as relating to one or more of the research questions. Careful consideration was given wherever more than one question was implied or anywhere an identification of a particular item was ambiguous. This was important for avoiding redundancy or accidental overlap.

3.6 Questionnaire

The study used a questionnaire-based survey method for data collection, as done by several earlier studies on the related topics (e.g. McCray 1999; Ocholla, 1996; Hollander, 2000; Zawawi , 2000; AI-Hosaini, 2002). This method was preferred as it was less time consuming and economical for a scattered population. According to Crawford (1996, p.13), the questionnaire technique is widely viewed as the most attractive method of quantitative data collection. It can be applied to a whole range of issues from a simple overview survey of user satisfaction to a detailed investigation of the needs of small groups of users.

The questionnaire for this study asked the participants to answer questions related to their information needs and information seeking behaviour as well as the adequacy of library collection, equipment and facilities. It comprised of five parts with 20 questions. The first part included questions pertinent to the demographic data. The second part was on information sources used and their usefulness. The third part was about the methods used by respondents and their current usage of library catalogues. The fourth part was about the role of medical librarians, and the last part was on the adequacy of library resources.

3.7 Pilot Testing

The questionnaire was subjected to pilot testing to obtain feedback on content, format, and administration procedures. The content validity of the questionnaire was checked by twelve selected participants. Moreover, the Director of the Medical Library in Oman offered the feedback, which was included in the questionnaire revision. Based on the received feedback, the Internet was added as one of the sources of information in Part Two Questions, since the respondents chose it as one of the items when they were asked to state whether they had other choices.

After these minor modifications, questionnaires was distributed to 492 students and staff in Semester Three (beginning in July and ending in August) of the academic year 2002/3 at the College of Medicine, Sultan Qaboos University.

3.8 Data Collection

Data was collected during semester three from the beginning of July until the end of August 2003. A covering letter describing the purpose of the study and urging individual participation in the study accompanied each questionnaire. Permission was sought from the deans and lecturers and managers of the library. The questionnaires were distributed in different areas such as the medical laboratories, the library, classrooms, and some in the hospitals where some of the students were under training. Some of the questionnaires were given to the participants by hand and others were left in the library information desk. In order to ensure that respondent do not fill-in more than one questionnaire, a notice was put next to the questionnaire reminding the respondents to fill-in only one questionnaire. In a situation where respondents were approached personally, they were asked verbally whether they had already filled-in the questionnaire or not, and none of the respondents was found responding twice. The total number of the questionnaires distributed was thus 492.

Some respondents returned the questionnaire on the same day, others after some days, others more than one week, and some took a whole month. Students were asked to return the questionnaires to the library, while academic staff were asked to return them to the Main Office, College of Medicine, the Sultan Qaboos University, Oman. The researcher followed up the questionnaires and reminded the participants to return the questionnaires either by visiting the staff in their offices or reminding the students to do so whenever possible and talking to friends to remind the concerned participants to return the filled-in questionnaires. Despite all this, only 241 usable questionnaires were

returned and analyzed in this study.

3.9 Data analysis

A coding scheme was developed for data analysis. For this purpose, all the questionnaires were numbered and questions were coded for facilitating data analysis. No names were used to identify the participants, and responses were kept anonymous. The Statistical Package for Social Sciences (SPSS) was used for statistical analyses. Several cross tabulations, percentages, frequency distributions were performed. Chi-square tests were also conducted to find out differences and relationship among variables.

3.10 Summary

This chapter has described the aim of the study, research design, population and sampling, instrumentation, data collection procedures, and the selected methods for the analysis of data. The next chapter will present the findings of the analyzed data.

CHAPTER FOUR

FINDINGS

4.1 Introduction

This chapter presents the analysis of data collected from the respondents. Information obtained through the questionnaire consists of demographic information, information needs and information seeking behavior, users' perception towards the performance of librarians and adequacy of collections, equipment and facilities at the Medical Library.

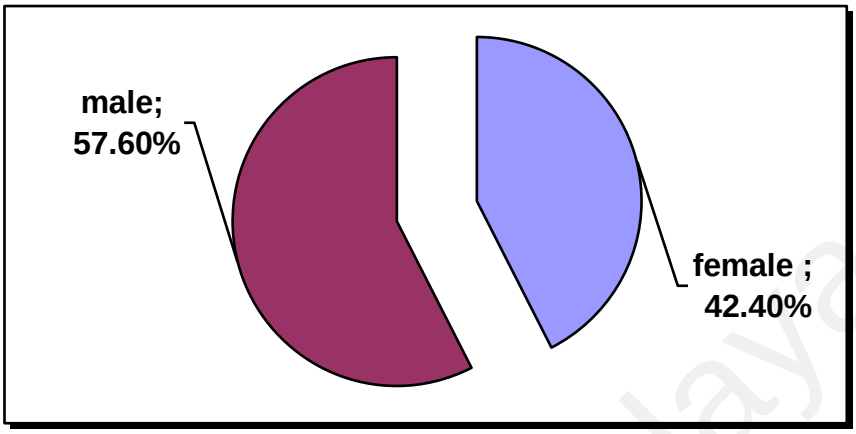
4.2 Demographic Information

A total of 492 questionnaires were distributed to both students and academic staff. Of the 492 questionnaires distributed, 250 were returned back by the researcher. Out of the 250 returned questionnaires, 9 were unusable. Three out of the 9 unusable questionnaires contained responses to demographic information only, five questionnaires had more than 6 questions unanswered and one questionnaire had unnecessary comments (e.g. not applicable) in place of required information. The final number of questionnaires used in the analysis was 241, representing a response rate of 63.4 % of the target population.

4.3 Gender

As shown in Figure 4.1, the proportion of respondents in terms of their gender was not balanced. The number of male respondents was 57.6% while the number of female respondents was slightly lower (42.4 %) than that of the male respondents.

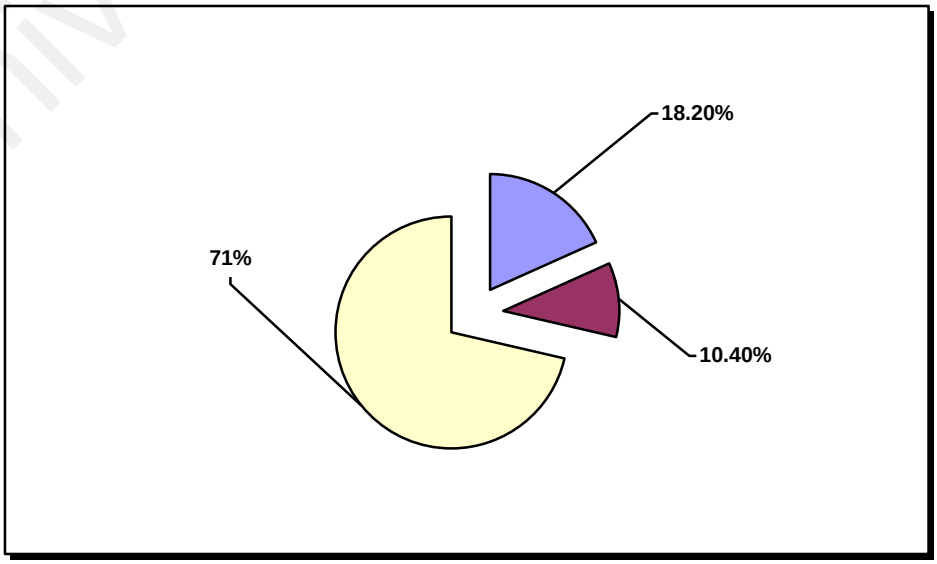
Figure 4.1: Gender of Respondents



4.4 Category of the Respondents

Findings showed that, 71% of the respondents were undergraduate students, 10.4% postgraduate students, and 18.2% academic staff. Of the undergraduate students' respondents, 35.5% were 5th year students, 22% 4th year students, 10.5% 7th year students, and 3% 6th year students. (Figure 4.2).

Figure 4.2 Category of the Respondents



4.5 Respondents' Category by Gender

Of the 44 academic staff, 29 (12%) were males and 15 (6.2%) were female. Likewise, of the 171 undergraduate students, 90 (37.5%) were male and 81 (33.7) were female. Unlike academic staff and undergraduate respondents, postgraduate respondents were almost equally distributed between male and female (Table 4.1).

Table 4.1: Cross Tabulation of Category by Gender (n= 240)

Gender	Category		
	Academic staff	**Undergraduate**	**Postgraduate**
Male	29(12%)	90(37.5%)	13 (5.4%)
Female	15(6.2%)	81(33.7%)	12(5%)

4.6 Computer Use Skills

Students and academic staff participating in the study possessed high computing skills. Of the 241 respondents, 77 (31.9%) possessed "very good", 97 (40.2%) "good", and 57 (23.6%) "satisfactory" computing skills. Only 9 (3.7%) of the respondents were found possessing "poor" computer use skills.

In Table 4.2, further analysis showed that 43(17.9%) out of 77 respondents who were "very good" in using computers were male, and 34 (14.2%) were female. Similarly, of the nine respondents with "poor" computing skills, four (1.7%) were male and five (2.1%) were female. The findings indicated that male respondents were more skilled in using computers than their female counterparts. Most probably these respondents have attended computer use training.

Table 4.2

Computer Skills by Gender (n=240)

Gender	Rating			
	V. Good	**Good**	**Satisfactory**	**Poor**
Male	43 (17.9%)	53 (22%)	36 (15%)	4 (1.7%)
Female	34 (14.2%)	44 (18.3%)	21 (8.7%)	5 (2.1%)

As indicated in table 4.3, a large number of college community appeared possessing better computing skills. However, academic staff and undergraduate population appeared to possess better computing skill than postgraduate students. Perhaps, this is due to unequal number of respondents' categories participated in this study.

Table 4.3

Cross Tabulation of Computer Skills by Category (n=239)

Category	Skill Rating			
	V. Good	**Good**	**Satisfactory**	**Poor**
Academic Staff	14 (5.8%)	20 (8.4%)	8 (3.3%)	1 (0.4%)
Undergraduate	58 (24.3%)	67 (28%)	39 (16.3%)	7 (2.9%)
Postgraduate	5 (2.1%)	9 (3.7%)	10 (4.1%)	1 (0.4%)

In summarizing this section, more than 63% of the target population participated in this study. The majority of the respondents were male (57.6%), with the female population being represented by 42.4% of the total respondents. Respondents' categories varied from students (81.4%) to academic staff (18.2%). They generally possessed good computing skills (72%).

In the following sections, demographic data of the respondents have been cross-tabulated with other variables to investigate if any relationships exist among the groups.

4.7 Preferred Information Sources

Respondents were asked to indicate preferred information sources. Findings showed that 82 (34%) out of 241 respondents preferred the Internet as a preferred source of information, followed by journal articles (74 respondents or 30.7%) and conference papers (62 respondents or 25.7%) respectively. In addition, respondents also preferred to use yearbooks (55 or 22.8%), dissertations/theses (53 or 22%), and dictionaries (52 or 21.6%). Other sources of information such as books, newspapers, indexes; abstracts, etc. were also mentioned by the respondents. However, the least preferred information sources among all was "patents", which was mentioned by 23 (9.5%) respondents among the preferred information sources. (Table 4.4)

Table 4.4
Preferred Information Sources (n= 241)

Information sources	Count (%)	Information Sources	Count %
Internet	82 (34.0)	Encyclopedias	50 (20.7)
Journal articles	74 (30.7)	Handbooks	46 (19.1)
Conference paper	62 (25.7)	Newspapers	46 (19.1)
Yearbooks	55 (22.8)	Guides	45 (18.7)
Dissertations & theses	53 (22.0)	Directories	44 (18.3)
Dictionaries	52 (21.6)	Colleagues	42 (17.4)
Indexes (print & electronic)	50 (20.7)	Books	39 (16.2)
Abstracts (print & electronic)	50 (20.7)	Patents	23 (9.5)

Based on the above findings, it appeared that most of the respondents used different information sources to meet their needs and assigned different values to these information sources. Primary information sources such as the Internet, journal articles, conference papers, reference materials were listed among the most preferred information sources. The findings are in line with Hurd et al. (1999) results who found molecular biologists depended heavily on scientific journal. Respondents in Haug (1997) study also cited journals among the preferred information sources.

4.8 Usefulness of Information Sources

With regards to the usefulness of information sources, the Internet was found the most useful source of information for the respondents, followed by discussions with colleagues as a source of information. As shown in Table 4.5, a total of 215 (89.1%) respondents indicated that discussions with colleagues as a source of information was either "very useful" or "useful" compared to 23 (9.5%) respondents who said "not very useful" while 3 (1.2%) "do not use at all." The Internet was the second most useful source of information with 212 (87.8%) respondents regarded it as either "very useful" or "useful" compared to six (2.4%) respondents who regarded this source of information as either "not at all useful" or "do not use." Online full-text services was rated the third most useful source of information among the respondents. A total of 163 (67.6%) respondents regarded it as either "very useful" or just "useful" compared to 15(6.20%) who regarded it as "not useful at all." Only 20 (8.2%) respondents did not use this source of information at all.

Table 4.5

Usefulness of Information Sources (n=241)

Information Sources	Very Useful	Useful	Not Very Useful	Not At All Useful	Do Not Use	No Response
Internet	132 (54.7%)	80 (33.1%)	22(9.1%)	3(1.2%)	3(1.2%)	1(0.4%)
Colleagues	96 (39.8%)	119 (49.3%)	23 (9.5%)	0 (0.0%)	3(1.2%)	-
Online Full-Text Services	89 (36.9%)	74 (30.7%)	43(17.8%)	15(6.2%)	20(8.2%)	-
Library Catalogues	50 (20.7%)	109 (45.3%)	66 (27.3%)	2(0.8%)	12(4.9%)	2(0.8%)
Journal Database Services	48 (19.9%)	104(43.1%)	43(17.8%)	15(6.2%)	30(12.4%)	1(0.4%)
Electronic Discussion List	33 (13. %)	79(32.7%)	54(22.4%)	11(4.5%)	57(23.6%)	7(2.9%)

Based on the above findings, it appears that most of the respondents use all the six information sources for fulfilling their information needs. However, the high percentages

on “not very useful” of some information sources; especially library catalogue shows a lack of awareness or user training need for this resource. It also shows that the available training programmes were not adequate and it did not reach to all students and faculty members of the Medical College. The higher percentages on “not very useful” also may derive from the lack of liaison between librarians and tutors responsible for training users on how to make use of information sources available at the library.

4.9 Usefulness of Information Sources by Gender

To determine whether the usefulness of the information sources varied by respondents’ gender, category or computer literacy, a non-parametric test for multiple independent samples was used to determine whether the values of usefulness of information differ between female and male, staff and students and the computer literacy of the respondents. Non-parametric tests make no assumptions about the parameters (such as the mean and variance) of a distribution, nor do they assume that any particular distribution is being used. In this analysis, nonparametric tests for multiple independent samples using the Kruskal-Wallis test were use. The Kruskal-Wallis test uses ranks of the original values and not the values themselves, which is relevant in this case, since the scale used in this section is ordinal.

Table 4.6

Usefulness of Information Sources by Gender

Information source	Chi-square	df	Sig.
Journal Database	2.147	1	0.143
Internet	0.778	1	0.378
Discussion With Colleagues	0.615	1	0.433
Online-Full Text Services	0.046	1	0.830
Library Catalogues	0.020	1	0.888
Electronic List	0.015	1	0.902

From Table 4.6 obtained by squaring average of each groups' ranks, shows an asymptotic significance level of greater than 0.05 and degrees of freedom of 1. The asymptotic significance estimates the probability of obtaining a chi-square statistic less than or equal to one. In this case, none of asymptotic result was significant to suggest any difference between female and male respondents in terms of the usefulness of information sources.

Based on the findings, we can conclude that there is no difference between gender and the usefulness of information sources. Male and female have similar perceptions towards the usefulness of the abovementioned information sources. Therefore, they should have equal access to these information sources.

4.10 Usefulness of Information Sources by Category

A Chi-square test on the differences of the usefulness of information source within the respondents' category suggested that of the six information sources mentioned, only two sources (journal database and online full-text services) showed a significant difference between students and academic staff in terms of their usefulness as compared to the other four sources of information (Table 4.7). This means there is a relationship between respondents' categories and the use of journal databases or online full-text services. The relationship might be due to the information needs of each category.

Table 4.7

Usefulness of Information Sources by Category

Information source	Chi-square	df	Sig.
Online-Full Text Services	36.143	2	0.000
Journal Database	24.735	2	0.000
Discussion With Colleagues	3.707	2	0.157
Library Catalogues	3.360	2	0.186
Internet	0.352	2	0.838
Electronic List	2.348	2	0.309

4.11 Usefulness of Information Sources by Computer Literacy Level

In contrast to gender and category, respondents' usefulness of the six sources of information differed with their computer literacy. The Chi-square value and the Kruskal-Wallis test, significant at 0.05 level, suggested differences between respondents' computers literacy level and their indication of the usefulness of library catalogue ($p = 0.045$), the Internet ($p = 0.002$), Journal database ($p = 0.031$), and Online full-text services ($p = 0.004$). This shows that respondents who are more skilled in using computers considered the Internet, library catalogues, journal database and online full-text services more useful as compared to those who are less skillful in using computers.

In fact, computer literacy has become increasingly a necessity not only for information professionals but also students and academic staff. They are expected to know the sources of information and be able to search and retrieve the needed information. Based on the above findings, it appears that, the possession of such knowledge and skills have helped some respondents to identify useful information sources as compared to others.

Table 4.8

Usefulness of Information by Computer Literacy

Information source	Chi-square	df	Sig.
Internet	14.479	3	0.002
Online-Full Text Services	13.412	3	0.004
Journal Database	8.849	3	0.031
Library Catalogues	8.052	3	0.045
Electronic List	7.041	3	0.71
Discussion With Colleagues	1.661	3	0.646

4.12 Information-Seeking Behavior

Respondents were asked to indicate different methods they employed in meeting their information needs. Information related to the method of searching for information, the place of searching for information, method of getting information from the library, methods of searching catalogue, and the use of other information sources and facilities are analyzed respectively.

4.13 Methods of Information Searching

Based on the findings (Table 4.9), publishers and collection by subject were the least frequently used choice when searching for information, while subject access point was the most "frequently" (80.9%) method used by respondents, followed by article title (70.1%). This high percentage is a result of the availability of OPAC in the library, which allows easy identification of information sources. Browsing through the shelves was "frequently" used by 17.8% of the respondents, probably because the method is easiest requiring little skills and a user can find related studies through this method.

Table 4.9

Information Search Methods (n=241)

Search Method	Frequently	Occasionally	Rarely	Never	No Response
Subject	195 (80.9%)	32(13.3%)	8(3.3%)	1(0.4%)	5(2%)
Title	169 (70.1%)	62(25.7%)	7(2.9%)	3(1.2%)	-
Article Title	118(48.9%)	84(34.8%)	28(11.6 %)	9(3.7%)	2(0.8%)
Key word	151(62.6%)	53(21.9%)	26(10.7 %)	8(3.3%)	3(1.2%)
Journal Title	100(41.5%)	99(41%)	33(13.6 %)	7(2.9%)	2(0.8%)
Part of keyword	65(26.9%)	86(36.9%)	67(27.8 %)	22(9.1%)	1(0.4%)
Author	47(19.5%)	101(41.9%)	77(31.9 %)	14(5.8%)	2(0.8%)
Browsing through Shelves	43(17.8%)	106(45.2%)	60(24.8 %)	30(12.4%)	2(0.8%)
Collection by Subject	39(16.2%)	111(46%)	58(24%)	31(12.8%)	2(0.8%)
Publisher	16(6.6%)	53(21.9%)	87(36%)	84(34.8%)	1(0.4%)

In general, respondents were familiar with most of the search methods, particularly subject area, title and keywords. This was probably because the three elements are essential for easy identification and access of information sources. It could be also due to the fact that the methods (Subject, Title and Key Words) are the most popular search method used by information providers for retrieving information (e.g. online databases, the Internet, or WWW).

4.14 Frequency of Use of Library Catalogues

Besides asking for information related to methods of information search, respondents were also asked to provide information related to their usage of different library catalogues. Based on the findings from the survey, it was found that most (180 or

74.7%) of the respondents "frequently" use catalogues at Sultan Qaboos University's library compared to their usage of library catalogues in other institutions. In contrast to the use of other institutions in a particular city, few (8 or 3.3%) respondents "frequently" use library catalogues of other institutions in Oman. However, most (172 or 71.4%) of the respondents "never" use library catalogues in other institutions in Oman or even if they use, they "rarely" use them compared to 61 (25.3%) respondents who uses them "occasionally".

Table 4.10

Frequency Use of Library Catalogues (n=241)

Library Catalogues	Use				
	Frequently	Occasionally	Rarely	Never	No Response
Sultan Qaboos University	180(74.6%)	39(16.1%)	17(7%)	5(2%)	-
Institutions Abroad	16(6.6%)	57(23.6%)	85(37.3%)	83(34.4%)	-
Other institutions in your city	13(5.3%)	70(29%)	67(27.7%)	91(37.7%)	-
Other Institutions in Oman	8(3.3%)	61(25.3%)	80(33.1%)	92(38.1%)	-

The findings indicate that, a majority of the respondents are aware of the time and effort they can save when using library online catalogue to search for information. More than getting the classification number of books, OPAC can provide users with information about the availability of any book. Moreover, OPAC can provide users with information about new arrivals not yet catalogued.

4.15 Methods of Getting Information from the Library

Questions in this section were aimed at providing information related to the methods employed by the respondents in meeting their information needs. Based on the information collected, most of the respondents (192 or 79.7%) "always" visited library personally whenever they need information. Only 3 (1.3%) respondents "never" visited

library personally, 38 (15.8%) visited "frequently" and six (2.5%) "occasionally" when they need information.

Apart from visiting library personally, calling the librarian to get information needed from the library was another alternative. Six (2.5%) respondents "always" called librarian, 35 (14.5%) called "frequently," 101 (41.9%) "occasionally" and 96 (39.8%) "never" used this method at all.

Sending email or fax to librarian or asking colleagues are other methods of getting information needed from the library. Only 8 (3.3%) respondents "always" send a fax to the librarian compared to 5 (2.1%) respondents who "always" sent an email to librarians. In contrast, asking colleagues about the needed information was the most common method among respondents. Many (120 or 50.4%) respondents either ask colleagues "always" or "frequently" for information from the library compared to 118 (49.9%) who "occasionally" or "never" ask colleagues at all as shown in Table 4.11.

Table 4.11

Methods of Getting Information from the Library (n=241)

Method	Frequency				
	Always	Frequently	Occasionally	Never	No Response
Library Visit	192(79.6%)	38(16.6%)	6(2.4%)	3(1.2%)	2(0.8%)
Ask Colleagues	17(7%)	103(42.7 %)	76(31.5%)	42(17.4%)	3(1.2%)
Fax Librarian	8(3.3%)	11(4.5%)	28(11.6%)	193(80.1 %)	1(0.4%)
Call Librarian	6(2.4%)	35(14.5%)	101(41.9%)	96(39.8%)	3(1.2%)
Email Librarian	5(2%)	9(3.7%)	21(8.7%)	205(85%)	1(0.4%)

It appeared that a majority of the respondents preferred to visit library, though the frequency of library visit varied. The finding is in accordance with Burton (1995) study

which reported that 80.6% of respondents visited their library once or more in a week. However, in the study by Zawawi (2000), more than 70% of the respondents visited the library at least once or twice a month. Other methods of obtaining information from the library were relatively less popular among the respondents.

4.16 Purposes for Using Library Catalogues

Respondents were asked to indicate purposes for using library catalogue. Findings showed that, confirming the existence of a book was the most frequently purpose for using library catalogue among respondents. More than 47% of the respondents reported using the catalogue "frequently" for this purpose.

Respondents were also found using library catalogue "frequently" to find list of books on subjects (29%). Few respondents (14.8%) "frequently" used the catalogue for creating reading list as compared to 38.1% of those who "occasionally" used the catalogue for obtaining citation details.

Respondents also were found to have other reasons or purposes to use the library catalogue. These include finding library books or journals. Alternatively, respondents find the book on the subject of interest or use citations before searching through the catalogue to find the required information. More than 24% of the respondents "frequently" used the catalogue for to find all books on a subject, compared to those who "frequently" search the catalog to find the library that holds the books (17.4%), journal (12.9%), or citations (12.6%).

Table 4.12

Purposes for Using Library Catalogues (n=241)

Purpose	Frequency				
	Frequently	Occasionally	Rarely	Never	No Response
Confirm the existence of the book	113(46.9%)	93(38.6%)	26(10.9%)	8(3.3%)	1(0.4%)
Find the list of books on the subject	70(29%)	110(45.6%)	46(19%)	13(5.3%)	2(0.8%)
Find all the books on the subject	58(24%)	101(41.9%)	64(26.5%)	16(6.6%)	2(0.8%)
Find the Library that holds the book	42(17.4%)	99(41.1%)	56(23.2%)	43(17.8%)	1(0.4%)
Create reading list	35(14.5%)	101(41.9%)	59(24.4%)	42(17.4%)	4(1.6%)
Find the library holding the Journal	31(12.9%)	86(35.6%)	74(30.7%)	48(19.9%)	2(0.8%)
Obtain citation details	30(12.4%)	92(38.1%)	76(31.5%)	40(16.5%)	3(1.2%)

The high percentage found to "confirm the existence of the book" was expected, because this information leads to other purposes such as identifying the location of the book, borrowing the book, etc. Furthermore, the low percentage for "finding the library holding the journal" showed that the library obtained most of the journals needed by the respondents. Similarly, the use of catalogue to "obtain citation details" was low because majority of respondents were students, particularly undergraduate students, who normally do small assignments or home work.

4.17 Use of Other Information Sources and Facilities

In this section, respondents were asked about their use of other information sources and facilities available in local libraries and institutions abroad. Based on the responses obtained, the use of the Internet, email or electronic discussion groups were more frequently used among the respondents compared to the use of other facilities, such OPAC or CD-ROM as information resources. Out of 95.8 % of those who use the Internet and its facilities, 45.0 % used it "frequently," 38.3% used it "sometimes" and 12.5% "rarely" used

the Internet and its associated facilities such as email or discussion groups. The use of Online Public Access Catalogue (OPAC) was the second most used facility. Out of 93.3% of those who use OPAC at Sultan Qaboos University Library, 40.8 % use it "frequently," 37.9% use it "sometimes" and 14.6% "rarely" use OPAC resources at Sultan Qaboos University library for searching for information.

CD-ROMs were the third most used information sources with 89.1% of the respondents using it though at a varying frequency. More than 12% of those who use CD-ROM use it "frequently," 46.9% use it "sometimes" and 30.1% "rarely" use this method. The use of institutions abroad as information sources while searching for information is found to be not very common among the respondents. Most (56.3%) of the respondents "rarely" or "never" use institutions abroad for their information search. Only 5.8% of the respondents "frequently" made use of other institutions.

Table 4.13

Use of Other Resources and Facilities (n =241)

Resources and facilities	Frequency			
	Frequently	Sometimes	Rarely	Never
Internet (e-mail, Discussion groups	108 (45%)	92 (38.3 %)	30 (12.5%)	10 (4.2%)
Online public access catalogue (OPAC) of SQU	98 (40.8%)	91 (37.9 %)	35 (14.6 %)	16 (6.7%)
CD-ROM	29 (12.1%)	112 (46.9%)	72 (30.1%)	26 (10.9 %)
Institutions Abroad	14 (5.8%)	91 (37.9%)	72 (30%)	63 (26.3%)

4.18 Purpose of Seeking Information

Respondents were also asked to provide purposes for seeking information. Based on the findings from the survey, academic staff were found seeking information to conduct research and publish (100%), for career development (79.5%), professional or occupational

matters (95.4%). While all the students were found seeking information for class assignments, nevertheless a majority of them (77.1% of undergraduate and 100% of postgraduate) sought information for research or publishing. None of the students found seeking information to announce the ownership and priority on intellectual property, for professional or clinical nursing problem.

Table 4.14

Purpose of Seeking Information (n=241)

Reasons	Academic staff	Undergraduate	Postgraduate
Career development	35 (79.5)	6 (3.5)	12 (48%)
To announce the ownership and priority on intellectual property	22 (50%)	-	-
Professional/ occupational matters	42 (95.4)	-	-
Confirming or refuting issues	27 (61.3)	63 (36.8)	21 (84%)
Pleasure	15 (34%)	73 (42.6)	11 (44%)
Simple interest in the subject	32 (72.7)	123 (71.9%)	18 (72%)
To gain general knowledge	27 (61.3)	78 (45.6%)	16 (64%)
To conduct research and publish	44 (100%)	132 (77.1%)	25 (100%)
Clinical Nursing problem	17 (38.6)	-	-

4.19 The Role of Librarians in Facilitating Information Needs

This section examined the perceptions of the respondents on the role played by librarians in effectively facilitating the information needs of the library users. Based on the responses as shown in Table 4.15, consulting librarians for help related to users' information need is the most "frequently" used by respondents as compared to the frequency of discussing information sources with librarians. A total of 57 (23.7%)

respondents consulted librarian "frequently" for help, 49.3% "sometimes," and 22.0% "rarely" consult librarian for help.

Respondents also discussed information sources they need from the library with librarians, although few (15.9%) of them do this "frequently" as compared to those (23.8%) who "rarely" do this or those (21.8%) who "never" discuss with librarians. The frequency of respondents' difficulties in getting information from the library is found to be not a common problem. Although most (95.7%) of the respondents faced some difficulties in getting information they needed from the library, most (55.2%) of them did not face these difficulties always but "sometimes" as compared to only 10.0% of the respondents who "frequently" face difficulties. More than 30% of respondents reported "rarely" facing difficulties in getting information and only 10 (4.3%) respondents reported to have "never" faces difficulties in getting information from the library. This indicates that librarians are useful in helping respondents get the information they require from the library.

Table 4.15

The Role of Librarians in Facilitating Information needs (n=241)

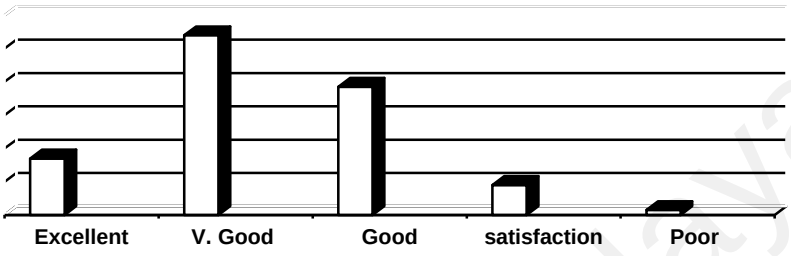
Role	Frequency			
	Frequently	Sometimes	Rarely	Never
Consult librarian for help	57 (23.7%)	119 (49.3%)	53 (22%)	12 (5%)
Discussing information source with librarian	38 (15.9%)	92 (38.5%)	57 (23.8%)	52 (21.8%)
Face difficulties in getting information needed	24 (10%)	132 (55.2%)	73 (30.5%)	10 (4.3%)

4.20 Perceptions of Librarians Performance

Respondents were asked to rate the performance of the librarians at the College of Medicine in effectively meeting their information needs. From the responses obtained, it was found that most of the respondents (185 or 76.8%) perceived the performance of the librarians as "very good" or "good" to meet their information needs. Only 3 (1.2%)

respondents rated the performance of the librarians as "poor" compared to 34 (14.1%) who perceived the performance of the librarians as "excellent". This indicates that most of respondents acknowledge positively the performance of the librarians.

Figure 4.3 Percetions towards Librarians Performance



4.21 Perception by Gender and Category

Cross tabulation was performed to examine if respondents' perception towards librarians' performance varies with regards to their gender or category. The result showed that academic staff were more satisfied with the performance of librarians compared to the students. A large majority (72.8%) of the academic staff rated the performance of librarians as either "excellent" or "very good." None of the academic staff was dissatisfied with librarians' performance. Like academic staff, majority (58.4%) of the undergraduate students were satisfied with the librarians' performance by either rating them as "excellent" or "very good," only 1.8% were found dissatisfied with librarians' performance..

Table 4.16

Perception by Gender and Occupation Category(n=241)

Status	Gender	**Rating**				
		Excellent	Very good	Good	Satisfactory	Poor
Academic Staff	Male	9.1%	36.4%	11.4%	11.4%	-
	Female	6.8%	20.5%	4.5%	-	

Undergraduate	Male	7.6%	25.1%	17.5%	2.9%	1.8%
	Female	7.0%	18.7%	16.4%	2.9%	-
Postgraduate	Male	4.2%	12.5%	29.2%	4.2%	-
	Female	14.2%	16.7%	20.8%	8.3%	-

Postgraduate students were also satisfied with the performance of the librarians, though not as satisfied as the academic staff or undergraduate students. Half (50%) of the postgraduate students rated the performance of the librarians as "good," 29.2% "very good,"18.4% "excellent," and 12.5% "satisfactory". While performance rating differed with respondents' categories, most of the female respondents from both academic staff and students group were more satisfied with librarians than their male counterparts. All female respondents rated the performance of librarians at the College of Medicine as either "excellent," "very good," "good," or "satisfactory," whereas 1.8% of the male respondents were not satisfied with performance of the librarians compared to their female counterparts who had not rated librarians poorly.

In general, the findings suggests that even though most of the respondents rated the librarians better, female respondents gave better rating to their librarians than male respondents, due to a special attention given to the female respondents' information needs by the librarians.

4.22 Adequacy of Library Resources

Students and academic staff utilize a library with adequate resources that can satisfy their information needs. Students and academic staff need to have resources necessary for their academic activities. This study, therefore, sought the opinions of the respondents in assessing the adequacy of their library's resources in meeting their information needs.

Adequacy of resources such as library collection, library equipment, facilities, and efficiency of library operations were rated by the respondents.

4.23 Perceptions towards Library Collections

From the list of various library collections mentioned in the questionnaire, it was found that, most of the respondents regarded book collection as "very adequate" (44.8%) or "adequate" (41%). According to the respondents the library has abundant journal articles, most (76.2%) of them regarded the journal article collection as either "very adequate" or "adequate." Similarly, newspapers, dictionaries, indexes and directories were also relatively considered as adequate collections. The least adequate collection was "patents".

Table 4.17

Perception towards Library Collections (n=241)

Status	Adequacy				
	Very adequate %	Adequate %	Undecided %	Inadequate %	Very inadequate %
Books	44.8	41	8.8	4.6	0.8
Newspapers	34.6	33.8	19.6	8.3	3.8
Journal articles	30.4	45.8	17.5	5.8	0.5
Dictionaries	27.6	45.2	23.0	3.8	0.4
Conference papers	22.9	36.3	36.3	4.2	0.4
Indexes (printed & electronic	22.9	45	27.1	5	--
Directories	20.3	43	30.4	5.5	0.8
Abstracts(printed & electronic	15.5	42	38.2	3.4	0.8
Audio-visual materials	15.1	45.6	26.4	9.2	3.8
Bibliographical literature	14.3	37.6	33.8	13.5	0.8
Dissertations and theses	10.9	32.8	45.8	9.7	0.8
Patents	7.1	41.4	43.1	7.9	0.4

It appeared that the College of Medicine's library has adequate collection for most of the materials required by the students and academic staff. While many respondents remained undecided to rate materials in the questionnaire, of those who rated less than one quarter regarded their library collections as "inadequate." It is also found that, although the library's collection of dissertations, theses, audio-visuals, and bibliographic literature are regarded as "adequate" by many respondents, these items were not as adequate as other materials such as books, newspapers and journal articles.

4.24 Perception towards Library Equipment and Facilities

Besides asking respondents to rate the adequacy of library collections, this section also investigated the respondents' perception on the adequacy of library's facilities and equipment. Based on the responses (Table 4.18), most of the equipment and facilities in the library were adequate in meeting respondents' information needs. However, equipment such as OPAC terminals (35.3%), photocopiers (30%), and air-conditioning (31.3%) were the most adequate equipment and facilities at the library, while most of the respondents regarded "library space" (19.2%) and "seating capacity" (18.8%) the most inadequate equipment or facilities in the library.

Table 4.18

Perceptions towards Library Equipments and Facilities (n=241)

Equipment & Facilities	Adequacy				
	Very adequate %	Adequate %	Undecided %	Inadequate %	Very inadequate %
OPAC terminals	35.3	41.6	20.6	2.1	0.4
CD-ROM work station	20.1	47.7	28.5	3.3	0.4
Microform reading	18.0	41.0	28.0	10.5	2.5
Photocopies	30.0	50.8	10.0	6.7	2.5
Library space	9.6	45.6	22.6	19.2	2.9
Seating capacity	7.5	44.2	25.8	18.8	3.8

Furniture & Furnishing	20.4	59.2	12.1	6.7	1.7
Air-conditioning	31.3	46.7	15.8	4.2	2.1

Generally, a considerable variation was observed among the respondents with regards to adequacy of the library equipment and facilities. Nevertheless, the library was meeting the information needs of its users to a reasonable level. The high percentage of "inadequacy" for library space and seating capacity might due to the continuous increase of user population, while the space and seats remained unchanged.

4.25 Satisfaction with Library Operations

To understand respondents' opinion on how efficient is library operation, they were asked to indicate the extent to which they agree or disagree with eight most important operations in the library (Table 4.19). Most of the respondents (82.1%) either "agree" or "strongly agree" that opening hours of the library were suitable as far as their information needs in the library is concerned. However, more than 9% of the respondents disagree with this.

Respondents also agree that library staff are available whenever they need them. They also agree that library staff are knowledgeable and helpful. More than 90% of the respondents agree that library staff were always available, only 2.9% "disagree" with this while the rest remained undecided. In addition, 88.0% of the respondents agree that library staff were helpful

Table 4.19

Satisfaction with Library Operations (n=241)

Library Operation	**Level of Agreement**					
	strongly agree	Agree	Undecided	Disagree	Strongly disagree	No response
Opening hours are	91(37.7%)	107(44.3 %)	16 (6.6%)	17(7%)	7(2.9%)	3(1.2%)

suitable						
Staffs are available	100(41.4%)	118(48.9%)	16(6.6%)	5(2%)	2(0.8%)	-
Staffs are helpful	93(38.5%)	119(49.3%)	27(11.2%)	2(0.8%)	-	-
Staffs are Knowledgeable	46(19%)	133(55.2%)	48(19.9%)	12(4.9%)	1(0.4%)	1(0.4%)
Ease to locate books	83(34.4%)	119(49.3%)	26(10.7%)	9(3.7%)	3(1.2%)	1(0.4%)
Easy to locate journals	54(22.4%)	120(49.7%)	53(21.9%)	10(4.1%)	2(0.8%)	2(0.8%)
OPAC terminals are available	47(19.5%)	116(48.1%)	66(27.3%)	8(3.3%)	-	4(1.6%)
Easy to check out materials	38(15.7%)	131(54.3%)	55(22.8%)	15(6.2%)	2(0.8%)	-

Locating books, journals, and checking out materials in the library is also found to be easy among the respondents. More than 84% of the respondents agree that locating books in the library is easy with 34.6% of them "strongly agree" and 49.6% just "agree". A large number of the respondents (72.8%) "strongly agree" or "agree" that it's easy to locate journals located in the library compared to only 5% of the respondents who either "strongly disagree" or 'disagree" with this.

Many respondents also agree to the availability of Online Public Access Catalogue terminals in the library. More than 19% of them "strongly agree," and 48.9% "agree" that OPAC terminal are available in the library. In contrast, only 3.4% of the respondents "strongly disagree" that OPAC terminals are always available in the library. Checking out library items was also found to be easy by many (70.2%) respondents, 15.8% of them "strongly agree" compared 6.2% of those who "strongly disagree." In general, most of the

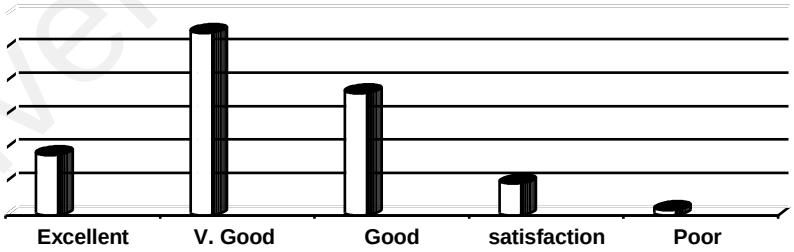
respondents agree that their library operation in terms of staffing and other operations is satisfactory.

4.26 Overall Satisfaction with the Library

In order to investigate the respondents' general satisfaction with the library in meeting their information needs, respondents were asked to indicate their satisfaction with the library. The results as shown in Figure 4.4, indicates that very few (1.2%) respondents were not satisfied with the library in terms of meeting their information needs. A total of 36 (14.9%) respondents rated their satisfaction with the library as "excellent," 45.2% "very good", 30.3% "good" and 7.9% "satisfactory."

The respondents are generally satisfied with the library as far as meeting their information needs are concerned. Ninety-four percent of the respondents were either extremely satisfied (excellent), highly satisfied (very good), or moderately satisfied (good) with the library's adequacy in resources, staff, equipment, and facilities.

Figure 4.4 Overall Satisfaction with the Library



4.27 Suggestions and Opinion

Respondents' suggestions on improving the library services and efficiency are incorporated in this study. There were only 10 respondents who had suggestions related to library collections, library equipments, facilities, and general operations. Out of the 10

respondents, seven suggested more OPAC terminals in the library, three suggested extension of library loan and one suggested more training for library staff on medical terminologies. In the context of library facilities, one participant suggested coffee shop beside the library so that readers can have coffee break while in the library without going far from the library.

4.28 Summary

This chapter has analyzed data from the survey on the information needs and information seeking behavior among the students and academic staff. The chapter has provided a brief introduction to the components of the variables categorically. The distribution of demographic information among the respondents was examined followed by the analysis of the variables related to the information needs and information seeking behavior, information usage among the respondents and respondents' perception towards the performance of librarians, and adequacy of library collection, equipment and facilities.

Most of the respondents (72.5%) were skilled in using computers, used different methods (e.g. library visit, call librarian, email, fax and colleague) to collect information from the library, used different search methods (author, title, subject heading etc.) through the library catalogue. However, most of the respondents (79.6%) preferred visiting the library personally when they needed information, and more than 90% of them expressed satisfaction with the library.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

This chapter discusses major findings of the study presented in the previous chapter. It also presents conclusions drawn from the results and recommendations.

5.1 Summary

The major objective of this study was to examine the information needs and information seeking behavior of the medical staff and students at the faculty of Medicine, Sultan Qaboos University, Oman. Specifically, the study attempted to:

1. To investigate information needs and seeking behaviour of students and academic staff at the College of Medicine at Sultan Qaboos University, Oman.
2. To identify the main methods used by the students and academic staff in order to obtain information.
3. To find out the purpose for information searching among students and academic staff.
4. To investigate user's perceptions on the performance of medical librarians in assisting them to identify information sources.
5. To investigate user's perceptions on the adequacy of collections, equipment and facilities at the Medical Library, Sultan Qaboos University, Oman.

The specific research questions addressed in this study were:

(1) What is the nature of information needs and information seeking behaviour among students and academic staff at the College of Medicine, Sultan Qaboos University?

(2) What methods do the students and academic staff at College of Medicine, Sultan Qaboos University use to search for information?

(3) What are the purposes of information searching among students and academic staff at the College of Medicine library of Sultan Qaboos University?

(4) How do the students and academic staff perceive the performance of medical librarians at the College of Medicine library?

(5) How do students and academic staff perceive the adequacy of collections, equipment and facilities available to them at the College of Medicine library at Sultan Qaboos University?

A questionnaire was designed and distributed to 492 participants at Sultan Qaboos University. The information obtained from the medical staff and students at the faculty of medicine through the questionnaire consisted of demographic information, information need and information seeking behavior, users' perception towards the performance of librarians, and users' perceptions towards the adequacy of library collection, equipment and facilities.

5.2 **Conclusions**

This study investigated information needs and information seeking behavior of end-users at the College of Medicine, the Sultan Qaboos University, Oman. It provided data which contributed to the understanding of the information needs; information seeking behavior of end-users; search methods used by the participants; reasons for seeking information etc. The study also provided important findings on the perceptions of end-users towards the performance of medical librarians, adequacy of library collection, equipment and facilities.

Respondents appeared to have good computing skill. It was observed that a majority of the respondents with high academic qualification were likely to possess a better computer use skills. Nevertheless, respondents with poor computing skills were

basically undergraduate students.

Respondents preferred to use a variety of information sources such as books, indexes, abstracts, etc. However, yearbooks, dictionaries and dissertations or thesis were the most preferred sources of information after the Internet, journals and conference papers. This finding confirmed the results of an earlier meta-analytic study by Haug (1997), which revealed that physicians preferred obtaining information from journals and books.

The Internet was perceived by respondents the most useful source of information. Similarly, the study showed that respondents who are more skilled in using computers considered the Internet, library catalogues, journal database and online full-text services more useful as compared to other information sources. This is in line with Hurd et al. (1999) results who found molecular biologists depended heavily on scientific journal. Meanwhile, the study showed significant difference between students and academic staff in terms of their perception towards the usefulness of journal database and online full-text services.

Respondents seemed to be very familiar with most of the popular search methods. However, they relied heavily on the use of subject headings, title and keywords access points and frequently make use of online catalogue to find books or journals.

To satisfy their information needs, a large majority of the respondents preferred to visit the library personally or contact librarians by phone. They did this for the purpose of conducting research, publishing, career development and class assignments. Most of them have positive perception about medical librarians. They expressed high level of satisfaction with librarians' ability to assist them in meeting their information needs. A majority of the respondents were generally satisfied with library collection, equipment, facilities and the way is providing services.

5.3 Recommendations

Based on the findings of the study, the following recommendations are put forward for the library administration for improvement of information services at the Faculty of Medicine's Library to meet information needs of medical staff and students, and another set of recommendations for further research.

a. Library Administration

i. An important number of respondents perceive library space, seating capacity inadequate. Therefore, library administrators and decision makers should give a serious consideration to this result. For example, further studies should be conduct to find out reasons behind the inadequacy of these equipment and facilities, and how to make them adequate to meet users' expectations.

ii. A majority of the respondents reported high satisfaction with their computer skill. In fact, computing skills have become increasingly a necessity for students and faculty members. They are not only expected to know the sources of information available on the Internet, but should also be aware how to search and retrieve relevant information to satisfy information needs.

iii. Results also indicated that male students are more skilled in using computers than their female counterparts. Emphasis should be given to promote computer use skill among library users. However, females should be the main target in such program in order to achieve equality with their male counterparts.

iv. Although respondents used different search methods, they relied heavily on subject, title and keywords search strategies. Therefore, the library should provide more access points (i.e. subjects, titles, keywords, etc.) in the OP AC.

v. The library administration must be responsible for training related to users' information needs and seeking behaviour. Different training approaches must be employed keeping in mind different backgrounds and information needs of the

user groups.

vi. The library administration should emphasize on the enhancement of the role of librarians in assisting library users to meet their information needs. Library instruction and training on how to use new information technol04e_ (the internet, online databases, etc.) should be among priorities.

vii. Although the findings are good indications of users' satisfaction with the librarians, further studies could be conducted to investigate factors contributing to librarians' performance and whether further improvement is needed or not for meeting future challenges.

b. Further Research

The results of this survey should be a starting point for many related issues as follows:

i. A similar study should be conducted covering students from all academic disciplines in the Sultan Qaboos University. This will not only help update the Current information needs and seeking behaviour of library users, but also provides invaluable information on the library's ability to achieve its goals.

ii. There is a need for a more in-depth study concerning users' information needs and seeking behaviour. For instance, further studies may combine more than one method such as interview, observation, focus group, case study, etc.

Concluding Statement

The study has presented data concerning information needs and information seeking behaviour of students and academic staff at the College of Medicine, Sultan Qaboos University, Oman. The findings have contributed to the existing body knowledge of human information behaviour. The implementation of the recommendations would help the library to improve its services, equipment and facilities to meet users' information needs.

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