DETERMINING THE EFFECTIVENESS OF DIGITAL REFERENCE SERVICES IN SELECTED ACADEMIC LIBRARIES IN MALAYSIA

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THESIS SUBMITTED IN FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

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ABSTRACT

New technologies have been used to assist in a variety of functions in library and information units including in the provision of reference services. Digital reference services (DRS) are becoming widely available in Malaysian academic libraries and primarily provide assistance to remote users mainly through e-mail format. This study examined the existing status and effectiveness of digital reference services (DRS) in four selected public academic libraries in Malaysia. The study focused on the awareness, usage, users' perception, users' satisfaction, library's performance, and looked at the perceived needs, issues and problems faced by librarians and students. The study is important to determine how academic librarians are exploiting the latest information and communication technologies to improve reference service operations. The research methodology employed was a case study approach that combined three data collection methods, i.e. questionnaires, interviews and content analysis. Two different sets of questionnaires were distributed: (a) a librarians' questionnaires to 163 librarians, and (2) a users' questionnaires to 1,000 students in four public universities in Malaysia. Structured interviews and systematic observations were conducted to collect information on the existing library services provided. The findings indicate: (a) all the four public academic libraries in Malaysia have implemented asynchronous DRS in the forms of e-mail reference and web forms; however, the extent of these services varies from institution to institution; (b) a majority (67.3%) of the students were aware of the university library offering DRS; (c) a majority (82.8%) of the librarians have been using DRS in answering reference questions; (d) a high percentage (73.1%) of librarians, but a small percentage (19.5%) of students have been using e-mail reference; web forms have been used by 32.3% of librarians and 28.2% of students; Ask-A Librarian have been used by 26.9% of librarians and 26.8% of students; (e) the digital reference services are effective form of service delivery in Malaysian academic libraries based on the findings on users' perception, users' satisfaction and library's performance; (f) the majority of the respondents would choose traditional reference (47%), but predicted online chat reference (42.7%), e-mail reference (37.4%) and video conferencing (36.5%) to be the most heavily used of reference services in the next five years. Recommendations are made on the need for the implementation of synchronous DRS, enhancing the role of DRS, marketing and promotion, staff training, user education programmes and cooperation. The main contribution of this research is the assessment of effectiveness of DRS in academic libraries in Malaysia, the identification of perceived needs, issues and problems and suggestions on the areas of improvement in the use of DRS. In the process, a proposed guideline for an effective DRS in academic libraries in Malaysia is presented. Finally, the researcher proposes directions for future research in the area of DRS.

ACKNOWLEDGEMENTS

Thanks to Allah the Almighty who through His mercy has guided me in this effort.

I would like to express my sincere gratitude and appreciation to Associate Professor Dr. Diljit Singh, my supervisor, for his encouragement, patience, wise insights and invaluable advice throughout the duration of this study.

I am indebted to Universiti Teknologi Mara (UiTM) and Malaysian Government for the study leave and scholarship granted to me. Specifically, I wish to record my appreciation to Associate Professor Dr. Laili Hashim, Associate Professor Dr. Adnan Jamaludin and other members of the Faculty of Information Management, UiTM for their support and advice. Special appreciation is expressed to Professor Dato` Dr. Raja Abdullah Yacob for his constructive comments and suggestions throughout the research.

Credit is due to the librarians and students in four selected public universities who participated in the study. Without their cooperation, the study would not have been possible. Thanks are also due to the staff and postgraduate students of the Faculty of Computer Science and Information Technology, University of Malaya for their knowledge, friendliness and help. Special thanks to Associate Professor Dr. Shahrir Jamaludin for freely giving his time and advice concerning much of the study's statistical analysis and to Mr. Robinson Samuel for his assistance in editing my thesis.

I am very grateful to my wife Rosmini Abdullah and my children Soraya, Syahir, Sofieza and Ilhan for their understanding and moral support during the period of this research.

Finally, I would like to thank Khir Johari, Mohamad Zaihan, Zulkifli Yusof and all others who have one way or other given their prayers, assistance, support and advice towards the successful completion of this thesis.

DEDICATED
TO

my wife, children, siblings
and the memory of my parents

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LIST OF ABBREVIATIONS

9MP	Ninth Malaysia Plan
ANOVA	Analysis of Variance
AOL	America Online
ARL	Association Research Libraries
CAS	Current Awareness Services
CD-ROM	Compact Disk Read Only Memory
CDRS	Collaborative Digital Reference Services
DARPA	Defense Advanced Research Projects Agency
DLS	Distance Learning Services
DRS	Digital Reference Services
EARS	Electronic Access to Reference Services
ERIC	Educational Resources Information Centre
FAQs	Frequently Asked Questions
FCSIT, UM	Faculty of Computer Science and Information Technology, UM
FCSIT, UPM	Faculty of Computer Science and Information Technology, UPM
FIST, UKM	Faculty of Information Science and Technology, UKM
FITQS, UiTM	Faculty of Information Technology and Quantitative Sciences, Universiti Teknologi MARA
ICT	Information and Communication Technology
IFLA	International Federation of Library Associations and Institutions
ILMU	Integrated Library Management Utility
IP	Information Protocol
IPL	Internet Public Library
IPTA	Institusi Pengajian Tinggi Awam or Public Higher Educational Institutions
IT	Information Technology
LC	Library of Congress
LISA	Library and Information Science Abstracts
MALMARC	Malaysian Machine-Readable Catalogue
MDG	Millennium Development Goal
MSC	Multimedia Super Corridor
NISO	National Information Standards Organizations
NITA	National Information Technology Agenda
NITC	National IT Council
OCLC	Online Computer Library Center
OPAC	Online Public Access Catalogue
OPP3	Third Outline Perspective Plan
OUM	Open University Malaysia
PERDANA	National Digital Library Initiative
PERPUN	Persidangan Perpustakaan Universiti dan Perpustakaan Negara Malaysia or Conferences of University Libraries and National Library of Malaysia
PTAR	Perpustakaan Tun Abdul Razak, UiTM or Tun Abdul Razak Library, UiTM
RCS	Remote Control Software
R & D	Research and Development
RUSA	Reference and User Services Association

SASL	Sultan Abdul Samad Library, UPM
SDI	Selective Dissemination of Information Services
SPSS	Statistical Package for the Social Sciences
SSM	Sistem Saraan Malaysia or Malaysian Remuneration System
TSLL	Tun Seri Lanang Library, UKM
UiTM	Universiti Teknologi MARA
UIUC	University of Illinois at Urbana-Champaign
UK	United Kingdom
UKM	Universiti Kebangsaan Malaysia
UM	University of Malaya
UML	University of Malaya Library
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPM	Universiti Putra Malaysia
URL	Uniform Resource Locator
USA	United States of America
USM	Universiti Sains Malaysia
UTM	Universiti Teknologi Malaysia
VRD	Virtual Reference Desk
VRF	Virtual Reference Facilitator

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

Reference services, or the personal assistance provided to library users seeking information, have been a main component of library activities for more than a century. Ever since the first library was established in Sumeria about 5,000 years ago, the library's activities have been shaped by questions and answers (Katz, 2002a). Over time, various technological developments have been used to assist in the provision of reference services. The tools consulted by reference librarians have become more varied and complex. The introduction of computerized resources and computer networks over the past 30 years has made the situation ever more complicated (Tedd, 1993; Ford, 2003).

The reference environment has undergone a significant transformation, as collections and information in general become increasingly accessible electronically. Chowdhury and Margariti (2004) noted that the introduction and development of the Internet and its associated Web technologies in the past decade have significantly influenced both the way libraries provide information services to their users and the way users choose to access information. Librarians are exploring ways of supporting patrons in the emerging virtual communities. One way in which this is being done, according to Moyo (2002), is by offering value added services, such as digital reference services to support remote access and navigation of library electronic resources.

Tenopir and Ennis (2002) indicate that information and communication technology (ICT) has transformed academic libraries' orientation and services. Nowadays, users take for granted web-based online catalogues, library-provided interactive portals to quality web sites, and a plethora of commercial online databases, the most popular of which are web

versions. The workstations, complex internal and external network connections, and a combination of in-house and online resources define reference services of the new millennium.

Higher education institutions play an important role in the development of a country by preparing future generations to use the acquired knowledge to fulfill their responsibilities more effectively. The libraries of these institutions try to meet the needs of the academic and research community by improving their services and enhancing their resources. One of the means is the provision of an effective reference service where the librarians help users to find an information source or information itself to meet their individual needs. Chall (1992) noted that a successful strategy to enhance exploitation of resources is to ensure users' satisfaction through an efficient and effective reference service. The speed and accuracy in dealing with user enquiries by reference librarians have a great impact on user satisfaction.

As new technologies are introduced, librarians in the higher education institutions must consider how the innovations can be applied to provide new and better reference services. Smith (2001) indicated that there is no need to limit reference interviews to in-person or face-to-face and telephone conversations, especially when many users are researching from their home and office computers. Librarians should take full advantage of the e-mail, web and other means of digital reference services in this digital library environment.

1.2 DEFINING THE DIGITAL LIBRARY ENVIRONMENT

A digital library is a library that has been developed to fulfill the needs of information facilities in the digital age. The primary form of information in this age is in many cases digital. With digital technology, information in various formats – text, audio, video and

electronic can be created, stored, organized, accessed and transmitted with relative ease, and in the forms that we could not have thought of earlier (Singh, 2004).

The digital age has brought many changes to libraries. Some of these changes have taken place even before the introduction of the Internet in the early 1990s. The reference departments of academic libraries have seen a rapid evolution from a print-centered world to a digital-intensive one. The 1980s and early 1990s saw much discussion in libraries on issues such as '*print versus electronic*', '*access versus ownership*', '*mediated versus unmediated online searching*', and professional concerns that gradually widened to include electronic licensing and consortial collection development (Penka, 2003). Healy (1995) summarized the questions of '*access versus ownership*' as:

> *'Do librarians rationalize services (e.g. special collections, outreach programmes) to ensure that needed material continues to be available on the shelves, or do they sacrifice some of the physical collection and provide access to others' collection via the new technologies?*' (p. 40).

The definition of a library as a collection of books changes in the digital era because ownership of digital information is an uncertain concept. Intellectual property issues such as copyright piracy, definitions of fair use, authorship, archiving and rights to retrospective collections are all being revised and reinterpreted with controversial results (Electronic Frontier Foundation, 2002).

In the context of librarianship, there is a tendency to refer to the '*digital library*', '*electronic library*' and '*virtual library*' interchangeably. Arms (2001) defines a digital library as '*a managed collection of information, with associated services, where the information is stored in digital formats and accessible over a network.*'

The American Digital Library Federation has given a more comprehensive definition of digital libraries as:

> *'Organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret,*

> *distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by defined community or set of communities'* (Greenstein, 2002: 2)

Burke (2003), quoting from Wainwright (1996), believes a digital library possesses the same functions and goals of the traditional print-based library and that the difference lies in the digital part of the term (which) indicates merely that the material is stored and accessed digitally.

Arms (2001) claims that the digital libraries have three main functions: to help users interact with the library, to store collections of materials, and to provide services. Two typical services provided by digital libraries are search services and location services. Search services provide catalogs, indexes, and other services to help users find information. Location services are used to identify and locate information.

A digital library should support the storage, representation and dissemination of all kinds of digital objects, as well as serving users with all kinds of computers and software. The users' computer can access the collections by a communication network, where the Internet is the dominant network.

Several researchers have discussed the specific characteristics of digital libraries (for example Oppenheim and Smithson, 1999; Lin, 2000; Arms, 2001; Deegan and Tanner, 2002; Chowdhury and Chowdhury, 2003). In general, a digital library has the following characteristics:

a. A large collection of publications in a digital format that are organized in some useful manner, such as subject directories or indexes of search engines.
b. Accessible, searchable, and duplicatible through the Internet or other media of electronic transmission with greatly reduced barriers in distance and time.

c. The size and contents of digital libraries undergo changes and modifications with various degrees of frequency while some Web pages are ephemeral, others often are relocated within a web site.

The main reason for developing digital libraries is a belief that they will provide better delivery of information than was possible in the past. Enthusiasts for digital libraries point out that computers and networks have already changed the ways in which people communicate with each other. In some disciplines, they argue, a professional or a scholar is better served by sitting at a personal computer connected to a communications network than by making a visit to a library (Arms, 2001). Adida, Lisdar and Rafidah (2003) pointed out that the digital library brings the library to the user's desk, either at home or at work, as long as they have a personal computer and network connection. From a personal computer, the user is able to consult materials that are stored on computers around the world.

A digital library must focus on access and service, not buildings and volumes. Libraries will support users in their searching and acquiring of information, and their organization will reflect services rather than physical location. Chowdhury and Chowdhury (2003: 10-11) list a number of benefits of having digital libraries, as follows:

a. A digital library brings information to the user
b. Improved searching and manipulation of information
c. Improved facilities for information sharing
d. Timely access to information
e. Improved used of information
f. Improved collaboration
g. Reduction of the digital divide

Digital libraries have created an information environment that is complex and fluid, connective and interactive, diverse and unpredictable, where the professional provision of

information is no longer constrained by time and place. Academic libraries have embraced a variety of widespread adoption of online services during the last decades. Tenopir and Ennis (1998) survey of 68 academic libraries on the impact of digital reference on librarians and library users reported three main areas of changes:

a. Changes in attitudes

Expectations and attitudes toward the research process have changed for both librarians and users. Heightened expectations from students and, to a lesser degree, from faculty are noticed by many librarians. Partly because of the Internet and World Wide Web, students expect to be able to answer every question and do every research online. Good reference service enhances these expectations, while adding a reality as well. Access to good secondary sources with as much full text as possible is clearly important to help meet these expectations.

b. Changes in instruction

One major impact of electronic services is the growing need for user instruction. The trend in education towards distance learning and web-based learning, is providing new challenges for information professionals as service providers. This has required the librarian to provide access to quality and valid information to support it by online instruction.

c. Changes in workload and workplace

Many librarians report an increase in their workloads as more and different resources are added with no increase in professional staff. As a result, in many universities paraprofessional staff and student assistants are providing more reference service, particularly basic assistance in using electronic sources. Librarians are moving more towards specialized research and instructional services.

1.3 **IMPACT OF THE INTERNET ON REFERENCE SERVICES**

1.3.1 Internet Usage in Malaysia

The Internet and the number of organizations providing information to users via the Internet (Internet information service organizations) are growing at a tremendous rate (Lankes, 1999, cited in Kantor & Neubarth, 1996). There are millions of users connecting to the global network every year. According to *World Internet Usage Statistics News and World Population Statistics* which were updated in March 2008, there are about 1.4 billion users on the Internet:

Table 1.1
World Total of Internet Users

Region	**Internet Usage**	**Usage % of World**	**Growth % 2000-2008**
Africa	51,022,400	3.6	1030.2
Asia	529,701,704	37.6	363.4
Europe	382,005,271	27.1	263.5
Middle East	41,939,200	3.0	1176.8
North America	246,402,574	17.5	127.9
Latin America	137,300,309	9.8	659.9
Oceania	19,353,462	1.4	154.0
WORLD TOTAL	1,407,724,920	100.0	290.0

Source: 'World Internet Usage Statistics News and World Population Statistics.' Available *at http://www.internetworldstats.com/stats.htm.* Accessed 28.5.2008: 1.

Table 1.1 shows that the world total usage percentage growth over the years 2000-2008 increased 290.0 % to give the total of 1,407,724,920 Internet users in 2008.

In Malaysia, the number of Internet subscribers has been estimated as 1.8 million in 2001. The number increased to 2.9 million in 2004, 3.5 million in 2005, and in 2006 the number of subscribers in Malaysia was close to five million (Malaysia Internet Usage and

Telecommunications Reports, 2007: 2). The following table shows the rapid growth of Internet users in Malaysia:

Table 1.2
Malaysian Internet Usage and Population Growth

Year	Users	Population	% Penetration
2000	3,700,000	24,645,600	15.0
2005	10,040,000	26,500,699	37.9
2006	11,016,000	28,294,120	38.9
2007	13,528,200	28,294,120	47.8

Source: 'Malaysia Internet Usage and Telecommunications Reports.' Available at *http://www.internetworldstats.com/stats.htm.* Accessed 28.5.2008: 1.

These numbers give a quantifiable picture of the potential global audience for libraries providing services through the Internet and carry implications in terms of library policy, digital reference practice and research.

1.3.2 Impact of Internet on Libraries and Reference Services

Library services have been influenced and enhanced by the Internet in many ways, such as methods of information dissemination, scope of information availability and convenience of information accessibility (Su, 2001). The Internet has changed reference service by exponentially expanding the universe of available information. It facilitates communication (through e-mail) with other libraries, librarians, and members of the user community. The librarians are able to answer questions in almost any subject area by referring to this expanding global network. As Rennie (1997) points out, the Internet is made of information and nobody knows more about how to order information than librarians.

The Internet also provides training opportunities for the staff and the users, makes easier inter-library loans and document delivery, improves cataloguing (copy cataloguing

and original cataloguing), and creates an improved image among the users through the web site (McClure, 1996).

Sauers (2001) pointed out that Internet technology introduces both challenges and opportunities to all aspects of librarianship, particularly in the reference area. Katz (2002: 45) identified specific areas in which the web excels for reference service: (a) current events; (b) popular events and personalities; (c) government; and (d) travel. Librarians must be able to determine which sites are the best to answer the reference questions. They also have to know how to access, evaluate and navigate Internet sites with the speed, efficiency and comfort level we have long enjoyed with print sources.

Recent studies have indicated that students regard the Internet as a primary information source and that reliance on the Internet is increasing (Wright, 2004). Elbakhiet's (1998) study on the impact of the Internet on the library revealed that the Internet produced some changes in information transfer, services and human resources of the library. There will be less emphasis on print media, but remote access and exchange of data will be a prominent feature of the library. In addition, human resources will be relocated to new areas of work since electronic material needs no handling like the print ones. The study concluded that postgraduate students at the University of Malaya believe that the Internet will not substitute the library as a physical entity, but is likely to supplement the role of the library for better information services.

Aman (2004) identified the pattern of Malaysian academic libraries' web sites usage among 823 university students. This study found that 70% of the respondents knew of the existence of their university libraries' web sites. A majority of the respondents agreed that the Internet adds value to library services, speeds up reference searching besides making reference work more challenging, more fun, more interesting and more accessible.

There have also been some studies on the use of Web in answering reference questions (Zumalt and Pasicznyuk, 1998; Gabriel, 1998; Tenopir and Ellis, 1998). Abdoulaye and Majid (2000) studied on the use of the Internet for reference services in Malaysian academic libraries. A total 40 library professionals working in the reference department of 9 Malaysian academic libraries participated in the study. The study found that the Internet has contributed positively to reference work and has enhanced their effectiveness and efficiency. However, a majority of the respondents disagreed that the Internet should completely replace traditional reference tools. They also felt that reference librarians should possess good computing and Internet use skills for providing effective reference services.

A few studies of Internet and web resources above have made meaningful connections to the existing literature in DRS. The present study is different from those studies since it explores on the current status and determines the effectiveness of digital reference services in selected academic libraries in Malaysia.

1.4 THE CHANGING ROLE OF REFERENCE LIBRARIAN

Reference librarians are variously referred to as '*mediators between the user and the information*', and '*navigators of information superhighway*' (Huling, 2002: 867). According to Thomsen (1999):

> ' *As we move into the 21st century, librarianship is being transformed in response to greater changes in society as well as to our own evolving sense of direction for the profession. Reference librarians, always on the front lines of the profession, connecting library patrons and library services, are especially sensitive to these changes and to the confusion and stress that change can bring.'* (p. 1)

The role of the reference librarian has changed greatly over the last two decades with the emergence of information technology and the huge impact in the librarianship and

information provision. The role grew from that of a collector and preserver of information resources to a professional involved in very complex issues of organization, dissemination and access to information.

Traditionally, the librarian's function was to assist in the collection development and acquisition, cataloguing and classification, circulation, provision of reference services, and preservation, conservation and archiving. As the library evolves into a digital library, reference librarians have been considering how to adjust reference services to the new environment and new information needs. According to some statistics, users' enquiries at the reference desk are declining (Palmer, 1999 and Lessick, 2000). To a great extent, with the digital library and plenty of self-help information, users feel able to access resources and services themselves. Despite this, however most researchers and practitioners agree that reference service and user education are still essential in the digital library (Chowdhury, 2002; Lankes, 2000; Lipow, 1999). Training sessions are needed to improve the users' information literacy skills. Today the reference librarian's responsibilities have increased by societal expectations for information access through enhanced electronic capabilities. Reference librarians like other librarians working in the other divisions are the key to the continued success of libraries.

Raghavan (2000) outlined new roles and challenges for the librarian in the digital era such as:

a. educators, trainers and facilitators to emphasis competency in information handling and lifelong learning, distance learning and virtual learning,
b. leadership or managerial role,
c. manager and advisor of web and electronic sources such as Internet, CD-ROM indexes, and full-text databases

d. collaborator by forming partnerships with other organizations to satisfy the needs of the users

e. as a human resource manager, link with human resources to the mission and goals of the organization

f. as a marketing manager, helping the organization to develop an appropriate competitive edge to stay ahead in the market as well as reduce professional malpractice by developing core competencies such as interplay of knowledge, understanding, skills, and attitudes required to do a job effectively (p. 2-3).

In discussing the future role of librarian in the virtual library environment, Burke (2003) highlights the following points:

a. to provide intellectual access to information in any format

b. to evaluate available sources of information

c. to organize and structure information

d. to ensure the preservation of information

e. to provide specialized staff to offer instruction and assistance in interpreting resources and access to resources (p. 4-10).

Tedd (2003) noted that no job responsibilities had changed as much as the information profession had in the last five years with the development of the range of Internet-based technologies. Information specialists now have added responsibilities as workers in the '*knowledge economy*', these include being:

a. Information gurus and guardians of information quality and ensuring that users have access to information from the most trusted sources

b. Business managers and knowing how to deliver appropriate information services (either from in-house or by outsourcing) to meet the needs of the users

c. Teachers/trainers to ensure that the users (and colleagues) know how to access relevant sources of information

d. Information advocates serving as the information '*champion*' for the organization to influence management and ensuring that everyone in the organization remains competitive by having the information and tools they need to make decisions faster

e. System designers to develop and design appropriate systems for the delivery of information to their users in an appropriate manner (Tedd, 2003: 119).

From the views highlighted, it is no doubt that the digital revolution has brought changes and affected the librarian and other information professional. This scenario is also changing the roles of the reference librarian into teaching, consultancy and researching besides providing access to information. The reference librarian must guide users in information gathering, information skills and tools, organizing information resources, search strategies and basic reference works. It has become necessary for the reference librarian to be involved in research by facilitating access to information, such as finding, delivering and summarizing information. It is believed that librarians will increasingly become members of research and development teams and play more role in the information creation process (Adida, Lisdar and Rafidah, 2003).

Librarians are also facing various challenges in the digital environment, such as building the resources, sustaining the resources and library staff training to fulfill the need of users in the information age. This has led to the substantial needs for a new breed of information professionals who must be well equipped with ICT knowledge and skills to work in the digital era. The changing of job specification has brought the changing nomenclatures to suit to the librarian new roles such as digital librarian, digital information professional, cybrarian and information broker (Sreenivasulu, 2000).

Today, it is almost impossible to identify a library or librarian that is not affected by computers, digital information and electronic infrastructure. Librarians today, must know how and develop new skills to monitor trends and technologies in their respective industries and for the future. Reference librarians today are presumed to have basic understanding of ICT knowledge and information retrieval skills in order to perform their job effectively. Abdoulaye and Majid (2000) study on the use of Internet in academic libraries in Malaysia have proven that all the respondents (reference librarians) possessed a high level of computing skills. They should not feel threatened by the technological development but should embrace the opportunities to provide better service to their users.

In concluding this section, it can be said that academic librarians should have knowledge of principles, methods and practices of library administration and library science besides the ability to communicate effectively with all levels of staff and students. They also have to keep abreast of changing trends and technology, plan and develop new systems. They must have ability to review and evaluate service levels, needs and interests of the academic community. Academic librarians are responsible for the overall management and operations of the library to ensure that there are adequate resources, facilities and services to meet the needs of university curriculum, students and staff.

1.5 THE MALAYSIAN EXPERIENCE ON ICT IN LIBRARIES

The global growth of new technology in Malaysia has been recognized since the 1970s; however its application has been slow (Raja Abdullah, 1990: 1). In the years before 1990s, other than costs, there were also obstacles like resistance to change, technical difficulties and management problems with new innovative technology.

The use of computers in libraries has become a significant factor in the evolution of library automation. A well-coordinated library system tied together by computers and other

technology would enable a library to control costs and expand its ability to deliver information in a timely and efficient manner.

Early indications of the importance of information can be seen through government policies and regulations. Bibliographic control and access to national information resources are provided for through implementation of a legal deposit law in Malaysia. The Preservation of Book Act, 1966 which was replaced in 1986 by the Deposit of Library Materials Act provide the basis for materials published and produced in Malaysia to be deposited, catalogue and organized, preserved and conserved by the National Library for current and future access by scholars and researchers.

Among the Malaysian government library-related policies that emphasize on the importance of information and information services are:

a. National Policy on Library and Information Services (Perpustakaan Negara Malaysia, 1994) was formulated in 1994 to spur the systematic development of library and information services in consonance with the government's objective to create a reading and informed society (Norma, 2002).
b. Malaysia has set up the National Digital Library Initiative or '*Sistem PERDANA*' in 1999 where all libraries in Malaysia (including National Library, academic libraries, government libraries, special libraries and state libraries) are networked together and share their digital knowledge and information resources. Academic libraries are an integral part of the National Digital Library Initiative as content providers on the MyLib website (National Library of Malaysia, 2003).
c. Several academic libraries in Malaysia also have a loosely library cooperative group called PERPUN (Standing Conference on National and University Libraries in Malaysia) which aimed to enhance cooperation among its' members, which include sharing of resources, ideas and act as a platform to discuss issues,

problems, policies and others to jointly take action to improve library services and undertake projects for common benefits (Shaifol and Aishah, 2005).

All these policies have provided librarians with vast and unlimited opportunities to contribute in this knowledge era.

1.6 THE ROLE OF ACADEMIC LIBRARIES

Academic libraries are those libraries that serve the information needs of students and faculty of the colleges and universities (Huling, 2002: 533). The value of libraries in higher education has never been an issue and its importance has been acknowledged worldwide. The importance of academic libraries can be seen from the need of students using it as a source of information to enhance their knowledge in desired fields. An academic library is the seat of knowledge in a university or college. It welcomes the birth of new knowledge, nurtures the existing one and preserves the old knowledge. It contributes to the development of the scholar through the strength of its collection, its services, technology and its staff (Rosna Taib, 2002: 3). Even in Malaysian scenario, any university and college must prove on the availability of professional or qualified librarian as well as library facilities before it is approved by the Ministry of Higher Education.

Academic libraries are facing more challenges as they enter the digital era. Increasing amounts of the material they acquire is being produced in digital formats, and college and university students are especially sophisticated users of the new information technology and are increasingly insistent that coursework and course readings be accessible via the Internet.

Rapid developments of ICT also have increased the demand for distance education or e-learning programs in the universities. E-learning is a new approach to education in which students can remain in their home place and continue their education. According to

Willis (1993), distance education takes place when a teacher and student(s) are separated by physical distance and technology is used to bridge the instructional gap. This approach to education and training allows for the adoption of a range of learning strategies in a variety of learning environments to cater for differences in learning styles, learning interests and needs, and variations in learning opportunities.

In Malaysia, Universiti Sains Malaysia (USM) pioneered long distance education in 1971 and in the mid 1990s distance education has been growing tremendously. Almost all the public universities in the country were offering distance education undergraduate programmes. Universiti Putra Malaysia (UPM) alone has 25 distance learning programmes with a student enrolment of 10,000. Universiti Kebangsaan Malaysia (UKM) offers 13 programmes with enrolment of 6,000 students (Yong, 2001).

The impact of distance learning on higher education and the need to provide equitable library services to students in the digital environment emerged as a critical areas until recently. Library services available to distance learning students included digital reference and instructional services, remote access to online research tools, database and research tutorials, interlibrary loan and document delivery. Digital reference services appeared to be one of the more significant services proffered by academic libraries although these services were developed often without forethought to goals and assessment (Profeta, 2006).

1.7 STATEMENT OF PROBLEM

The application of ICT is widespread in various disciplines including in the areas of library and information management. The dynamic nature of the Internet creates an ever-changing information environment and transforms the way information is delivered and accessed. Since a greater number of users connect to the Internet (*Internet World Statistics*, 2008: 1;

Penka, 2003: 4), user expectations for immediate access of information and knowledge resources steadily increases (Wasik, 2003a: 2).

McClure, et al. (2002) noted that people have become increasingly comfortable utilizing and indeed relying on digital services as part of their way of life. For instance, many people are now shopping, banking and paying their bills through various electronic and digital technologies. They also communicate with others in their personal and business lives by using e-mail or real-time services such as online chat, instant message services, or video conferencing. In the context of librarianship, the users are expecting their libraries to provide more services online. These services include access to on-line catalogue, the ability to place request on-line, access to electronic resources and the provision of some type of digital reference services.

In Malaysia, academic libraries have been in a more privileged position to provide better and more services to users compared to other types of libraries such as school libraries, special and public libraries based on the following factors:

a. Academic libraries hold relatively larger collections as well as they are better staffed and funded.

b. Most university libraries are headed by senior librarians and supported by a number of professional staff.

c. University libraries are well endowed with financial allocations for collections (Shahar, 2003: 1561).

Additionally, as noted by Lee and Teh (2000) that the academic community in the country has pioneered the establishment and use of the Internet and Web sites.

Most academic libraries in Malaysia have made advances in digital era. However, the reference services and the digital reference services were not fully utilized and the services provided are not being used effectively. Despite the advances brought by

technology and they are in the more privileged position to provide better and more services, the structure and organization of reference service in academic libraries have changed little since its inception. Services continue to be tied to the physical reference desk, requiring that users come into the library building for assistance.

Campbell (1992) predicted that the model of reference focused on a physical desk could not survive in the information age. The users' expectations of the services were changing and the demand for rapid delivery of information in electronic form was growing. He challenged reference librarian to create a service that is '*increasingly electronic and non-building-centered*'. Although much of what he envisioned has occurred, the reference desk remains in the center of reference services (Huling, 2002).

This study is motivated by recent studies on DRS and library usage in academic libraries. Dee and Allen (2006) who reported a survey of the usability of DRS in academic health science library web sites postulated that such services in many libraries appear to be '*underused*'. Zaiton, Kaur and Zanaria (2003) described the lack of usage of academic libraries' services among academia. They also suggested the University of Malaya (UM) Library to promote its reference services since the students were not aware of the services. Laili (2000) in his study on the perceptions of the library services and usage in selected higher educational institutions in Malaysia concluded that users are not really getting the full benefit of the library services and some of the services are underutilized. The reasons for this problem are the lack of knowledge and the low state of awareness of certain services, attitudes of staff and inadequate training to use the services.

Academic reference librarians should play an important role in assisting undergraduates, postgraduates, and faculty in teaching, learning and research process by offering digital reference services. The roles of librarians are not static but are constantly evolving. Based on the literature (Raghavan, 2000; Tedd, 2003 and Connor, 2006), the role

of reference librarians today need to be more teaching centered rather than stereotyped service centred. This can be seen in academic libraries where teaching and guiding students is the primary responsibility of reference librarians. The librarians would not be able to perform their duties well if they do not have sufficient knowledge and training on appropriate and up to date methods of library instruction and practices.

1.8 OBJECTIVES OF THE STUDY

The study attempted to achieve the following goals:

a) To examine the current status of digital reference services in academic libraries in Malaysia and to identify issues and problems faced by librarians and students in their use of digital reference services.

b) To determine the effectiveness of digital reference services in academic libraries in Malaysia.

   Effectiveness in this context is assessed through students' awareness, usage, users' perception, users' satisfaction, library's performance and perceived needs of digital reference services.

c) To examine how demographic variables are related to awareness, usage, satisfaction and perceived needs of digital reference services.

   Demographic variables in this context refer to faculty, gender, age, student level, semester, currently living and mode of study.

1.9 RESEARCH QUESTIONS

In order to achieve the above objectives, the following research questions were used to guide the study:

a) What is the current status of digital reference services provided by the academic libraries in Malaysia?

   The current status here refers to the operational format of DRS in the library, the staff responsible and the administration aspects involved, the activities pertaining to DRS, including the cooperation and proportion of time been spent on the DRS, the acquired skills to use DRS, the policies for DRS provision, the reference librarian's duties, the reported types of reference questions, the subject areas the users' normally asked during DRS and finally the future plans for DRS. Those factors are sought to find out what the academic libraries are implementing in terms of DRS.

b) How aware are the students of the availability of digital reference services in academic libraries in Malaysia?

   Students' awareness here are observed in terms of the respondents physical visits to the library in the last semester, their access to the library's electronic resources, their awareness of DRS, and their knowledge about the service.

c) How are the digital reference services used by the librarians and students of the respected universities in Malaysia?

   Digital reference services used here refer to the formats of DRS the respondents used, the frequency of use of the service, the time they would most likely ask the questions through DRS, and their rating on the importance of DRS.

d) How effective are the digital reference services offered by academic libraries in Malaysia?

   In this study, the effectiveness is measured by the following factors: (i) Users' perception, (ii) Users' satisfaction, and (iii) Perceived library's performance.

e) What are the perceived needs for digital reference services among university students in Malaysia?

Perceived needs refer to the options that would likely be used by the respondents if they decided to get reference help, the formats of reference service perceived to be most heavily used in the next five years, and their perceived prediction of the future of DRS.

f) What are the issues and problems faced by the librarians and users in relation to digital reference services?

The sub-questions addressed are on what are the benefits of DRS from the point view of librarians and students, and what are the problems/limitations of DRS from the librarians and students perspectives.

g) How can digital reference services be improved from the perception of librarians and students?

The respondents were asked to briefly note any comments and suggestions for improving the DRS.

1.10 SIGNIFICANCE OF STUDY

The principal significance of this research is to create new knowledge and to find solutions to problems pertaining to the provision of digital reference services in the academic libraries. The findings of this study serve as an addition to the existing body of knowledge on digital reference services. This study provides insights on the current status of DRS in academic libraries in Malaysia. It contributes to the understanding of the awareness, usage, effectiveness and perceived needs of students towards DRS in academic libraries in Malaysia and other developing countries.

The study also contributes in terms of filling a gap to the literature pertaining to DRS. A major gap in the literature of DRS was the lack of research pertaining to user aspects of the services since most of the studies on DRS focused on the librarians and

libraries. Gross, McClure and Lankes (2001) pointed out that while interest in DRS is strong, progress is hampered by a lack of user input. This study is regarded as an attempt to find a solution to the problems pertaining to the implementation of DRS in selected academic libraries in Malaysia. Some major recommendations were proposed to improve existing academic library services.

The study highlights the formats and tools that can assist librarians plan, implement and assess how reference services are delivered in this digital environment. In addition, this study stressed that DRS can only succeed when it is properly delivered by well trained staff through well organized user education programmes, effective marketing and promotion, as well as collaboration. Besides, this study can contribute to the setting the agenda for the future of DRS community in academic libraries in Malaysia and other developing countries.

The findings of this study can also serve as advice to academic libraries in Malaysia to exploit the latest information and communication technology to improve library operations. One possible solution which is in line with the development of online library services in Malaysia is to implement the digital reference services using both asynchronous and synchronous formats of DRS for improving library services, as well as to support teaching and learning in institutions of higher learning.

In the ICT era, reference work can be conducted online, and communication is made easier and time is no longer a barrier. The study can create greater awareness of DRS and Internet as a valuable scholarly tool. This will prompt libraries, students and academic staff to work together to exploit its resources for effective academic work, as stated by Badu and Markwei (2005) in their study on Internet awareness and use in the university. This study is also necessary to encourage librarian-student communication because

librarians would be the best people other than their lecturers who will understand their information needs and providing them assistance and services.

Malaysian higher educational institutions are striving to become world-class universities. Many Malaysian universities are targeting to be ranked among the foremost in the world based on international standards of academic excellence. In accomplishing the university's quest to be world-class, there should be conducive teaching, learning and research environment. The Malaysian universities need to provide high quality of facilities and support systems which include the library and information services (*The way forward: the research universities partnership with industries*, 2006). Rosna (2002) noted that the library is one of the criteria for accreditation, evaluation and rating of academic programmes, as well as ranking of universities and colleges. The academic library supports directly and contributes to the success of an academic programme, more so than other support services of a university or college.

The study hopes to provide the basis for further research in the area of reference and information sources and services. It is expected that knowledge gained through this study would be useful in planning and implementing digital reference and information services in academic libraries. From the study it is hoped that there will be awareness among academic libraries in Malaysia of the importance of the existence of models (for instance Lankes, 1998, and Wasik, 2003a) for digital reference services. The results of this study may also be useful for the libraries in the country in evaluating and reorienting their services, collections and facilities.

To the best of the researcher's knowledge, there has been no study conducted so far on the current status, awareness, usage, users' perception and satisfaction of DRS in Malaysia. This study may help to overcome the lack of such studies in Malaysia and other developing countries. The study on current status of DRS is necessary to know the present

situation of implementation of online library systems in academic libraries in Malaysia. The researcher felt that the collected data can be a management tool for strategic planning in the library. From the study of current status, one can know about the current practices in term of library systems used, staff and administrations, policies, cooperation and future plan. As noted by Janes, Carter and Memmott (1999), knowing more about emerging services will help us better plan and implement future services and to think about such important issues as staffing, resources needed, training, users and situations best suited to digital services, the limitations and possibilities of digital services, measures of success and potential cooperative models with commercial or expert-based services. With this knowledge, we will be able to continue to provide high quality services to users and communities.

The research questions pertaining to awareness of DRS are vital in examining whether the users are aware of the services or not and at the same time can be used for improvement of library services. For library administrators, it would be meaningless and a waste of time and energy if the users are not aware of the services provided.

The study on effectiveness of DRS is essential as they give an opportunity for students to evaluate the performance of the academic libraries. In fact, the library also can find out the user preferences of the services besides their level of satisfaction, as well as giving their perception toward the services.

The case study method chosen for this study is hoped to provide insights and contexts for understanding reference services in academic libraries and the practices that could benefit both the librarians and users.

Finally, as a faculty member specializing in the field of reference services, this study will increase the researcher's own knowledge of the subject matter that could be utilized and disseminated to the students as well as to the academic communities.

The remainder of this introductory chapter consists of a discussion of the scope and limitations of the study and organization of the thesis.

1.11 SCOPE AND LIMITATIONS

There are several limitations of this study and these are discussed below:

This study covered four (4) government-funded universities in Malaysia, namely Universiti Teknologi MARA (UiTM), University of Malaya (UM), Universiti Kebangsaan Malaysia (UKM) and Universiti Putra Malaysia (UPM). The study excluded other public universities, university colleges, international universities, private universities and colleges.

The 4 public universities were chosen because of the following reasons:

a. they are the older universities (established more than 30 years) when compared to others. With the exception of Universiti Sains Malaysia (USM) and Universiti Teknologi Malaysia (UTM), all other public universities in Malaysia were established after the 1980s,

b. their libraries are well established in term of online services, collection, staff, library programmes and activities. This is in line with Laili (2000) whose study was based on having well-established libraries and adequate professional staff when choosing UiTM and UPM in his study on the perceptions of the library services and usage in selected higher education institutions in Malaysia.

c. the students' enrolment as well as the total number of lecturers in the 4 public universities are comparatively higher compared to many other public universities and private universities. As of June 2006, UiTM had a student enrolment of 85,614, followed by UPM which had 45,198, UM had 26,376 and UKM had 24,325. In terms of academic staff, UiTM had a total number of 4,930 lecturers, followed by UPM which had 2,213, UM had 1,892 and UKM had 1,667 (Noor Hidayat, 2007).

This study only involved postgraduate and undergraduate students of the Faculties of Computer Science and Information Technology in 4 public universities in Malaysia. Students from other faculties in selected universities were not included as sample in this research since the researcher only focused on ICT students.

For Tun Abdul Razak Library, UiTM the study involved librarians working in the main campus in Shah Alam only (N=38). UiTM librarians working in the branch libraries (N=39) were excluded in this study since they were located separately in the twelve branch campuses throughout the country.

In this study, effectiveness was measured through users' satisfaction, users' perception and library's performance. Various key factors which either enhance or hinder the implementation of DRS in academic libraries were also identified and used to measure the effectiveness of DRS in selected academic libraries in Malaysia such as the awareness, usage and perceived needs towards DRS.

This study was essentially a case study, focusing on the existing status and the effectiveness of digital reference in selected academic libraries in Malaysia, hence the technical aspects of digital reference services were not explored.

1.12 ORGANIZATION OF THE THESIS

The thesis is divided into five chapters. Chapter 1 covers the background of study, defining digital library environment and the impact of the Internet in reference services. This is followed by the explanation of the changing role of reference librarian, the Malaysian experience and the role of academic libraries. This chapter also explains the statement of problems, objectives of the study, research questions, significant of study and scope and limitations of the study.

Chapter 2 deals with literature review that covers background and evolution of reference services, the concept of DRS, emerging models, general process models, DRS collaboration, benefits and limitations, personalized services, trends and challenges, technological development, evaluation and guidelines, effectiveness of DRS and DRS in academic libraries.

Chapter 3 gives the overview of the research methodology which includes definitions, framework of study, research design, sampling and population, data collection methods and instruments.

In Chapter 4, the researcher attempts to present the data analysis and findings of the study.

Chapter 5 summarises, explains and interprets the main findings and implications of this study. It also includes recommendations and some directions for future research.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter presents a review of related literature on digital reference services. In general, much of the literature on digital reference services consists of descriptive studies of individual digital reference services and their constituents. Until recently, almost all the published research on digital reference services has been observational in nature.

In assessing the state of literature of digital reference services in libraries, Gross, McClure and Lankes (2001) use the term '*anecdotal*' (or the '*this is how we did it in our library*' variety) or editorial in nature. Less of what has been written on this topic can be considered '*research*' in the formal sense. While reference services are a well-established part of the traditional libraries environment, the provision of reference service in the digital environment is still very much in a formative stage. Some of the research literature on general reference services are also being used in this study to give background information on DRS.

The main aim of the literature review is to enhance the researcher's understanding of the area to provide a conceptual framework for the study. The scope of this literature review was extracted from books, journal articles, conference papers, theses and dissertations, technical reports, bibliographies, speeches and talks in both print-based and electronic media on the subject of digital reference services in libraries.

Related research literature was collected and examined from on-line databases such as Library and Information Science Abstracts (LISA), Educational Resources Information Center (ERIC), ProQuest, Emerald, INFOTRAC, Library Literature and Information

Science Full Text and H. W. Wilson Social Sciences Abstract. Sources from Internet that were pertinent to the research were also reviewed. Printed materials such as books, journal articles and dissertations obtained through the web OPACs of the University of Malaya (UM) Library, Tun Abdul Razak Library, UiTM and International Islamic University Malaysia (IIUM) Library were also reviewed.

In searching for the literature, keywords such as *digital reference service(s)* and *reference service(s)* were used. Other related terms including *digital libraries, virtual reference services, on-line reference services, on-line chat reference, web-based reference services, electronic reference services, e-mail reference, Ask-A Librarian, academic libraries* and *university libraries* were also used to support the search.

The researcher analyzed the updated bibliography on digital reference services compiled by Sloan (2004) to ensure that all related documents/literature pertaining to the area were identified and retrieved. The bibliography contained 700 entries where 40 percent of the items listed were available via the Web. Some of the items which deal specifically with DRS in academic libraries were found useful in the study.

In the reference area, a few textbooks have been written and edited by reference librarians and educators, from that of James I. Wyer in 1930 who wrote '*Reference work: A textbook for students of library work and librarians*' to William A. Katz's '*Introduction to Reference Work*', Volumes I and II, eight edition published in 2002 (Katz, 2002a, 2002b). The researcher found two books pertaining to digital reference services entitled: '*Implementing digital reference services: setting standards and making it real'* (edited by R. David Lankes, et al., 2003) and '*Digital reference services in the new millennium: planning, management and evolution'* (edited by R. David Lankes, J. W. Collins and A. S. Kasowitz, 2000). Although those books are focused on services in American libraries and information centres, they are also relevant in this study.

There are also journals specialized in reference services, for instance *RQ* (now *Reference and User Services Quarterly*) published since 1960, *Reference Services Review* began in 1972, and *The Reference Librarian* published in 1981 (Bopp and Smith, 2001). In addition to textbooks and journals, there are also monographic literature including the proceedings, guides, manuals and reports on digital reference services.

Early published studies on DRS mainly focused on the use of e-mail or web form as means of providing reference service to remote users (Abels, 1996; Kasowitz, et al., 2000). Additional studies indicate that offering real time reference service is a fairly recent addition to the more established DRS mentioned earlier (Kloss and Yin, 2003).

The findings from the literature are summarized in the following sections:

a. Background of Reference Services
b. Evolution of Digital Reference Services
c. The Concept of DRS
d. Emerging Models of Digital Reference
e. General Process Model
f. Digital Reference Collaboration
g. Benefits and Limitations of DRS
h. Personalized Services
i. Trends and Challenges in DRS
j. Technological developments in DRS
k. DRS Evaluation and Guidelines
l. Effectiveness of DRS
m. DRS in Academic Libraries
n. Conclusion

2.2 BACKGROUND OF REFERENCE SERVICES

Reference service is one of the library's primary practices, besides acquisition, classification, cataloguing and physical planning. The term reference services, or sometimes referred to as reference and information services, is a difficult concept to define. Davinson (1980: 13) noted that reference and information service can refer to the provision of information and/or materials to people entering a reference library and requesting help from the library staff. In the same vein, Keenan and Johnston (2000) defined reference service as provision of information in response to requests.

Huling (2002: 867) defined reference service as '*personal assistance provided to library users seeking information'*. Assistance referred to all of the many ways that libraries help their users to gain access to and use of the collection (Bailin and Grafstein, 2005: 317). Bunge and Bopp (2001) noted that such personal assistance is the essence of reference services and is the fundamental role of the reference librarian. The goal of the reference librarian is to meet the information needs of the users. How and to what extent this is done varies from library to library and depended on the type of library. In the same vein, Tyckoson (2001) stressed:

> *'For anyone using libraries today, reference service is a standard feature. Regardless of the type of library, the size of its collection, or the demographics of its users, patrons expect to get help with everything from complex research projects to finding materials in the collections. Service has become almost synonymous with libraries'* (p. 183).

A large library is likely to have a reference section of several staff who deal with a wide variety of subjects. They may also be responsible for a function or a subject area. A large library will have a separate reference desk and a loans desk to meet the need of the users. A smaller organization may have only one or two staff who must provide a wide variety of services, although in a more specialized subject area. Huling (2002) pointed out that academic libraries focus on teaching users how to find information, special libraries

primarily find information and package it for their users, and public libraries practice some of both approaches.

Gosling (1999) noted that the reference services provided by a library include:

a. assistance in using the library

b. answering requests for information

c. reader education

d. conducting literature searches

e. current awareness services (p. 7).

The distinguishing feature of reference services is that it specifically ensures the optimum uses of information resources through substantive interaction with the users on direct and indirect levels as follows:

a. Reference or information services consist of personal assistance provided to users in pursuit of information.

b. Formal and informal instruction in the use of the library or information center and it resources may range from the explanation of the use of the bibliographical aids (for example catalogues, information databases) to more formal assistance through interpretive tours and lectures.

c. Indirect reference service reflects user access to a wide range of informational sources (for example bibliographies, indexes, information databases) (Katz and Clifford, 1982: 9-10).

Chowdhury (2002) noted that the provision of such personalized information services has remained the central theme of the library and information profession. The importance of reference services grew over time with the introduction of new technologies and services in libraries. Bunge (1999: 185) categorized reference services into three broad groups:

a. information services that involve either finding the required information on behalf of the users, or assisting users in finding information;
b. instruction in the use of library resources and services (broadly defined as information literacy skills); and
c. user guidance, in which users are guided in selecting the most appropriate information sources and services.

The Reference and User Services Association (RUSA) of the American Library Association has been a leader in formulating standards for reference services. RUSA that has a responsibility for supporting the development of reference services for library users of all ages has issued guidelines for the development and delivery of such services. The guidelines state that:

> *'Information services in libraries take a variety of forms including direct personal assistance, directories, signs, exchange of information culled from a reference source, reader's advisory service, dissemination of information in anticipation of user needs or interests, and access to electronic information.'* (RUSA Reference Guidelines: 1)

Traditionally, reference services have been offered face-to-face or in person at a reference desk within the library building, over the telephone and through correspondence. The reference librarian handles all types of queries, from directional questions, ready reference questions, specific-search questions to research questions. The role of the reference librarian is primarily to answer patron questions and secondarily to provide readers advisory services.

Higgens (1984) outlined the sequence of reference process as shown in Figure 2.1.

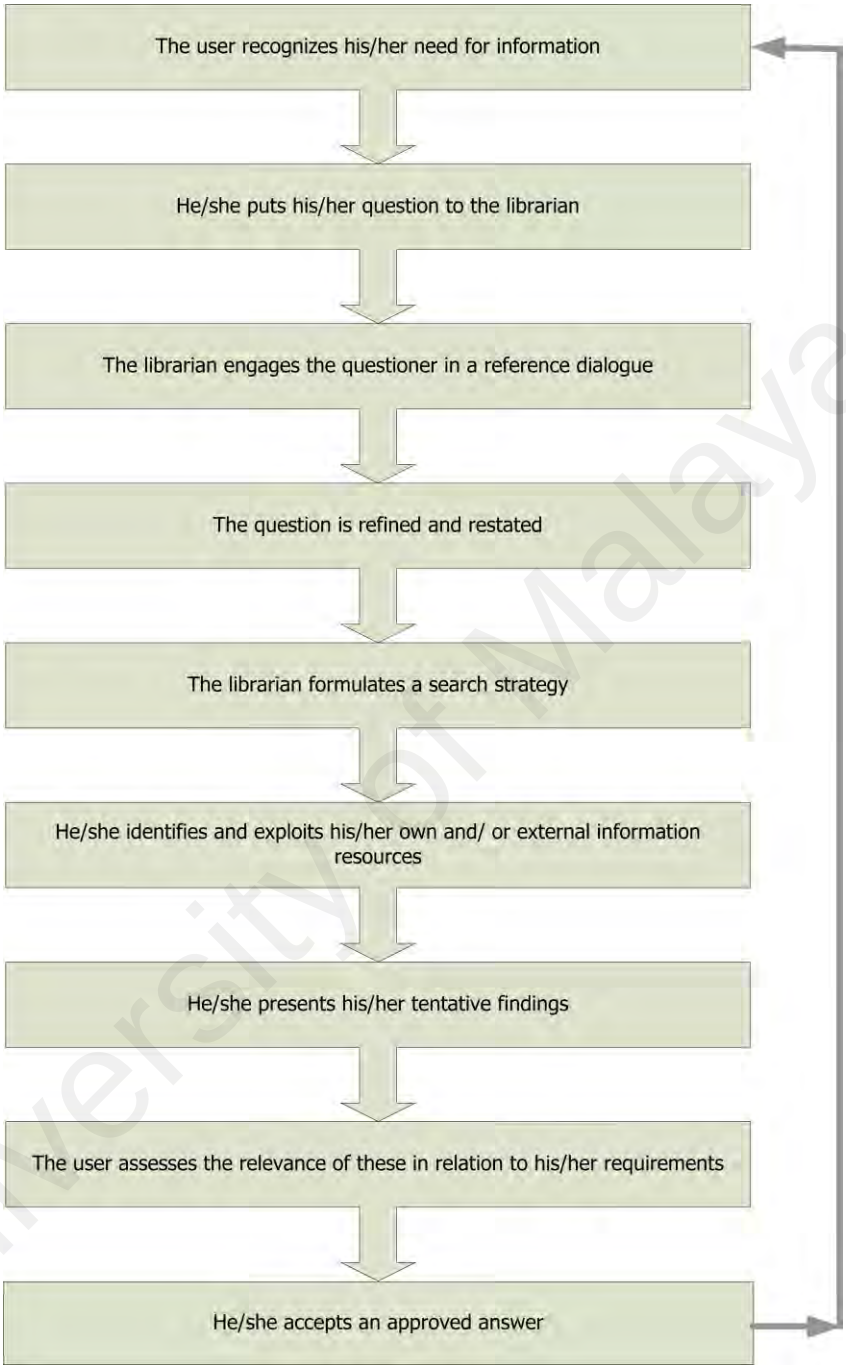

Figure 2.1
Sequence of the Reference Process

Source: Higgens, G. L. (ed.). (1984). *Printed reference materials*. 2nd ed. London: LA: 32.

An important part of a reference process according to Chowdhury and Chowdhury (2003) is the reference interview, which involves a personal discussion between a user and reference librarian. Through the reference interview, the reference librarian tries to understand the specific information need(s) of the user as well as collects background information about him or her particularly on the individual's subject knowledge and the reason for searching for the information. Through the reference interview, the reference librarian is able to filter the retrieved information in order to select the most suitable source(s) for the user. Librarians facilitate interaction in online environments through an evolution of the traditional practice of the reference interview. Doherty (2007) suggested a new theory of reference interaction that calls for further studies to be conducted to test and refine it.

While reference services are largely responsive, the assistance or service is provided when asked for by the users, libraries also have played a key role in providing information services that anticipate user needs. Such proactive services include various forms of current awareness services (CAS) and selective dissemination of information services (SDI). CAS are provided to ensure that library users keep up-to-date with information in their interest or subject areas. SDI involves asking users to describe their information needs and then supplying items which fit those needs when they are received by the library.

Among other services associated with reference division/unit are information literacy skills or bibliographic instructions, literature searches, bibliographic/reading lists compilation, indexing/abstracting, new titles list, displays/exhibitions, inter-library loan/document delivery services, answering reference query/reader's advisory services, computing facilities and photocopiers.

According to Gosling (1999), an important part of reference division is the reference collection provision that consists of works which assists users to find information or refer them to other sources of information. Printed reference sources are usually shelved close to the reference desk for security reasons, because they are expensive. Additionally the reference staff can observe users and see when they need assistance. The reference librarian normally advice users on how to use these reference sources efficiently.

2.2.1 Philosophies of Reference Services

Wyer (1930) outlined three levels of reference service:

a. conservative, which is to direct the patron to a source,

b. moderate, to show the patron the source that might answer his need and instruct him on how to use it; and

c. liberal, to provide the information or the actual answer to his question.

According to Connor and Alford (1982), Wyer's concept were the basis for the scope of Reference and Adult Services Division (RASD), American Library Association's guidelines, and should assist the library in clarifying its philosophy of reference service. The later approach balances the instructional function with the full-service mode. Debates on this issues raged in the 1960s and 1970s, but they have abated as reference librarians have determined that a balanced approach takes into account the needs of the user at a particular time.

Reference services in the digital age focus on relationships rather than the reference library as place, collection or even a collection of services (Ferguson and Bunge, 1997). Envisaging a wide range of relationships which might be expressed as the librarian as facilitators, assistant, instructor and problem solver that add value to the core digital services being provided, they also emphasize the need for a set of values that are apparently

new but that in fact go right back to Ranganathan. The famous Five Laws of Library Science of Ranganathan (1931) were the first source to give a user and service-centered view of libraries. The five laws were further discussed in Ranganathan's book '*Reference service*' which was published in 1940.

a. Books are for use – is the use of its thought-content that is the expressed thought embodied in the book.
b. Every reader his book – the reference librarian should find out pin-pointedly the books (or other materials carrying information or knowledge) needed by every reader for his/her use.
c. Every book its reader – expects the reference librarian to act as the canvassing agent for every book and every document in the library.
d. Save the time of the reader – expects from the reference librarian something more than the first three laws. It introduces the new factor 'time' into the service where the reference librarian should have great familiarity with the world of books and documents in general.
e. A library is a growing organism – the documents in the library continuously grow in quantity and variety. The reference librarians should keep themselves promptly informed of new books and other documents (Ranganathan, 1940: 54-60).

The researcher felt that these laws, although apparently very simple, provide a good basis for discussion of the philosophy and principles behind the management and organization of libraries.

2.3 EVOLUTION OF DIGITAL REFERENCE SERVICES

The historical development of reference services can be traced in the literature. As a main component of library services, reference services are constantly developing as is the library itself, moving from the traditional, to automated, to hybrid, and eventually to digital.

Sutton (1996) defined a four-part typology of expansion of reference collections from a paper-based traditional library to a digital library:

a. *Traditional.* A specific place with a finite collection of tangible information bearing primary entities like books and journals.

b. *Automated.* A mix of paper and digital reference resources and meta-information that point to non-digital media.

c. *Hybrid.* Typified by the use of both print and digital meta-information sources and the coexistence of both digital and paper primary resources. This type of library allows for the first time remote access to '*some subset of the library's digital collection or to digital resources*'.

d. *Digital.* A library as a logical entity. The library without walls that does not collect tangible information bearing entities, but instead provides mediated, geographically unconstrained access to distributed, networked digital information (p. 132).

Historically, libraries have been described as the '*storehouses of knowledge*' (Chowdhury and Chowdhury, 2003) and been organized along traditional and functional lines of acquisition, cataloguing and loan services. The invention of printing in the mid-15th century, the wide distribution of books by the 16th century, the growth of literacy among middle classes in the 17th and 18th centuries and the 19th century's mass education movement increased both the amount of the demand for information. As early as the mid-18th century, people were complaining there simply was too much to read, too much to

know (Katz, 2002a). Reference service arose in the late nineteenth and early twentieth centuries in response to several forces and trends, including:

a. an increase in the number and variety of information resources available in libraries and outside,
b. an increase in the complexity of those information resources,
c. these increases (above) combined together made it more difficult for people to find the resource they were looking for, and to find the information they needed within that resource, and
d. an increase in the number and diversity of people using libraries (particularly public libraries), leading to a wider range of information needs, enquiries, and sophistication in the search for information (Janes, 2002).

The modern concepts of reference work can be traced to Samuel Green's 1876 paper, '*Personal relations between librarians and readers*', later published in *American Library Journal* (now *Library Journal*) (Bopp and Smith, 2001). While it is doubtful that Green actually invented the idea of reference service for library users, he was the first to speak publicly about the concept and was the first to discuss it in writing. In both his speech to the first meeting of the American Library Association and his article, Green discussed the need for librarians actively to assist members of their communities in using library resources. While the term '*reference*' did not evolve until several decades later (Rothstein, 1953), the publication of Green's article helped to popularized the new concept of reference service.

Green (1876) cited in Tyckoson (2001) introduced four main functions of the reference librarian which remain as the basic tenets of reference service today:

a. instructs patrons how to use the library
b. answers patron queries

c. aids the patron in selecting resources

d. promotes the library within the community

His article noted that although catalogs and indexes are valuable, most users require instruction in their use. User also must be guided in selecting the books that best meet their information needs. Green also highlighted the importance of human interaction in the personal assistance process where librarians must be '*easy to get at and pleasant to talk with*' (i.e., approachable), and librarians must mingle freely with users and help them in every way (Schement, 2002).

Many changes have taken place since the publication of that first article. Rothstein (1953) detailed the growth and development of reference service from the earliest times until the mid-twentieth century. Technological innovation has played a key role in reference librarianship in the second half of the twentieth century. Telephone service began to appear alongside traditional face-to-face and postal reference services early in the twentieth century (Bopp, 1995). During the 1960s, libraries began to explore new technologies such as microfilm and microfiche, tapes and sound recordings. The 1970s and 1980s brought about significant changes with the emergence of full-text databases and electronic card catalogs in many academic, public, and special libraries (Grohs, Reed and Allan, 2003).

Eventually the electronic catalogue databases became the online public access catalogues (OPACs) providing local as well as remote access. With OPACs, the users can specify their queries as asset of keywords linked by logical operators AND, OR and NOT. Another major change in the process of storage, retrieval and dissemination of information was brought by the invention of CD-ROMs. By the late 1990s, many libraries moved from CD-ROM to providing databases through the Internet. The Internet introduced new

possibilities and interactive technologies such as e-mail, chat, and instant messaging to the reference desk (Penka, 2003).

According to Kasowitz (2001), many libraries and organizations have responded to an increased need for formal methods of remote communication between information seekers and information professionals by providing reference service via the Internet, or digital reference service, to their users. Wasik (2003a) traced the origins of digital reference services to the library field, where libraries sought to expand traditional services by providing reference assistance in an electronic environment. Lankes, Collins and Kasowitz (2000) give five reasons for moving to electronic reference services:

a. increasing access to resources beyond the library

b. lack of geographic constrains for users

c. the need to differentiate services to different populations of users in the face of shrinking budget

d. increases in complexity of information resources and the need for specialized knowledge

e. new options for answering reference questions (p. 187).

Academic libraries were the first to provide digital reference services in the early 1980s (Gross, McClure & Lankes, 2001). One of the first services to go online was the Electronic Access to Reference Services (EARS) launched by the University of Maryland Health Services Library in Baltimore in 1984 (Wasik, 2003a quoted from Weise and Bergendale, 1986). EARS allowed patrons to make reference queries or request to various library services via e-mail, using terminals either on or outside campus (Braxton and Brunsdale, 2004).

The number of academic and public libraries offering e-mail reference service continues to grow making e-mail the most common vehicle for providing digital reference

services. The early-adopter libraries launched digital reference services for two main reasons: to extend the hours that questions could be submitted to the reference desk, and to explore the potential of campus-wide networks, which at that time was a new technology (*http:en.wikipedia.org/wiki/Digital-reference-services*).

Kawakami (2003) noted that with the advent of the World Wide Web, libraries created online forms that asked the user to input specific information such as format type or time period and thus give the librarian guidance as to what the user needed. Libraries also posted FAQs on their web pages in the hopes that the user would find his question answered therein. FAQs however, do not have an interactive component and may not address a user's particular question.

Throughout the 1990s e-mail reference became increasingly important. By the early 1990s, Ask-A Librarian e-mail reference services were common. By the mid 1990s, at least 75 % of 122 ARL (Association Research Libraries) member libraries and 45 % of academic libraries offered digital reference service via electronic mail or a web form (Goetsch, Sowers, & Todd, 1999; Janes, Carter, & Memmott, 1999). Digital reference services become important and effective resources for meeting information needs of thousands of users, and the number of the user requests to these services has continued to increase. By the end of the 1990s, 99% of 70 academic libraries offered e-mail reference and 29% offered real time reference service (Tenopir, 2001). A number of virtual reference services, such as the Internet Public Library and AskERIC also emerged in the 1990s; these organizations offer only electronic reference services (Lankes, 1998).

The year 2000 brought the advent of live reference in academic libraries with the use of chat or commercial call centre software to communicate with users in real time. Kawakimi (2003) wrote that technologies that have been adapted from the commercial

sector allow the librarian to conduct a synchronous or real time dialogue with a user to clarify an information need and use application sharing to deliver information online.

Collaboration has kept pace with technology with the implementation of regional and international reference services. For instance, the Library of Congress began its Collaborative Digital Reference Service projects to test the provision of professional library-quality reference service to users anytime anywhere (24 hours per day, 7 days per week), through an international digital network of libraries (Wells and Hanson, 2003).

2.4 THE CONCEPT OF DIGITAL REFERENCE SERVICES

Digital reference service (DRS) also known as '*virtual reference*' and `*online reference*' is relatively new addition to library services that is gaining wide-popularity in academic and public libraries (National Information Standards Organization, 2001). The terms digital reference services, web-based reference services and electronic reference services are used interchangeably by Su (2002) as terms with similar meaning.

There are various definitions of digital reference services. According to White (2001), a DRS can be defined as:

> *'an information access service in which people ask questions via electronic means (such as e-mail or Web forms). In turn, knowledgeable individuals answer questions, and responses are transmitted via electronic means. Interim search processes need not involve electronic devices although they often do. There may even be interim contact with questioners via telephone or electronic means if questions require clarification.*' (p. 173).

David Lankes (1998), a pioneer in the field of digital reference services defines digital reference as Internet-based question and answer services that connect users with individuals who possess specialized subject or skill expertise. Johnson, Newton and Reid (2004) define digital reference services as Internet-based question and answer services that

connect users with experts in information sources in a variety of subject areas through web forms and/or e-mail.

Digital reference services refer to a network of expertise, intermediation and resources put at the disposal of a user seeking answers in an online/networked environment. A digital reference occurs when a question is received electronically and responded to electronically (Bertot, McClure and Ryan, 2000). A transaction must include a question received via e-mail, WWW form, chat, web cam or other formats of DRS available.

Digital reference services are often called `Ask-A services' provide subject expertise and information referral over the Internet to their users. According to Wasik (2003a), digital reference and Ask-A services are:

> *'Internet-based question-and-answer services that connect users with experts in a variety of subject areas. In addition to answering questions, experts may also provide users with referrals to other online and print sources of information. As opposed to traditional expert systems that attempt to capture and model problem-solving tasks in a manner similar to humans, digital reference services use human intermediaries, or experts, to answer questions and provide information to users'* (p. 1).

Janes, Carter and Memmott (1999) developed their own definition of digital reference as a mechanism by which people can submit their questions and have them answered by a library staff member through some electronic means (e-mail, chat, web forms, etc.) not in person or over the phone.

Wikipedia defines digital reference as a service by which reference work is conducted online and the reference transaction is a computer-mediated communication. In its broadest sense, digital reference services is a concept that depicts reference services delivered or initiated electronically, often in real-time, where the users employ computers or other Internet technology to communicate with reference staff, without being physically present.

A digital reference service generally comprises the following elements:

a. the user of the service,

b. the interface (e-mail, web form, chat, videoconference, etc.),

c. the information professional, and

d. electronic resources (including electronic or CD-based resources, web resources, local digitized material etc.), as well as print resources (Berube, 2003: 1).

Throughout the literature, the researcher found that the term digital reference service is applied to the use of computer-based technology that use human as mediators. In presenting the DRS research agenda developed as a result of a three day symposium of Harvard University, Lankes (2005) defined digital reference as the use of human intermediation to answer question in a digital environment.

Library professionals agree that digital reference is a new type of service based on the same question-and-answer type of assistance provided in traditional in-person reference. In traditional libraries, the focus is on the containers of information; reference services are location-bound. In digital libraries, the focus is on the information itself, and reference services are not bound by location.

2.5 EMERGING MODELS OF DIGITAL REFERENCE

Until the Internet really began to start in the early 1990s, librarians relied on the correspondence, the telephone, and the fax machine to help users who were unable to come in to the library for reference service. With the advent of Internet-based tools, librarians now have a greatly expanded set of options (Francoeur, 2002).

Tenopir and Ennis (2002) offer five digital reference options:

a. Locally loaded, a combination of loading reference databases locally on a computer in the campus and providing access to reference databases loaded on another library's computer, such as a consortium
b. CD-ROM databases (networked or stand-alone)
c. Intermediary online searching (where a professional does the searching)
d. End-user online search services (where the patron performs searches on a commercial online system)
e. Patron access to the Web (other than to Web versions of commercial database services) (p. 266).

Chowdhury and Chowdhury (2001) categorized online reference and information services into 3 broad groups:

a. reference and information services from publishers, database search services, and specialized institutions;
b. reference services provided by libraries and/or experts through the Internet; and
c. reference and information services where users need to conduct a search and find information through the Web.

Prevalent formats of digital reference services according to Lam (2003) include e-mail, AskA Services, online pathfinders, chat, and real-time live Web reference. Kasowitz (2001) focuses on real-time reference which includes chat technologies, instant messaging software and web contact software. He also describes that many libraries and organizations have recognized the benefits of providing digital reference service through collaborative services.

Several researchers have used the terms '*asynchronous*' and '*synchronous*' to describe the service delivery of digital reference (McClennen, 2002; Francoeur, 2002;

Wells and Hanson, 2003; Berube, 2003 and Han and Goulding, 2003). According to McClennen (2002), DRS has been practiced in two modes: synchronous and asynchronous. Synchronous digital reference is characterized by real-time two way communication between the question asker and answerer, using mechanisms such as `*chat*', `*instant messaging*' or `*voice over IP*'. With synchronous, real time technologies, typically using text, patrons click a button on a web page to exchange messages with a librarian in real time.

Asynchronous digital reference is characterized by communication in one direction at a time, typically by e-mail or web forms. It involves the use of FAQs (frequently asked questions), e-resources, which are comprised of subject guides, lists, journals, and other content, and e-mail, which may be forms-based or address-based. According to Pomerantz et al. (2004), since the invention of the World Wide Web, there has been a great increase in the number of reference services utilizing asynchronous electronic communication media to conduct the reference transaction.

The two broad categories of digital reference service models are as follows (adapted from Francoeur, 2002 and Berube, 2003) :

a. *Asynchronous transactions*, which involves time delay between the question and answer.

i. E-mail

This is still the major format for online information delivery. User sends the library an e-mail with a reference query, supplying whatever information he or she feels is necessary and the library may reply by e-mail, telephone, fax, correspondence, etc.

ii. Web forms

Web form transactions can only be initiated from a designated web site, where users must respond to specific queries in addition to asking their questions. In order

to send the form, which will usually be received by the library in the form of e-mail, users must click on a button specifically designated for that purpose.

iii. Ask-A services

Ask-A services are usually corporate-sponsored web sites that allow users to ask questions and receive answers for free from public information located mainly on the World Wide Web or from proprietary databases and networks of field experts. A list of current AskA services is available at *http://www.vrd.org/locator/subject.shtml.*

b. *Synchronous transaction* which takes place in '*real-time*' with an immediate response to the query.

i. Text-based chat

Chat or Instant Messaging is where librarians and users can '*speak*' to each other in real time on the Internet using special text-based software. An example is the Live Help service offered by Gateshead public libraries, which uses Swiss software, Click and Care. The transaction involves a split web screen, in one screen users type question and can instantly see librarians' responses, in the second screen, librarians can call up web pages or other electronic references where the required information can be found. Although chat reference is associated with the 24/7 service model, this level of service is often impossible for single libraries to implement.

Francoeur (2002) categorized chat reference into two categories as follows:

a. Chat reference using simple technologies

User exchanges short, text messages back and forth with the librarian. Running the service this way doesn't allow for all the fancy interactivity that web contact centre software allows, but it does allow for rapid, basic communication. There are three ways of running this kind of a service: with free, instant messaging software (such as AOL Instant

Messenger), with a web-based chat room (such as those at Anexa.com), or with chat software purchased by the library (such as Conference Room).

b. Chat reference using web contact centre software

Borrowing technology from online customer service, software for web contact centres not allow for instant messaging, but they also offer and give the librarian power to control the user's browser. A librarian can actually make the user's browser display a recommended web page, such as a search engine (with a suggested query typed in by the librarian) or the main page for the library's online catalogue.

ii. Video-conferencing or web-cam services

This form of digital reference includes the visual element, which may be an antidote to the communications problems inherent in the more text-based services. Librarians and users are able to use both text and speech for reference transactions. Instead of a window for the textual exchange, there is a window in which librarians and users can see each other while conducting a face-to-face interview. Examples of video-conferencing softwares are *CUseeMe* and *Microsofts' NetMeeting* (Smith, 2001).

iii. Digital Reference Robots

Digital Reference Robots essentially use artificial intelligence to respond to questions; the most well known of this type of service is Ask Jeeves available on the Internet.

The other format of digital reference services is *Collaborative Digital Reference Services (CDRS)* where two or more libraries team up to offer reference services using any of the above formats.

(This is further explained in section 2.7)

In conclusion, the following figure illustrates the various types of digital reference services currently in practice:

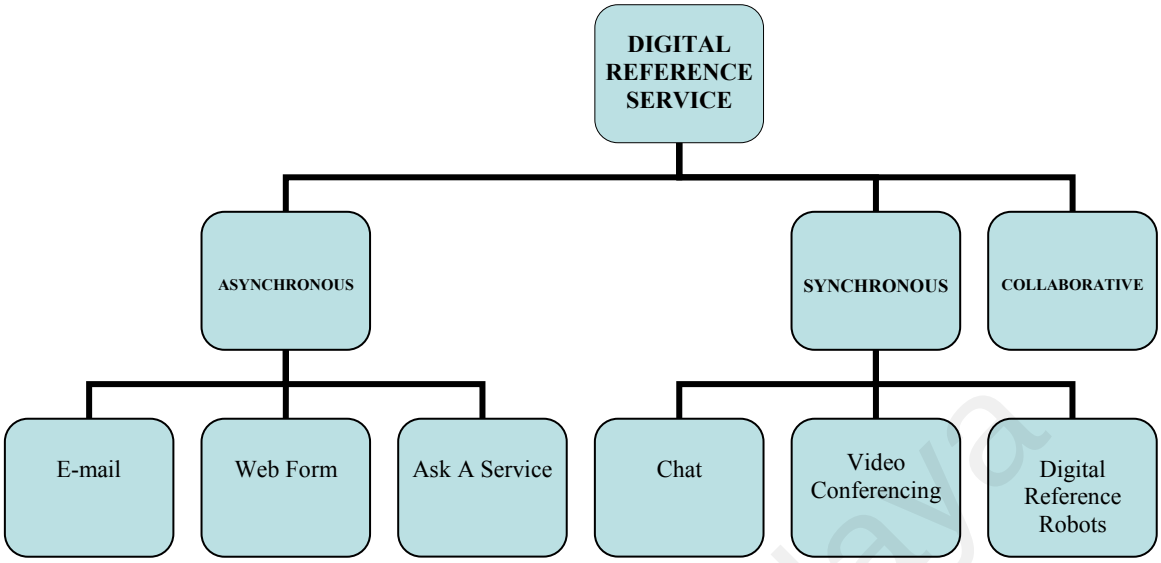

Figure 2.2
Topology of Digital Reference Service

2.6 GENERAL PROCESS MODEL

Several models exist that describe specific steps in this asynchronous reference transaction. Some of these models describe processes similar to processes in the traditional reference interview, while others describe entirely new processes. The general process model of asynchronous digital reference is as follows:

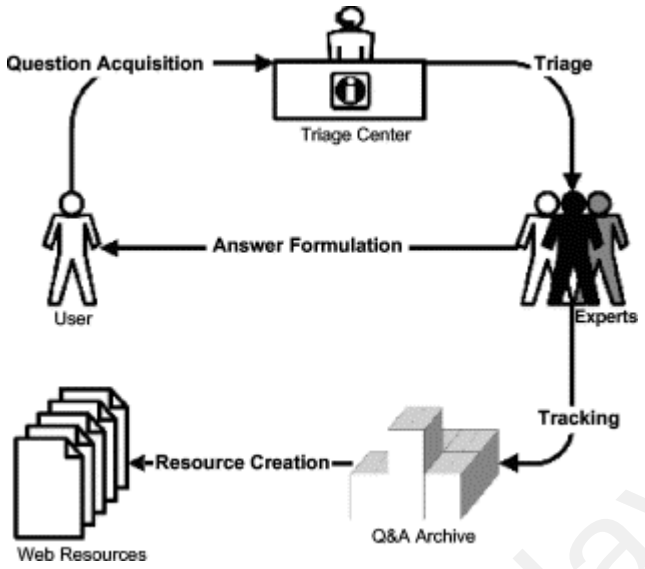

Figure 2.3
General Digital Reference Model
Source: Pomerantz, Jeffrey et al. 'The current state of digital reference: validation of a general digital reference model through a survey of digital reference services.' *Information Processing and Management*, 40(2), 2004: 349.

The above model is derived from Lankes (1998) and the Virtual Reference Desk (VRD)'s Project AskA software specifications document (Virtual Reference Desk Project, 1998). This model consists of five steps:

a. *Question acquisition* is a means of taking a patron's questions from e-mail, web forms, chat, or embedded applications.

b. *Triage* is the assignment and routing of a question to a digital reference service, and to a reference or subject expert within a service. This step may be automated or conducted via human decision support. Triage also includes the filtering of repeated questions or out-of-scope questions.

c. *Answer formulation* includes factors for creating good answers such as age and cultural appropriateness. Answers are also sent to the user at this point.

d. *Tracking* is the quantitative and qualitative monitoring of repeat questions for trends. Tracking allows the identification of hot topics and may indicate where gaps exist in the collection.

e. *Resource creation* concerns the use of tracking data to build or expand collections and better meet users' information needs (p. 348).

The process model is presumed to be applicable to all asynchronous digital reference services, though different services employ variations of the processes at each step. Some services may even skip steps; for example, not all services may archive questions or answers to create resources. Additionally, some steps may be repeated, especially if this model is seen to span more than one service, for example, a triage centre at one digital reference service may receive a question and route it to a different service, which may then route it to an expert (Pomerantz, Nicholson and Lankes, 2003).

Chowdhury and Margariti (2004) quoted from Wasik (2003a) briefly outline the following six-step process that organizations can follow to offer a successful digital reference service:

a. *Informing*. Conduct preliminary research both in their area of expertise and in the existing services within their area.

b. *Planning*. Develop procedures, methods and policies that reflect the overall organizational goals.

c. *Training*. Prepare their staff accordingly with a special training plan.

d. *Prototyping*. Pilot-test the service before it is launched to identify problems.

e. *Contributing.* Ensure ongoing publicity and resource development to support the service.

f. *Evaluating.* Ensure regular evaluation of the service to provide information in areas that the service can be improved (p. 3).

The six-step process reveals an overall methodology that many digital reference services do not employ. Due to inadequate planning and perhaps inexperience with Internet-based information delivery systems, many services experience question overloads and often forced to stop operations as a result.

McClennen's '*Roles in digital reference*' defined a role-based model of digital reference. This model focuses on roles that are played by the participants based on the traditional process of librarian/patron interchange. The five roles are:

a. *Patron*: person asking the question

b. *Filterer*: this may be a person or an automatic process which filters the non-questions (for instance, repeat questions, inquiries about previous transactions, unclear, out-of-scope, or spam)

c. *Answerer*: person who assists the patron with information needs

d. *Administrator*: person who monitors workflow, clears the way for answerers and filterers to do their jobs, may assign questions and check answers for content

e. *Coordinator*: person(s) responsible for defining and implementing policies and procedures that involve the operation on the service (NISO, 2001: 2-3).

In conclusion to this section, the researcher found that the general digital reference model by Lankes (1998) has been given more attention for asynchronous DRS and can be adopted by academic libraries implementing DRS. Besides, the six-step process can be implemented to make DRS more successful since it clarifies the process and methodology that the academic libraries can follow in offering the service. Other than this, the role-based model of DRS can make the services more effective when the service providers are aware of their roles. The libraries implementing DRS cannot move to synchronous or more sophisticated DRS if there is no proper model, planning, methodology and collaboration of the services.

2.7 DIGITAL REFERENCE COLLABORATION

Digital reference collaboration is where two or more libraries deciding to work together and share resources (staff, hardware and software) to offer reference services to users at participating institutions (Meola and Stormont, 2002).

There are numerous local, national, and international initiatives for the provision of digital reference services. These include efforts within centralized library environments, between libraries under different management structures within the same institution, libraries within the same region, as well as larger initiatives such as the IPL (Internet Public Library) Reference Centre, AgNIC's (Agricultural Network Information Centre) distributed service, VRD (Virtual Reference Desk), or the Library of Congress' CDRS (Collaborative Digital Reference Service), which attempt to serve any user, any where (Wells and Hanson, 2003).

The IPL was founded by a class at the University of Michigan's School of Information and Michigan students almost exclusively generated its content and managed the Ask a Question reference service. Now a consortium of colleges and universities with programme in information science is developing and maintaining the IPL. AgNIC is a voluntary alliance and partnership of nearly 60 member institutions and organizations working to offer quick and reliable access to quality agricultural information and sources.

Penka (2003) identified five types of cooperation in digital reference: internal, informal, formal, affinity and anonymous. Internal cooperation occurs when the library staff work together to solve problem or meet a shared need. Informal is where reference professionals use other resources including contacting knowledgeable individual to answer user questions. Established consortia or groups with some form of publicly known charge are example of formal cooperatives. Groups formed around subject areas or meeting on a

common need that have no other type of formal agreement represent affinity groups. Finally, anonymous cooperation occurs when a library forward a query to another library automatically selected based on a set of criteria like expertise or availability.

Penka (2003), Blumenstyk (2001), Carlson (2001) and Huling (2002) describe the Collaborative Digital Reference Services (CDRS) offered by the Library of Congress. The goal of the project is to provide a service that is available seven days a week and twenty-four hours a day to users around the world. The service uses new technologies to provide best answers in the best context, by taking advantage not only of the millions internet resources but also of the many more millions of resources that are not online and that are held by libraries. The new technologies here should refer to technologies that can support synchronous digital reference such as chat software, remote control software and web contact centre software.

CDRS pilot project eventually involved over 260 libraries of various types in North America, Australia, Europe and Asia. The service combines the strengths of local library collections and staff with those of librarians around the world. In June 2002, Library of Congress (LC) and Online Computer Library Center (OCLC) introduced *QuestionPoint*, a cooperative digital reference that evolved from CDRS and operates on a subscription basis (Penka, 2003). This service is asynchronous, and relies on the use of site profiles and service level agreements to automate routing of questions through the network.

Roesch (2006) discusses some of the more famous collaborative reference projects for instance the British public libraries collaborative reference service '*Enquire*' and the Danish project '*Biblioteksvagten*' which includes over 60 public and academic libraries. The modules and functionalities were able to answer and administer questions per e-mail and chat constitutes the core of this service. A library profile module is used to coordinate the collaboration amongst the participating libraries. This profile module stores information

about each library's central subject areas and main competencies, which enables the software to automatically forward specific queries to the most relevant library that is available at that point in time.

Kasowitz, Bennett and Lankes (2000) demonstrate that digital reference has gone beyond an e-mail address read at a reference desk. The authors explore the creation of a digital reference consortium of AskA services and libraries. This consortium was formed not to encourage patron use, but rather as a way to survive overwhelming use and success. One of the outcomes is a set of standards that can serve as a model for digital reference consortia and cooperation in general. The standards identified were user transaction standards which include accessible, clear response policy and interactive besides service development and management standards that include authoritative and training experts. Breeding (2001) provides an overview of some methodologies and collaborations currently in use to help users learn to use virtual resources and find the information they need for themselves.

2.8 BENEFITS AND LIMITATIONS OF DRS

Digital reference services have a number of strengths and weaknesses. DRS is a new powerful method of delivering a reference service besides providing more alternatives and flexibility to users. According to Johnson, Newton and Reid (2004), using digital reference services could be a time saver for users, and using the Internet is generally cheaper than using a telephone. Digital reference services provide an extra choice for users, and may take some of the load of a busy reference desk, although it does not lessen the overall workload for the library.

Lam (2003) wrote that e-mail reference offer users the convenience of asking for information or reference assistance whenever and wherever they are as long as the Internet

is accessible. Besides technically easy to implement, e-mail reference can reduce the psychological barrier that stops some users from asking for assistance in the library. Users can make requests from remote sites, notably from their home or office computer workstations. Accessible 24-hours a day and unrestricted by geography, DRS are a powerful means for the free exchange of information and the promotion of interactive learning where the learning or teaching situation is characterized by participation on the part of the learner.

E-mail reference also has the advantage of providing more clear and complete answers than what could possibly be given at a busy reference desk. When answering a question through e-mail, the reference librarian usually has more time to think about the question, the user's information need, and if necessarily, consult with other librarians who have more related expertise or knowledge.

Smith (2001) noted that written responses may be preferable to the 'on the spot' oral response received when questionnaire are asked in-person, over the telephone or using videoconferencing or voice chat. In fact, written responses are less likely to be misunderstood or forgotten. Since the reference interview is conducted in writing, librarians easily can electronically stored or file e-mail and web form requests and their responses so that the response can be retrieved later when similar questions are asked or the same user returns. Although user asking questions using text-chat also receive written answers, chat is synchronous so librarians must reply immediately, which often will not provide the opportunity to craft a well-written response.

However, there are several limitations or weaknesses of reference queries by e-mail or web forms. According to Bopp and Smith (2001), the major disadvantage of accepting reference queries by e-mail or web page is the asynchronous nature of the interaction: library staff cannot interview the user in real time. As Abels (1996) has pointed out when e-

mail is used to communicate, an interchange of questions and answers to clarify the question can result in substantial delays in providing the answer. This is a disadvantage particularly for the actual reference process. A question that arrives during office hours, for example may be answered shortly, but late-night queries are not answered until the next morning. Additionally, questions cannot be answered immediately if no library staff are available. One other limitation of e-mail reference is that all responses or answers will become written records once they are sent out. Librarians generally have no problems verbally answering questions at a reference desk, but some may worry about putting their responses or answers in black and white (Hanson and Tomajko, 2000).

Roesch (2006) stressed that the usually indispensable process of clarification via a reference interview is impaired and sometimes even impossible. Thus, reference via e-mail does not reach the quality of subject-oriented services. Only the question as articulated by the user is answered, oblivious of a possible discrepancy between the question asked and the actual information needed.

Synchronous or real time digital reference can be implemented to overcome those problems. With chat technologies and video-conferencing, users can access information and receive real time guidance from librarian.

Online chat reference offers real time conversation or interviews between the reference librarians and the remote users or researchers using a computer and the Internet. Instant messaging software products such as AOL allow librarian to communicate synchronously in the shared environment. Through text-based chat, one party types words on a keyboard and these words directly appear on the other's computer monitor. With voice chat, user can communicate by speaking or by typing and either their voice or their typed words are transmitted to the recipient's computer. Examples of how a library could use online chat are to have a link labeled '*Chat with a Librarian*' or '*Click for life help*' on the

library home pages with text surrounding the link telling users the hours online chat reference service is available.

The main benefit of using online chat reference is that it occurs in real time whereby as soon as a user types a query, the question appears on the librarian's monitor. The librarian can respond promptly simply by typing. If the question is not clear, the librarian can ask for clarification and receive a quick response. Once the request is clear, the librarian can immediately answer the question or indicate that research is needed.

However, online chat services can be available only when a reference librarian is on duty, so remote researchers would not be able to send reference requests 24 hours a day as they could with e-mail or web form reference services. Unless there is a mechanism alerting librarians that someone has initiated a chat session, such as beep, librarians would have to monitor their computer screens constantly, which would be inconvenient.

Video-conferencing or web-cam for reference services is where video and audio are delivered in real time to and from the library over the Internet. Desktop video-conferencing requires that both locations have a computer, Internet connection, digital camera and microphone. Video-conferencing provides benefit where both librarians and users are able to speak as well as view and see each other during the remote reference interviews. However, video-conferencing will not be an option for the average person with a reference question. Although video-conferencing software can be downloaded at no cost, remote users also must have a digital camera and microphone as well as someone who knows how to use them (Smith, 2001).

Collaborative DRS provide numerous benefits, such allowing individual libraries to share expertise and resources, expanding hours of service, reduce software and database costs, and providing access to a larger collection of knowledge (e.g., question-answer archives).

2.9 PERSONALISED SERVICES

The computer technology has been at the heart of this latest period of innovation in reference work. Many new models, new tools, and new ideas have been discussed, implemented, and accepted into practice. However, despite all of these changes, the basic functions of reference service have remained essentially constant. As Huling (2002) indicates:

> *'Regardless of the delivery methods, the value of reference service remains the same: to provide quality information through personalized service to library users at the time of need'* (p. 867).

The personalized service aspects have for a long time remained one of the primary goals of library and information services. Although digital libraries are tailored to the information needs of a specific community, they are large and broad enough in scope to create individual information overload. Digital library personalization reduces the gap between the content offered by the library and individual information needs. Neuhold, Niederee and Stewart (2003) discussed various personalization methods for digital libraries. The advantages and challenges of founding personalization on a better understanding of the library user is illustrated by three advanced personalization approaches: Personal Reference Libraries, Collaborative Content Annotation, and modeling and exploitation of Personal Web Context. Personal Reference Libraries are a powerful form of project-centred personalization and cooperation in digital libraries. They are based on the idea of reference libraries in the traditional library context. Collaborative Content Annotation consists of the enrichment of information object with comments and other forms of meta-information for retrieval support. Personal Web Context stressed on the role

of communities and building the person web context. Each of these approaches focuses on another individual aspect in the interaction between the library and its user.

According to Deegan and Tanner (2002), personalization often referred to as the '*MyLibrary*' trend in portals, with examples such as '*My Netscape*' or '*My BBC*', this is the trend towards services that appear to allow the user to customize or personalized their interaction with the portal interface, the retrieval engine or the content. This is a direct response to the sense of information overload and frustration that users frequently report when accessing massed digital resources.

Archer and Cast (1999) highlighted the different approaches the reference services have been added over the years but the basic premise of the services have not changed the desire to assist and educate users in locating information. As new technologies are added, such as desktop conferencing and web access, it is important that the personalized contact which is the heart of reference service be preserved. The human touch in the reference process is very important to the success of the reference transaction.

2.10 TRENDS AND CHALLENGES IN DIGITAL REFERENCE

There are many digital reference services available today. LiveRef at *http://www.public.iastate.edu/~CYBERSTACKS/LiveRef.htm* keeps a registry of real-time digital reference services. Francoeur (2001) reported that as of April 2001, 272 libraries had a chat reference services in place. Libraries in United States have spearheaded DRS and those in other countries are following suit (Chowdhury and Margariti, 2004: 50).

In the Summer 2000 issue of *Reference and User Services Quarterly*, David Lankes discussed on the overwhelming demand of AskA services and other digital reference services. This demand has led to the emergence of several concerns, including:

a. how to manage the overwhelming use of digital reference services;

b. how digital reference changes library practice, such as the reference interview; and

c. software and customer service operations that provide real-time service (p. 352).

It is important to recognize that as the Internet issues constrain the need to re-evaluate reference service and it is important for reference librarians to continue to evolve along with it.

Gross, McClure and Lankes (2001) noted that despite e-mail remains the main vehicle for digital reference services in libraries, libraries are currently experimenting with various applications that provide synchronous interaction between the user and the librarian. Several libraries, including the University of Michigan, University of California, Irvine, and a joint project with the University of California, Berkerley and North Carolina State University, report undertaking synchronous digital reference using video conferencing, but the results have so far not been successful. This is due in part to the additional requirements of hardware and software packages as both parties need to own web cams. In addition, it is doubtful whether this means of communication will gain general acceptance in the community.

In the same vein, McClure et al. (2002) claimed that many libraries are now providing digital reference services, either as an integrated component of their regular reference service, as a separate service, or as part of a collaborative consortium. Many other libraries are thinking about or are about to implement such services. Additionally, an increasing number of AskA services have been developed in the commercial, educational and non-profit sectors that are not directly affiliated with any specific library (e.g., AskJeeves, Internet Public Library, Ask Dr. Math, Ask Joan of Art, AskERIC).

Many libraries are experimenting with live reference service. However, it has been noted that most libraries in the USA are still in the first phase even after several years' experimentation (Tunender, 2002). Janes (2002) argued that libraries have been providing

digital reference services for a few years and they should move on from experimenting to defining new services.

In a study related to digital reference services, Lankes (1999) addressed the problem of Internet information services having to meet the increasing information demands of users in the dynamic Internet environment. The purpose of his research was to use K-12 digital reference services as a starting point to better understanding the process of building and maintaining Internet information services. The study used qualitative methods (elite interviews and document analysis) to elicit descriptions of six exemplary K-12 digital reference services. These descriptions were then compared across organizations to find commonalities.

Pomerantz et al. (2004) conducted a study to determine the paths digital reference services take through a general process model of asynchronous digital reference. This study presents a snapshot of the state-of-art in digital reference as of late 2001 until early 2002. A survey based on the general process model was conducted; each decision point in this model provided the basis for at least one question. Common, uncommon, and wished-for practices are identified, as well as correlations between characteristics of services and the practices employed by those services (47 respondents). The study found some of the most widely employed practices: sending an automated response to the user by e-mail, upon receipt of a question (96%), asking a user for an e-mail address on a question submission web form (90%), maintaining a question submission web form (83%) and responding to questions by e-mail (80%). Identification of such trends has implications for the development of software tools for digital reference.

Wasik and Lankes (1999) discussed the value of digital reference and AskA services in the K-12 educational environment. They described how AskA services are built and maintained, and also explain how the service works in the classroom. Lankes (2003)

examined the domain of digital reference services for and by the primary and secondary education community. He argued that these services represent a revelatory case for digital reference, serve as a research environment, and provide models, theory and frameworks that will inform future research in the digital reference and digital library domains.

2.11 TECHNOLOGICAL DEVELOPMENTS IN DRS

Technology is creating new ways for librarians to provide reference services to remote users. Computer-based reference has significantly improved library service to contemporary users, from the introduction of online and cataloguing databases to local and wide area networks to electronic reference sources. The appearance of the Internet in the 1990s showed a new era for libraries in terms of networking opportunities. More specifically, virtual reference or web-based reference has had a major impact on the referral function. *Library Trends (*volume 50, number 2, 2001) examines the extent to which and how technological advances have changed basic reference practice.

Technologies that can support synchronous digital reference can be divided into three categories:

a. chat software;

b. remote control software (RCS); and

c. web contact centre software.

The different technologies can offer different benefits such as low cost (chat software), ability to control the patron's browser and authentication (RCS), and features designed especially for digital reference such as question queuing, scripted messages and session transcripts, as in the case with Web contact software, such as MCLS's (Metropolitan Cooperative Library System), and 24/7 Reference (http://www.247ref.org/) (Chowdhury and Margariti, 2003: 51).

Lipow (1998) pointed out that despite the belief that technological development will spell the end of library service, there will always be a need for human interaction with technology. But this requires that librarians make their work more visible by being more convenient and less remote. The greatest factor in encouraging the development of this service is the realization that it could exist anywhere in the world.

Ryan (1996) examined previous technological innovations in reference work, specifically mail, telephone and teletype. She concluded that these technologies were quickly and effectively adapted and adopted, that policies and limitations to those services soon followed, and that librarians used them not only to extend the reach of their work but also to communicate with each other.

Smith (2001) stressed on the use of current technologies, such as e-mail or forms on the web, chat, videoconferencing and remote application sharing software, used by libraries for enhancing digital reference services. He explores each of these technologies and their current and potential use in reference services. Richardson et al. (2000) examined the information technology aspects and key organizational issues involved in establishing an electronic reference desk service in a library. They also reviewed the usefulness of some electronic reference services.

Penka (2003) focused on the need to understand the technical environment within which digital reference occurs, from issues of patron definition and access, to the role of cooperative relationships and networks in meeting the shared needs of librarians and patrons. He provides an overview of today's reference environment along with data and practical examples from services like QuestionPoint, the Library of Congress, and Ask Joan of Art to demonstrate the importance and effect understanding audiences, appropriately using technology, and working cooperatively can have for libraries in digital reference.

Gray (2000) discussed issues that need to be resolved in the provision of virtual reference services, including: control of traffic from nonaffiliated users, expansion of services beyond basic ready reference, decrease of response time, expansion of service hours, and evaluation of archived questions in order to diagnose and correct problems with library systems and services.

2.12 DRS EVALUATION AND GUIDELINES

Evaluation has been the focus of the literature of DRS, however many of these evaluations have been anecdotal in nature, and more empirical studies need to be emphasized. Libraries need to evaluate their services and have guidelines in order to establish a service's value to the user community as well as to improve the service. Evaluation is also an important component in strategic planning for digital reference services (Wasik, 2003).

Saracevic and Kantor (1997) discussed a number of issues related to value and criteria for evaluation of library and information services. They stressed that user-centred studies have been conducted using a variety of criteria and associated measures, among them: satisfaction, success, utility, relevance, completeness, specificity, accuracy, timeliness, impact, effort, difficulty, failure, frustration and the like. A number of these criteria and associated measures reflect one or another dimension of value, but multiple dimensions are needed to capture the richness of value-in-use.

Whitlatch (2001) and Tyckoson (2001) have noted that the evaluation of reference and related information services in an electronic era should still be based on the same principles used to evaluate traditional face-to-face reference services and printed reference tools. Traditional research methods which are surveys and questionnaires, observation, individual and focus group interviews, and case studies can be utilized very effectively in

an electronic environment. Additionally, Whitlatch (2001) offers four distinct areas of evaluation for digital reference services:

a. economics (the cost or productivity of services);

b. the process (aspects of librarian/reference system and user interaction);

c. resources (books, indexes, databases, staffing levels, equipment, design of physical or electronic environment); and

d. products/outcomes (information or knowledge that the users obtain) (p. 208).

Shachaf (2008) stressed that evaluations of traditional reference have investigated the types of questions asked and the accuracy, completeness and usefulness of the information provides by a reference librarian. They have also assessed user satisfaction and examine the behaviour of librarians. Evaluations of DRS can use similar measures and have examined, for example the type of questions, accuracy, completeness, importance of the service and user satisfaction.

United Nations Educational, Scientific and Cultural Organization (UNESCO) considered digital reference services such an important development that it commissioned International Federation of Library Associations and Institutions (IFLA) has issued a digital reference guidelines to promote digital reference best practices on an international basis. IFLA's Discussion Group on Reference first met in 1998. It was created to address the effects of new technology on reference work and on user expectations. In 2002, acknowledging the importance of these issues as well as the group's growing audience, IFLA created the official Standing Committee on Reference Work. These guidelines grew out of reference workshops and meetings held over the course of several years.

Libraries in different countries may have different traditions of public service, which both affect their current reference practices and their users' expectations. The guidelines which cover the administration and practice of digital reference services attempt to create

some common standards from diverse traditions. The guidelines on administration of digital reference services cover reference policy, planning, staffing, training, interface design, legal issues, publicity and promotion, evaluation and collaboration. Whereas the guidelines on the practice of digital reference consist of general guidelines, content guidelines, chat guidelines and guidelines for chat sessions. It is hoped that this guidelines will allow the worldwide community of librarians to freely explore the possibilities of implementing digital reference services.

McClure, Lankes, Gross and Choltco-Devlin (2002) presented a manual that described a range of assessment techniques, statistics and measures that could be used for assessing digital reference library services. The project Assessing Quality in Digital Reference eventually was supported by a number of public, academic and state libraries in both the United States and United Kingdom as well as a number of library consortium and other organizations. They propose a series of quality standards that can be used to evaluate the quality of digital reference services:

a. courtesy of library staff,

b. accuracy of answer,

c. user satisfaction with the service,

d. rate of repeat users,

e. awareness that the service exists,

f. cost per digital reference transaction,

g. completion time, and

h. accessibility

Novotny (2001) provided the chief methodologies available for conducting assessments of electronic services which includes case study, cost-benefit analysis, focus group, individual interviews, observation, surveys, usability studies and Web Log Analysis.

Existing criteria for evaluating reference services are discussed with suggestions for how they can be applied or adapted to the online service environment. While evaluating digital reference services, one should look at the major points:

a. services linked to library's main Web page,

b. submission methods to ask queries,

c. stated policies,

d. technological barriers; and

e. presence of FAQs in library Web pages (Lankes, et al., 2000)

Kasowitz, Bennett and Lankes (2000) study from the AskA Consortium that sought to identify standards used to access digital reference services. In addition to determining that traditional characteristics of reference services apply, the study identified twelve quality characteristics to measure digital reference service: authoritative, accessible, fast (turnaround of response), private (protects user information), consistent with good reference practice, clear in user expectations, reviewed regularly, provides access to related information, noncommercial, publicized, instructive and offers training to experts.

In Malaysia, the Ad-hoc Committee on Standards for Academic Libraries of the Malaysian Library Association, headed by Dato' Dr. Zaiton Osman has come out with two standards both published in 1999, namely '*Standard for Private University Libraries*' and *'Standard for Private College Libraries'*. These reports have been submitted to the National Accreditation Board of the Ministry of Education, for study with a view toward endorsing the standards as a prerequisite for approval in the setting up of private colleges and universities in the country (Drake, 2003: 1738).

The committee has recommended for implementation the standards for collections, organization of materials, staff, management, services, facilities/environment, budget and information technology. With regards to services, the library shall establish, promote and

maintain a range and quality of services that will not only support the academic programmes but also to encourage optimal use of the library.

There are clearly stated requirement for professional reference services that shall be available during hours when professional staff are on duty. In terms of user education, the standard stated that the library shall ensure the library orientation and user education programmes be provided for all new students to enable them to use library systems to support learning. Similar programmes should be made available on a continuing basis for academic staff and senior students (PERPUN, 1999: 34).

2.13 EFFECTIVENESS OF DRS

Effectiveness can refer to how well an organization is doing relative to some set of standards (Whitlatch, 1990a: 207). Therefore, when people discuss about reference effectiveness, they must determine whose set of standards they wish to use in evaluating reference services. A major concern in the evaluation of reference services evolves around the variables that should be measured.

Reference effectiveness has been measured and evaluated in many different ways as been discussed in section 2.12. Throughout the literature (Roesch, 2006; Whitlatch, 1990a), the criteria used to measure effectiveness was inherently subjective and based on personal values and preferences of individuals.

In this study, the researcher adopted a series of quality standards that can be used to evaluate the quality of DRS as used by McClure, Lankes, Gross and Choltco-Devlin (2002), Kasowitz, Bennett and Lankes (2000) and Whitlatch (1990a). Based on their works and other writings, the following are the factors determining the effectiveness of DRS used in this study: users' perception (quality of service, usability and typical access time), users' satisfaction (access, availability, accuracy, current information, response time and answers

given) and library's performance (sufficient access, information literacy, guidance and training, efficiency, knowledge and courtesy). Awareness, usage and perceived needs were also used to measure the effectiveness of DRS since these were key factors that hinder or enhance the implementation of DRS in academic libraries in Malaysia.

2.14 DIGITAL REFERENCE SERVICES IN ACADEMIC LIBRARIES

There are a number of studies on various aspects of DRS in academic libraries that covers on current status, awareness, technological developments, standards, guidelines and evaluation of DRS. Looking at the earlier studies, the researcher found the following: (a) There were no local studies on DRS. Most of the studies were conducted in the context of United States and United Kingdom, (b) There were lack of studies on the perception, usage, satisfaction and effectiveness of DRS, and (c) Most of the studies focused on the libraries or librarian but not the user.

Over the past two decades, academic libraries have experienced major changes in technology. The emergence of the Internet and its related technology has challenged academic libraries to provide digital reference services to their university populations. Nowadays, more and more academic libraries are developing their own websites and the interest has shifted from processing printed materials to providing access to information via the web (Aman, 2004).

Janes, Carter and Memmott (1999) surveyed of 150 academic library web sites, showing that 45% offered digital services that attempted to deal with two basic questions: (a) what proportion of libraries dealt with digital reference and (b) what are the characteristics of that service. The survey was conducted by utilizing the services instead of merely contacting the librarians so that an assessment could be made of their effectiveness. Issues considered included ways in which users submit questions, FAQ documents,

policies, technological barriers, to what degree public versus private institutions would have such services and to what extent such services are linked to the library home page. The researchers should include the survey techniques by contacting the librarians in obtaining quantitative data by questionnaires and interviews.

Harrison and Hughes (2001) collected data from 500 students and academic staff in Manchester Metropolitan University, United Kingdom in a study related to the electronic resources provided by their university library. The results indicated that 46% of the respondents expressed the importance of having off-campus access to electronic resources. Some 40% were unaware that library staff prepared user guides and help-sheets. Nearly 35% did not know of the existence of their own university library website. Some 33% did not know of the availability of web-based UK university library catalogues.

Tenopir (2001) reported on a survey of the current practices of digital library services in 70 academic libraries in the USA. These studies noted that university libraries allow their patrons to pose reference questions in different ways: 99% offer e-mail reference, 96% offer reference services by appointment, while 29% of the libraries offer real-time virtual reference.

Tenopir and Ennis (2002) conducted four surveys over a decade (in 1991, 1995, 1997 and 2000) to the academic members the Association of Research Libraries (ARL) provide insights about changes that have occurred in academic library reference services due to new and rapidly evolving technologies. The surveys contained both open-ended questions to gather opinions and factual questions to measure what libraries offer. Libraries adopted digital information sources and services at an increasingly accelerated rate in the 1990s due to the availability of the Internet, in particular the World Wide Web. Digital sources have brought about changes in the physical environment of the reference room, in the type and range of resources available, and in the attitudes and expectations of reference

librarians and users. The web is changing what resources are searched, how results are distributed, how instruction is delivered, and relations with faculty. The reference librarians surveyed think that as the reference environment has changed, it has helped them to provide better services to users.

Foley (2002) discusses the results of a pilot program on chat reference at the General Library of the University at Buffalo. In addition to a general description of issues involved in the program, the article covers the process used to evaluate the program. This process included patron surveys, demographic information and librarian reports. Result indicated that most users were: between the ages of 18 and 25 (70%); on-campus when they sent the question (69%); and affiliated with the university and faculty, staff, students or alumni (84%).

In 2002, Janes surveyed a total of 648 reference librarians in USA on the usage of digital and networked technologies and resources in the libraries. Some 83% of academic libraries at that time offered digital reference service. Others were still in the planning stage. The researcher found that the use of digital reference service by the university students had reduced the number of reference questions received by 39.1%. Some 78.8% of the reference librarians surveyed had used e-mail while only 46.6% used web forms. A majority of the respondents strongly agreed that the use of digital technologies had made reference work more accessible, more challenging and more interesting. According to the respondents, 80% of ready reference questions would be well served by digital reference services.

Janes and Hill (2002) carried out a survey in 22 libraries (12 academic libraries, 7 public libraries, 2 government libraries and one corporate library) and found that the main motivation for the libraries to develop digital reference service was the strong demand for such a service from users who could not benefit much from traditional face-to-face

reference service due to geographical distance. The number of questions answered ranged from 4 per week to 208 per week depending on the season. An interesting finding was that the respondents noted a significant increase in the number of questions received when they moved 'AskA Librarian' to the main page of their library website. The respondents also noted that the number of questions received via the web increased from 20 to 130 over a single semester.

Johnson (2004) surveyed two four-year public universities in South Atlantic region in USA. The survey inquired about university affiliates' awareness of, use of, and the interest in reference services, with a particular focus on online chat reference (synchronous digital reference). Survey respondents reported strong prior use of face-to-face reference and a desire to use this service first when pursuing research topics. Awareness and use of the online chat reference service at each institution was comparatively low, but respondents forecasted the service would be among the most heavily used in ten years.

Chowdhury and Margariti (2004) discussed the current practices followed by some major libraries in Scotland for providing digital reference services. They looked at the digital reference services provided by three academic libraries, namely Glasgow University Library, the University of Strathclyde Library and Glasgow Caledonian University Library. Two other premier libraries in Scotland, namely Mitchell Library in Glasgow and National Library of Scotland in Edinburgh were also reviewed.

They conclude that digital reference services are effective forms of service delivery in Scotland's academic, national and public libraries, but that their full potential has not yet been exploited. E-mail is the major technology used in providing digital reference, although the academic libraries are planning to use more sophisticated Internet technologies. They also note that the majority of enquiries handled by the libraries are relatively low-level

rather than concerning specific knowledge domains, and training the users to extract information from the best digital resources still remain the challenge.

Maharana and Panda (2005) conducted a case study in selected academic libraries in India (7 Indian Institutes of Technology and 6 Indian Institutes of Management) to investigate the present status of DRS being provided in the libraries under study. The study revealed that 53.9% of the libraries have provided e-mail reference services. Surprisingly, 6 (46.1%) of the libraries have introduced video conferencing and 3 (23%) online chat reference. Although a remarkable advancement in the automation and electronic access to information has been achieved in these libraries, there is a long way ahead to march towards the establishment of standard DRS at par with similar institutions in developed countries.

More recently, VandeCreek (2006) surveyed the users of Ask-A Librarian service at Northern Illinois University (NIU) to evaluate users' satisfaction levels over a ten-month period voluntarily completed a seven-item Web-based questionnaire. Of the 499 e-mails sent, only 167 (34%) completed surveys were received. The results indicated that the majority of respondents (92%) were satisfied overall with Ask-A Librarian service. The main users of Ask-A Librarian were graduate students (44%) followed by undergraduates (25%) and faculty members (21%). Survey results also revealed some of the strengths and shortcomings of other library services as well.

Profeta (2006) examined the effectiveness of asynchronous reference service for distance learning students within Florida's community college system. The purpose of the study was to examine the adequacy of asynchronous e-mail reference services offered through Florida's 28 community college libraries and the contribution of these digital reference service providers to the students' online learning community. The researcher

analysed data obtained through an unobtrusive study of asynchronous digital reference services and interviews conducted with digital reference service providers.

Studies existed for traditional and telephone reference service; however, the literature lacked studies addressing asynchronous digital reference service. Results from the unobtrusive portion of this study showed that the researcher received 240 of a possible 392 responses from the digital reference providers. The researcher scored 24% as accurate with source information, 4% as accurate without source information, 20% as partly accurate with source information, and 7% as partly accurate without source information. The students scored 48% as accurate with source information, 12% as accurate without source information, 17% as partly accurate with source information, and 9% as partly accurate without source information. Responses took anywhere from 6 seconds to 20 days. The communication techniques exercised by the DRS providers were substandard. The study resulted in the recommendations for the areas of digital environment, unobtrusive methodology, standards, accuracy, measurements, online relationships, training of DRS providers, student training, institutional responsibility and marketing.

Kibbee (2006) investigated issues faced by academic research libraries in providing virtual reference services to unaffiliated users. An analysis of service at the University of Illinois at Urbana-Champaign (UIUC) was done to examine user expectations and level of demand. A comparison of questions received via online chat and e-mail during a six-month period reveals an overall user preference for real-time service, with online chat transactions exceeding e-mail by a ratio of 2:1. In analyzing 200 e-mail transactions at UIUC, the majority (58%) were bibliographic in nature. A small proportion (less than 10%) are fact-based questions.

2.15 CONCLUSION

Discussions on the topics related to digital reference services have generated a sizable body of literature. As earlier mentioned in this chapter that less of what has been written on DRS can be considered research in the formal sense. The literature review had identified several studies on reference services and DRS which include the following topics: background of reference services, evolution of reference services, concept of DRS, emerging models of DRS, general process model, digital reference collaboration, benefits and limitations of DRS, personalized services, trends and challenges in DRS, technological developments of DRS and DRS evaluation and guidelines. All these studies have given basic knowledge to the researcher in understanding the specific areas of DRS. Table 2.1 summarizes the literature review.

Table 2.1
Summary of Literature Review

Areas of DRS	Authors/Years	Findings
Background of Reference services	Davinson (1980), Huling (2002), Bailin and Grafstein (2005), Bunge and Bopp (2001), Tyckoson (2001), Keenan and Johnston (2000)	Definition or concept of reference services
	Wyer (1930), Ranganathan (1940), Connor and Alford (1982), Ferguson and Bunge (1997)	Philosophy of reference services Reference theory Basic concept of user centred services
	Bunge (1999), Gosling (1999), Katz and Clifford (1982), Chowdhury (2002)	Types of reference services Functions of reference services Characteristics of reference services
	RUSA Reference Guidelines (2000)	Guidelines for development and delivery of services
	Higgens (1984), Chowdhury and Chowdhury (2003)	Reference process
Evolution of DRS	Sutton (1996), Katz (2002a), Janes (2002), Rothstein (1955), Bopp and Smith (2001), Grohs, Reed and Allan (2003), Penka (2003),	Historical development of reference services Origin of DRS Reasons for moving to DRS

	Kasowitz (2001), Wasik (2003a), Lankes (2000), Braxton and Brunsdale (2004), Kawakimi (2003), Janes, Carter and Memmot (1999), Tenopir (2001), Kawakimi (2003), Wells and Hanson (2003)	Basic tenets of reference services Importance of DRS Early libraries providing DRS
Concept of DRS	NISO (2001), Su (2002), White (2001), Lankes (1998), Bertot, McClure and Ryan (2000), Wasik (2004), Janes, Carter and Memmott (1999), Wikipedia (2006), Berube, 2003), Lankes (2005), Zanin-Yost (2004), Roesch (2006)	Definitions of DRS Elements of DRS
Models of DRS	Francoeur (2002), Tenopir and Ennis (2002), Chowdhury and Chowdhury (2001), Lam (2003), Kasowitz (2001), McClennen (2002), Wells and Hanson (2003), Berube (2003), Hans and Goulding (2003), Pomerantz et al. (2004), Smith (2001), Maharana and Panda (2005)	Formats or types of DRS offered Asynchronous and Synchronous Categories of DRS model
General process model	Lankes (1998), Pomerantz et al. (2004), Chowdhury and Margariti (2004), Pomerantz, Nicholson and Lankes (2003), Wasik (2003a), NISO (2001)	General digital reference model Six-steps process model Role-based model Describe specific steps in asynchronous DRS
Collaboration	Wells and Hanson (2003), Penka (2003), Blumenstyk (2001), Carlson (2001), Huling (2002), Kasowitz, Bennett and Lankes (2000), Breeding (2001), Roesch (2006)	Types of cooperation CDRS pilot project
Benefits and Limitations of DRS	Johnson, Newton and Reid (2004), Lam (2003), Smith (2001), Abels (1996), Roesch (2006)	Strengths and weaknesses of e-mail, online chat, videoconferencing and collaboration
Personalized services	Huling (2002), Deegan and Tanner (2002), Archer and Cast (1999)	Methods of personalization Reduce the gap between the contents and information needs
Trends and Challenges	Francoeur (2001), Chowdhury and Margariti (2004), Gross, McClure and Lankes (2001), McClure et al. (2002), Tunender (2002), Janes (2002)	Registry of real-time DRS E-mail as main vehicle for DRS Should move from experimenting to defining services DRS in educational environment

Technological Developments	Chowdhury and Margariti (2004), Lipow (1998), Ryan (1996), Smith (2001), Richardson et al. (2000), Penka (2003), Gray (2000)	Impact of technologies on retrieval functions Potential use of online chat reference and video conferencing
Evaluation and Guidelines	Saracevic and Kantor (1997), Whitlatch (2001), Tyckoson (2001), Wasik (2003b), White (2001), Whitlatch (1990a), IFLA (1998), McClure et al. (2002), Novotny (2001), Lankes et al. (2000), Drake (2003), Kloss and Yin (2003), PERPUN (1999), Roesch (2006), Shachaf (2008)	Criteria for measures including satisfaction, success and accuracy Methods of evaluation: surveys and questionnaires, observation, interviews and case studies Areas of evaluation: economics, the process, resources and product Evaluation also based on awareness, users' satisfaction, access time, accessibility, accuracy and courtesy of library staff IFLA guidelines and administration and practice of DRS Real time reference service evaluation State of art in the focus on quality
DRS in academic libraries	Aman (2004), Janes, Carter and Memmott (1999), Harrison and Hughes (2001), Tenopir (2001), Tenopir and Ennis (2002), Foley (2002), Janes (2002), Janes and Hill (2002), Johnson (2004), Chowdhury and Margariti (2004), VandeCreek (2006), Kibbee (2006), Maharana and Panda (2005)	More academic libraries are developing DRS Findings of studies pertaining to DRS in academic libraries Implementation of DRS in academic libraries Current status of DRS User survey of DRS DRS in academic libraries in India

Some studies investigated the academic libraries implemented DRS, such as those carried out by Janes, Carter and Memmot (1999), Tenopir (2001), Tenopir and Ennis (2002), Janes (2000), Janes and Hill (2002) and Chowdhury and Margariti (2004). In general, these studies concentrate on reporting the changes that have occurred in academic library's reference services due to the new and rapidly evolving technologies. The studies also highlight on the current status and characteristics of DRS offered by various academic libraries in United States and United Kingdom.

A few studies had focused on the awareness, usage, satisfaction and interest among users of DRS in academic libraries such as those of Harrison and Hughes (2001), Foley (2002), Johnson (2004) and VandeCreek (2006). The present study attempts to combine both the librarians and students approaches in line with the objectives of the study and the research questions developed.

This study tries to adopt the evaluation aspects from the previous studies of Lankes et al. (2000), Whitlatch (1990), Whitlatch (2001), Novotny (2001), Tyckoson (2001), McClure et al. (2002), IFLA (2002), Kasowitz, Bennett and Lankes (2000), Wasik (2003b) and Kloss and Yin (2003). The studies noted that the evaluation should be based on traditional face-to-face, besides developing series of quality standards that have been widely used in library and information management settings. In addition, PERPUN (1999) has provided an adoption of local contents for standards and evaluation of academic libraries' services particularly on reference services in academic libraries in Malaysia.

Looking at the earlier studies, the researcher found that there were no local studies on DRS since most of the studies focused on the situation in United States and United Kingdom. The studies of Kibbee (2006), VandeCreek (2006), Johnson (2004), Janes (2002), Foley (2002), Janes and Hill (2002) and Tenopir and Ennis (2002) focused on the implementation of DRS in United States, whereas the studies carried out by Chowdhury and Margariti (2004) and Harrison and Hughes (2001) focused on the situation in United Kingdom. In terms of local studies pertaining to DRS, the related areas to the present study were on the use of Internet on reference services in Malaysian academic libraries by Abdoulaye and Majid (2000) and the usage of academic libraries' web sites among university students by Aman (2004).

In conclusion, reference and information services have always been the main element of library services. They provide personalized assistance to library users in

accessing suitable information resources to meet their needs. Over time, various technological developments have affected the provision of reference services especially after the introduction of online library services. Finally, this chapter has provided an understanding of the area of digital reference services besides given the conceptual basis for formulating the research questions, research design and data analysis procedures for the study. The following chapter will describe the research methodology used to carry out this study.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

This chapter is concerned with the methods undertaken for the study. This is a descriptive research where data was collected to answer seven research questions concerning the current status and effectiveness of DRS in academic libraries in Malaysia. Gay (1996) noted that a descriptive study determines and reports the way things are. Typical descriptive studies are concerned with assessment of demographics, attitudes, opinions, conditions and procedures. Descriptive data are normally gathered through a questionnaire survey, interviews or observations.

The following research questions guided the study:

a. What is the current status of digital reference services provided by the academic libraries in Malaysia?
b. How aware are the students of the availability of digital reference services in academic libraries in Malaysia?
c. How are the digital reference services used by the librarians and students of universities in Malaysia?
d. How effective is the digital reference services offered by academic libraries in Malaysia?
e. What are the perceived needs for digital reference services among university students in Malaysia?
f. What are the issues and problems faced by librarians and students in relation to digital reference services?

g. How can digital reference services be improved from the perception of librarians and students?

The research methodology was established to achieve the research objectives. Data was collected to fulfill the research objectives. This chapter is divided into the following sections:

a. Definitions
b. Framework of Present Study
c. Research Design
d. Sampling and Population
e. Instruments
f. Data Collection Method
g. Data Analysis

3.2 DEFINITIONS

The following definitions apply to this study:

Reference service refers to personal assistance provided to library users seeking information (Huling, 2002: 867). In this research, reference services include the following: (a) information services that involve either finding the required information on behalf of the users, or assisting users in finding information; (b) instruction in the use of library resources and services; and (c) user guidance, in which users are guided in selecting the most appropriate information sources and services.

Digital reference service refers to a mechanism by which people can submit their questions and have them answered by a library staff member through some electronic means (e-mail, web forms, chat, etc.) not in person or over the phone (Janes, Carter and Memmott, 1999: 146).

Academic libraries in this study refer to libraries attached to higher educational institutions, such as colleges and universities, serving the teaching, learning and research needs of students and staff (Feather and Sturges, 2003: 3).

Selected academic libraries in Malaysia refer to the libraries attached in the four government-funded universities in Malaysia, namely Universiti Teknologi MARA (UiTM), University of Malaya (UM), Universiti Kebangsaan Malaysia (UKM) and Universiti Putra Malaysia (UPM).

Case study is a research design that entails the detailed and intensive analysis of a single case (Bryman, 2004). Case study can involve either single or multiple cases, and numerous levels of analysis. Moreover, case studies can employ embedded design, that is, multiple levels of analysis within a single study. Digital reference services in four academic libraries in Malaysia are the phenomena under investigation in this case study.

Current status in this study means present state of the art or the current practices (as of 15th June 2008 when the study ended) of DRS offered in 4 selected academic libraries in Malaysia which covers format of DRS offered, staff and administration, services and facilities, types of reference questions and subject areas, policies, training, cooperation, future plan etc.

Librarian is a professionally trained staff responsible for the administration of a library and its contents, including the selection, processing and organization of materials and the delivery of information, instruction, reference and loan services to meet the needs of its users (Reitz, 2004).

Students in this study refer to those who are enrolled or attend classes at the respective faculties or universities.

Effectiveness means the capability of producing an effect or how well an organization is doing relative to some set of standards (Wikipedia, 2007; Whitlatch,

1990a). In this study, effectiveness was measured based on Whitlatch's (1990a) measurement of reference effectiveness mainly through users' satisfaction, users' perception and library's performance. The other key factors used were awareness, usage and perceived needs toward DRS.

Awareness in this study means having knowledge of and implies knowledge gained through one's own perceptions or only means of information.

Usage can refer to the act, manner or amount of using; use. In this study, usage means the extent to which a service/product can be used by specified users to achieve specific goals.

Perceived needs refer to the necessary needs of the users or their preferences. In the context of this study, perceived needs mean the extent to which students perceive that their information needs are met.

3.3 FRAMEWORK OF PRESENT STUDY

From the available literature on DRS, a framework was established to present the approach to this study. This framework is presented in Figure 3.1.

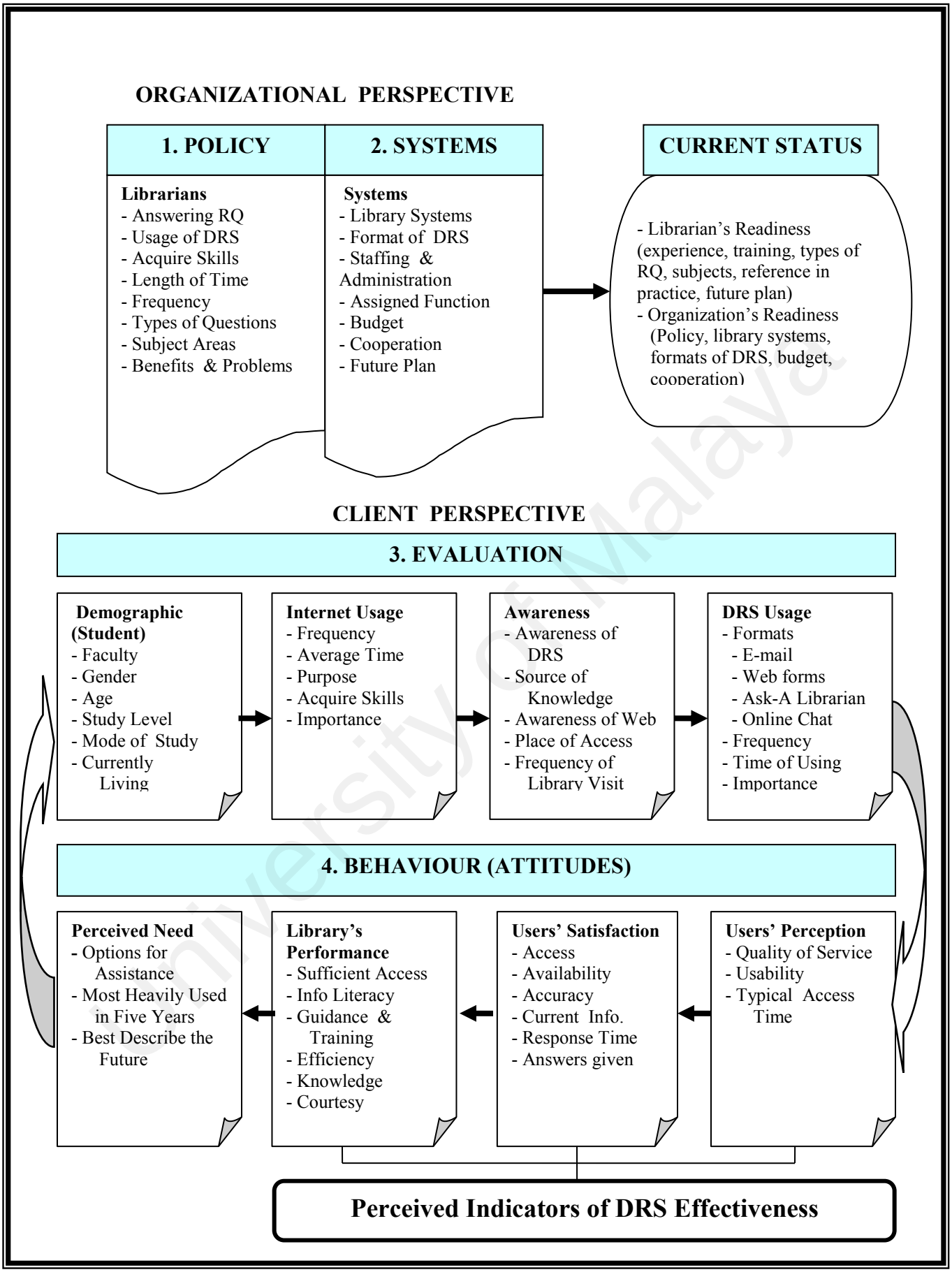

Figure 3.1
Framework Based on Lankes (2005) Four 'Lenses'

The framework was based on the approaches to the central issues and questions in DRS that should be focused on both librarians and students. Librarians and students are the main elements in the implementation of DRS in academic libraries besides the interfaces and electronic resources.

Librarians play an important role as service providers or administrators who are responsible in establishing the systems and policies. This study is going to be about examining the current status of DRS in selected academic libraries in Malaysia which include the implementation of the systems, policies, evaluation and behaviour of staff. The researcher evaluated among others the existing format of DRS offered, staff and administration, services and facilities, types of reference questions and subject areas, policies, training and cooperation.

The students are the main user of the systems besides academic staff and researchers. In this study, the researcher developed the survey instrument to measure the gap between users' expectation for excellence and their perception of actual library services delivered. A series of quality standards that can be used to evaluate the quality of DRS as used by McClure, Lankes, Gross and Choltco-Devlin (2002), Kasowitz, Bennett and Lankes (2000) and Whitlatch (1990a) were adapted. The study clarified the demographic of the students' respondents, identifying the Internet usage, besides determining the awareness, usage, effectiveness and the perceived needs of students towards DRS in academic libraries in Malaysia.

In this study, awareness is measured by asking whether the respondents are aware or not of DRS, how did they know about the service, awareness of university libraries' web sites, place of access and frequency of library visits. DRS usage concentrates on what formats of DRS they used, frequency and time of using. Effectiveness in this study is

measured by three main factors: user's perception, user's satisfaction and library's performance.

The researcher adopted the four 'lenses' described by Lankes (2005) to incorporate the digital reference research agenda: policy, systems, evaluation and behaviour. The policy lens focuses on both the process and effect of organizational decision-making and the actual products in digital reference. The systems lens focuses on the means by which technologies can be used to improve both the efficiency and effectiveness of digital reference. The evaluation lens focuses on the means of determining success in digital reference, whereby the assessment and evaluation can identify the strengths and weaknesses of different formats of DRS and at the same time will contribute towards the improvement of the services implemented. Finally, the behavioural lens focuses on human attitudes and interactions with and within a digital reference system.

3.4 RESEARCH DESIGN

In general, a research design provides a framework for the collection and analysis of data. Bryman (2004) noted that a choice of research design reflects decision about the priority being given to a range of dimensions of the research process. In this research, the case study was designed to collect information needed to fulfill research objectives and to provide responses for research questions.

According to the literature (Stake, 2000; Tellis, 1997; Yin, 1994), the case study has been used across a number of disciplines and as a consequence, it has come to mean different things to different people. The case study method as practiced in library and information science research today has its roots in the social sciences, especially in sociology (Zach, 2006: 5).

A case study can mean a research method which focuses on the characteristics, circumstances, and complexity of a single case, or a small number of cases, often using multiple methods. The case is viewed as being valued in its own right and whilst findings can raise awareness of general issues, the aim is not to generalize the findings to other cases (*http://www.sachru.sa.gov.au/pew/glossary.htm#top.*)

In case studies, the researcher explores a single entity or phenomenon ('the case') bounded by time and activity (a program, event, process, institution, or social group) and collects detailed information by using a variety of data collection procedures during a sustained period of time (Merriam, 1988; Yin, 1989).

Case studies are used when it is necessary to develop a detailed understanding of what is happening in complex circumstances. Often a large-scale survey will not provide the depth of understanding required. It then becomes necessary to look in detail at what is happening in a smaller number of instances or cases. This provides greater depth at the expense of breadth (Moore, 2000: xiii). According to Stake (1998: 86), the case can refer to '*a choice of object to be studied*' rather than a '*methodological choice*.'

Case study is a valuable method of research, with distinctive characteristics that make it ideal for many types of investigations. Eisenhardt (1999: 138) noted that case studies typically combine data collection methods such as questionnaires, interviews, observation and archives. The evidence may be quantitative (e.g. numbers), qualitative (e.g. words), or both. Finally, case studies can be used to accomplish various aim: to provide description, test theory, or generate theory.

Digital reference services in selected academic libraries in Malaysia are the phenomena under investigation in this case study. The experiences and ideas of librarians, the opinion of students and the available documentation on digital reference services are

the units for analysis. The required evidence, therefore, was designed to be acquired through:

a. surveys and questionnaires,

b. interviews,

c. content analysis, and

d. reviewing documentation and log records on digital reference services.

In order to have control over data collection procedure, the following universities located in Selangor and Federal Territory were selected as cases for the study:

a. Universiti Teknologi MARA (UiTM)

b. University of Malaya (UM)

c. Universiti Kebangsaan Malaysia (UKM), and

d. Universiti Putra Malaysia (UPM)

Since the study sought to investigate the present situation and the effectiveness of digital reference services in academic libraries in Malaysia, a case study seemed a pertinent approach. Rehman and Amoah (1996) for instance choose 4 Malaysian university libraries in their case study on the effect of automation on job design in libraries.

In order to accomplish the study, the researcher followed the following steps:

a. Identification and approval of research topic.
b. An extensive literature review in the area of digital reference services.
c. Content analysis of the four public academic libraries' Web sites.
d. Developing the questionnaire based on the literature review and opinion from the lecturers in the area of information management and practitioners.
e. Pre-testing the questionnaire and revising it.
f. Distributing the questionnaire to the respondents.
g. Interview with the Chief Librarians, head of reference librarian and IT units.

h. The data from the questionnaires was coded, keyed-in and analysed to answer the research questions.

These steps are further elaborated in Figure 3.2 below:

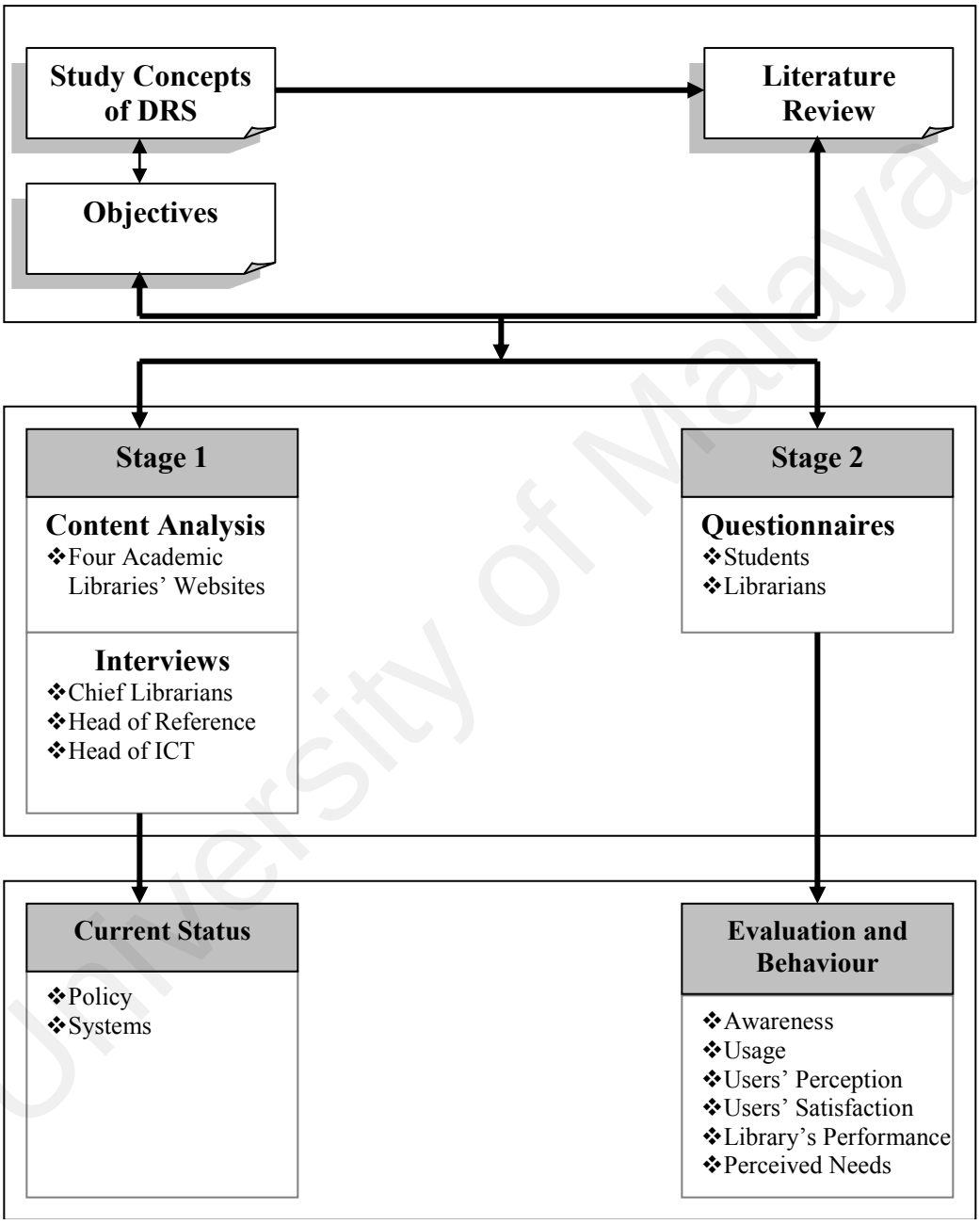

Figure 3.2
Research Process

3.5 SAMPLING AND POPULATION

A sample is a set of respondents selected from a larger population for the purpose of a survey (Salant and Dillman, 1994: 53). Population is the larger group to which one researcher hopes to apply the results (Fraenkel and Wallen, 2006: 92). The advantage of sample is their ability to obtain information from a relatively few respondents to describe the characteristics of an entire population. Fraenkel and Wallen (2006) noted that samples should be as large as the researcher can obtain with a reasonable expenditure of time and energy.

In this study, the sampling approach that the researcher used was purposive sampling. According to Robson (1999):

> *'the principle of selection in purposive sampling is the researcher's judgement as to typicality or interest ... which enables the researcher to satisfy her(his) need in a project*' (p. 141-142).

Sekaran (2000) stressed that purposive sampling is confined to specific types of people who can provide the desired information, either because they are the only ones who possess it, or conform to some criteria set by the researcher. By using this approach to sampling, the researcher used personal judgement to select samples, which would provide the data needed.

The target population of this study comprised of the following:

a. The librarians in the 4 public universities in Malaysia. As shown in Table 3.1, all the librarians working in the main campus of the 4 public academic libraries in Malaysia (N=163) were selected to answer and complete the questionnaires. The librarians from the Reference Service Departments/Units (N=24) were chosen since they were directly involved in implementing digital reference services. Librarians from other divisions/units like Acquisition, Cataloguing and Serial were also chosen since they have to work as a reference librarian on call or night duty at the reference desk.

Table 3.1:
Number of Librarians' Respondents in Four Selected Public Academic Libraries in Malaysia (April 2005)

Libraries	Number of Librarians*
1. Tun Abdul Razak Library, UiTM	38**
2. University of Malaya (UM) Library	48
3. Tun Seri Lanang Library, UKM	41
4. Sultan Abdul Samad Library, UPM	36
TOTAL	**163**

* As of April 2005
** Shah Alam Campus only

The lists of the librarians were taken from the 4 public academic libraries' web sites.

b. The undergraduate and postgraduate students of the Faculties of Computer Science and Information Technology in the 4 public universities in Malaysia; namely Faculty of Information Technology and Quantitative Sciences, UiTM, Faculty of Computer Science and Information Technology, UM, Faculty of Information Science and Technology, UKM and Faculty of Computer Science and Information Technology, UPM. The students' enrolment of the four faculties as in 2005/2006 academic session are as follows:

Table 3.2
Students' Enrolment in the Five Faculties in 2005/2006 Academic Session

Universities/Faculties	Undergraduates	Postgraduates	Total
1. Faculty of Information Technology and Quantitative Sciences, UiTM	1,856*	151*	2,007
2. Faculty of Computer Science and Information Technology, UM	1,344*	515*	1,859
3. Faculty of Information Science and Technology, UKM	1,426*	350*	1,776
4. Faculty of Computer Science and Information Technology, UPM	1,326*	219*	1,545
TOTAL	**5,952**	**1,235**	**7,187**

Source: * data obtained from the administrative office of the respective faculties

Each faculty is of similar size in terms of students' enrolment. The four faculties also have a similar structure in terms of staffing and resources as well as physical facilities. The students from the above faculties were chosen in the study for the following reasons:

(a) They are IT literate and should have basic knowledge in the areas of ICTs compared to the students from other faculties, thus they were in a better position to answer the research questions. Roesnita and Zainab (2005) wrote that it was assumed that being IT undergraduates, they were competent ICT users and would have little problems in handling a digital library environment and would more likely utilize electronic resources made available over the campus network,

(b) They were on the way of embarking on a career as information professionals and could be expected to know some aspects of digital reference services.

In terms of sample size, Neuman (2003) noted that for small populations (under 1,000), a researcher needs a large sampling ratio (about 30 percent). For moderately large populations (10,000), a smaller sampling ratio (about 10 percent) is needed to be equally accurate, or a sample size of around 1,000. Based on Neuman (2003) and a proportional allocation formula by Krejcie and Morgan (1970) who developed a table of sample sizes for given population sizes, the users' questionnaire were distributed to 1,000 students. Some 250 students from each faculty in 4 selected universities in Malaysia were identified and selected during Semester 2005/2006 course registration.

3.6 INSTRUMENTS

In this study, questionnaires were chosen as the main research instruments in data gathering. The questionnaires were created based on an extensive literature review in the area of digital reference services. Several studies on related topics were consulted and their instruments were critically examined in order to develop the questionnaires of this study.

In order to measure the effectiveness of DRS the researcher adapted a series of quality standards that can be used to evaluate the quality of DRS by McClure, Lankes, Gross and Choltco-Devlin (2002). The questions adapted are pertaining to awareness, users' satisfaction, access time, accessibility, accuracy of answers, and courtesy of library staff. The researcher also used Whitlatch (1990a) questions on users' satisfaction, users' perception and library's performance. The questionnaires were also developed based on library reference survey's instrument by Johnson (2004). The researcher adapted the questions pertaining to perceived needs of DRS: i.e. options for assistance, most heavily used in 5 years and best describe the future. The researcher also conducted interviews with the librarians and lecturers in the area of information science in order to consult on the suitability of the questionnaires based on the objectives of study.

The research instrument consists of Questionnaire Set 1 and Questionnaire Set 2, besides Interview Schedule for library management.

3.6.1 The Questionnaire Design

Two sets of questionnaires were developed and administered: (a) *Questionnaire Set 1: Librarians' Questionnaire* were distributed to the librarians/service administrators, and (b) *Questionnaire Set 2: Students' Questionnaire* were distributed to the students as the users of the services.

3.6.1.1 Questionnaire Set 1: Questionnaire for Librarians (Appendix I)

Questionnaire Set 1 is a 6-page self-administered questionnaire which requires respondent to answer the questions without assistance from the researcher. The questionnaire is divided into 6 parts:

a. Part A: Demographic

b. Part B: Usage of DRS

c. Part C: Training

d. Part D: Types of Questions and Subject Areas

e. Part E: Benefits and Problems

f. Part F: Comments and Suggestions

Part A of the questionnaire collected data on personal information of the respondents including the academic library they belong to, their current position, grade, gender, age, highest academic qualification and working experience as a librarian. The respondents were asked whether they have been working as a reference librarian and how often they were the only reference librarian on duty.

Part B deals with the questions on the usage of any of the digital reference format. They were also asked on how long they have been using DRS to answer questions, and also how long they have been using web as a resource to answer reference question/s in the reference desk. They were also asked on the frequency of using DRS and web in answering reference questions. In Part C, the respondents were asked to indicate on how did they acquire skills to use DRS and to evaluate the quality of the web.

Part D requires the respondents to indicate the types of reference questions and subject areas the users' normally asked during DRS. In Part E, the respondents were asked their opinion on the benefits and problems of DRS. Finally, in Part F, the respondents were asked to state any comments and suggestions for the improvement of DRS services.

In general, Part C, D, E and F of the questionnaires were developed to achieve the study's objective on the current status and Part B on the usage and effectiveness of DRS.

3.6.1.2 Questionnaire Set 2: Questionnaire for Students (Appendix I1)

The questionnaire consisted of 12 pages in 10 parts:

a. Part A: Demographic
b. Part B: Internet Use
c. Part C: Awareness of DRS
d. Part D: Usage of DRS
e. Part E: User's Perception
f. Part F: User's Satisfaction
g. Part G: Library's Performance
h. Part H: Identifying the Need for DRS
i. Part I: Benefits and Problems
j. Part J: Comments and Suggestions

It included interval-scaled items, closed-ended questions and one open ended question. Part A covers questions pertaining to the name of the university and faculty/organization they belong to, gender, age, status, semester, specialization, mode of study as well as where they are staying. Part B deals with the frequency and the average time using the Internet per week. They were also required to state the main purposes of accessing the Internet based on a number of listed purposes given. Question on how did they acquire skills to use Internet were also asked. The respondents also have to give their opinion based on the Likert-type scale matrix which precoded numerical values assign to the closed-ended statement designed to measure the intensity of views of respondents to a given statement.

In Part C, the respondents were asked on how often they visited the library last semester and from where did they access the library' electronic resources. They were also required to state whether they aware or not of the university library's web site. They were

also asked whether they are aware of DRS or not and after that how they know about the service.

In Part D, respondents were required to specify on which library's reference services/DRS they have used. They were also asked on how often they used DRS last semester and what time they asked question through DRS channel. They were asked to rate the value of DRS. They were also required to state the reason for not using the service. Part E consists of questions for the respondents to rate the quality, usability and typical access time in using DRS. Part F asked the respondents to identify their level of satisfaction in term of access, availability, accuracy, current information, response time, answers given and overall view.

In Part G, respondents were required to indicate whether the library has provided sufficient access, information literacy skills, guidance and training. The other questions touched on the aspects of efficiency, knowledge, courtesy and cooperation of staff. In Part H, the respondents were asked to choose one option from the multiple choice on what do they prefer if they have reference question. They were also asked to give their opinion for reference service in the next five years. In Part I, the respondents were required to tick the list of given benefits and problems pertaining to DRS and finally in Part J they were asked to give comments and suggestions for improvement of DRS.

Part I and J of the questionnaires aimed to achieve the objective on current status whereas Part B, C, D, E, F, G and H on effectiveness of DRS.

3.6.2 Interview Questionnaire/Schedule

Various construct items have been designed to answer the research questions. The cooperation and feedback of the respondents help to gather the needed information. The first part the interview questionnaires collected the demographic data which include the

academic libraries' background and personal information of the respondents. The following parts of the interview questionnaires are designed to answer the research questions pertaining to current status of DRS in selected academic libraries in Malaysia.

3.6.3 Pilot Study

It cannot be denied that most social science research involves the study of human behaviour such as satisfaction, perception, motivation etc. These concepts may not be directly observable and thus it is necessary to operationally define these concepts. In other words, these concepts would have to be reduced to directly observable behavioural patterns, which are measurable. One common instrument used for this purpose in most social science research is a survey questionnaire. Two issues arise when using such instruments to collect data namely the validity and reliability of the measuring instruments (Richardson et al., 2005: 42).

In order to ensure validity, reliability and effectiveness of the research instrument, the questionnaire was pre-tested on a number of respondents representing both academic librarians and users of the digital reference services as follows: (a) 30 librarians from Tun Abdul Razak Library, UiTM and University of Malaya (UM) Library, and (b) 30 students from the Faculty of Computer Science and Information Technology, UM. The pre-testing exercise was undertaken to identify any problems that the librarians and students might face in understanding questions posed to them as well as to give them chances to give comments and suggestions.

Results from the pilot study showed that respondents were able to understand most of the questions and their responses were interpretable. The necessary amendments and changes were made before going into the field. Comments and suggestions were also sought from the lecturers in the field of information science as well as the reference

librarians/practitioners on how best the questions could be designed. Following the pre-testing the questionnaires was modified to overcome some of the problems. Some questions were restructured while some others were reformulated to cater for computer analysis.

Most of the open ended-questions were changed to multiple choices. For both sets of questionnaires, the open-ended questions on benefits and problems of digital reference services, for example were changed to multiple choices, so that the respondents would tick the list of given choices. This was done by analyzing all the given answers and after that matched with the findings from the literature.

3.6.4 Reliability Test

The researcher conducted an analysis of internal reliability of different sections of the variables using the Cronbach's alpha technique. Cronbach alpha (ά) is an internal consistency or reliability coefficient for an instrument requiring only one test administration. Table 3.3 indicates the result of the reliability analysis for each item on the interval scale.

Table 3.3
Reliability Analysis (Cronbach's Alpha) Per Categorical Variable

Categorical variables	**Number of Respondents**	**Number of Items**	**Alpha Coefficient**
Usage of DRS	447	19	0.645
User perception	447	3	0.879
User satisfaction	447	25	0.978
Library's performance	447	19	0.969
Benefits and problems	447	21	0.760

The results of the reliability analysis for each categorical variable on the scales showed high reliability coefficients that ranged between 0.645 for usage of DRS to 0.978

for user satisfaction. Categorical variables of usage of DRS scored the lowest (0.645) since the nature of the questions that permitted the respondents to tick all services that apply. Only four questions from this section were ordinal/five-point Likert-type scales. However, according to Nunally (1978), coefficients of 0.6 and above were considered reliable and meets the requirement for an exploratory research.

3.7 DATA COLLECTION METHOD

3.7.1 Questionnaires

After examining the objectives of study and research questions, the use of survey technique to collect data through questionnaires and survey interviews was suitable for this study. The survey method has been the most common form of quantitative research. It is a systematic collection of information from respondents through the use of questionnaires. Whitlatch (2001) noted that surveys and questionnaires are methods of directly collecting information on individuals' thoughts, beliefs, attitudes, and opinions, plus objective data, such as gender and education level.

In this study, a structured questionnaire was designed and distributed to respondents. The main advantage of questionnaires is that they are usually less expensive to administer. This is because questionnaires are most often simply mailed or handed to large numbers of respondents simultaneously. The respondents also may have greater confidence in their anonymity and thus feel free to express views they fear might be disapproved of or might get them into trouble.

The disadvantages of questionnaires are such as obtaining meaningless information from poorly designed questions and the lack of depth of information from the respondents. Another problem in using questionnaires is low response rates, especially from surveys distributed through the mail.

3.7.1.1 Administration of the Questionnaires

Data collection for *Questionnaire Set 1: Questionnaire for Librarians* occurred between April 2005 and June 2005. The questionnaires were mailed to the librarians with the stamped return envelopes and introductory cover letters from the researcher and the supervisor. They were requested to return to the researcher within a stipulated time. A follow-up phone calls and follow-up visits were made to non-respondents to ensure a reasonably high rate of the questionnaires' return.

Data collection for *Questionnaire Set 2: Questionnaire for Students* was carried out between July 2005 and October 2005. In order to ascertain better response rate, the researcher personally distributed the questionnaires to the students in their classes before the lectures. The respondents were given a week to complete and return their questionnaires. The responses were either self-collected during the lectures or returned by hand or by post to the researcher.

Students' respondents were selected from various semesters. The researcher tries to choose the students from a wide variety of areas in computer science and information technology. The students are of undergraduate and postgraduate from full time and part time. Attempts are also made to distribute to equal number of male and female respondents.

3.7.2 Interviews

Face to face interviews between a researcher and respondent(s) have been used on a wide range of topics in social sciences (Fontana and Frey, 2000). The researcher conducted structured interviews as one of the methods of data collection undertaken for this study. Structured interview means interviews that are guided by a list of questions or issues to be explored such as general information, reference services, reference staff, reference services

policy, reference functions and activities, budget and future plan. The purpose of interviewing respondents was to find out the present state of art of DRS in selected academic libraries in Malaysia.

This portion of the study was conducted during the fifth semester of the study (November 2005 until May 2006). Interviews were self administered and were intensively conducted. The researcher contacted the selected respondents to make appointments based on the interview schedules. Before any interview sessions the researcher explained about the background of the research and the purpose of the interview. The interviews which involved open-ended questions were tape-recorded with the consent of the interviewees and later transcribed to provide accurate records for analysis. In addition to recording the interviews, the researcher took brief notes to keep track of comments that needed to be followed up.

The researcher analysed the contents of the interviews to answer the research questions. These interviews helped the researcher to gather information on the current status besides build up an additional information and overall view of digital reference services in academic libraries. Overall, the interview can provide in-depth information which may not be given in the questionnaire.

To ensure a well rounded coverage, the researcher included all the Chief Librarians, head of the Reference Divisions/Units as well as the head of ICT personnel in the 4 public academic libraries in Malaysia. The head of Reference Divisions/Units and also the head of ICT personnel from the academic libraries helped to provide data for the study and in most cases led the researcher to other important information sources. Through these interviews, the researcher was also able to find out the issues and problems besides future plans associated with implementing digital reference services.

Tipton (2002) conducted a structured interview with librarians at The Texas A & M University System to collect information on existing library services provided to distance learners.

3.7.3 Content Analysis

Content analysis is one of the oldest forms of data collection as well as a standard methodology in the social sciences for studying the content of communication such as websites and it is most frequently used in evaluation (Powell, 1993, 108; *http:www.answers.com*). Gray (2000) for instance used content analysis methods to analyze Web sites of 10 large research libraries that provide virtual reference services. Lee and Teh (2001) used the same method to evaluate the contents and design of 12 academic library Web sites in Malaysia.

Started from March 2005, the researcher analysed all the four public academic libraries' web sites in Malaysia in order to: (a) record the digital reference services available, (b) note how the digital reference services are offered and (c) view the guidelines for service provision/policy pertaining to DRS. The content analysis were focused on online services linked to library's main web pages and submission methods to ask queries. Chowdhury and Margariti (2004) used this technique when researching on current practices of DRS in Scottish libraries.

3.8 DATA ANALYSIS

Analysis for the survey questionnaires was done using the Statistical Package for Social Sciences (SPSS) version 12.0 for Windows. SPSS is a widely used computer programme that allows quantitative data to be managed and analysed (Bryman, 2004). According to

Richardson et al. (2005), the objective of most research can be briefly described as descriptive, inferential or predictive.

The descriptive analysis and inferential statistical analysis have been performed to produce significant result that can be used to reflect the research objectives. According to Kerr, Hall and Kozub (2003) descriptive statistics describe or summarise the characteristics of the data set. Inferential statistics is a branch of statistics that involves drawing inferences about the population from which the data set was sampled. Frequency distributions, means and standard deviations were calculated and presented in table format.

Cross tabulations and Chi-square tests were used to examine the differences and relationships between selected variables including demographic profiles and awareness, usage and perceived need of DRS. Both tests have been widely used to evaluate the dependence and association of categorical variables. The *t* test and the one-way analysis of variance (ANOVA) were used in this study to test mean difference for significance. ANOVA has the advantage that it can compare more than two groups of samples, while *t* test are limited for only two groups.

According to Neuman (2003), statistical significance means that results are not likely to be due to chance factors. Any result that shows p-value of less than 0.05 will be considered significant and will form a basis for discussion. In this research, the results are significant at the 0.05 level, which means that:

a. Results like these are due to chance factors only 5 in 100 times.
b. There is a 95 percent chance that the sample results are not due to chance factors alone, but reflect the population accurately.
c. The odds of such results based on chance alone are 0.05 or 5 percent.
d. One can be 95 percent confident that the results are due to a real relationship in the population, not chance factors (Neuman, 2003: 357).

3.9 SUMMARY

This chapter describes the important aspects involved in selecting a research methodology and research design adopted in this research. The questionnaires have captured the librarians and students profiles, gathered data on the awareness, usage, effectiveness, issues and problems of DRS in academic libraries in Malaysia. The interview and content analysis provide data on current status and additional information which may not been given in the questionnaires. The following chapter will present data analysis and findings of the study.

CHAPTER 4

FINDINGS

4.1 INTRODUCTION

This chapter presents the data collected in this study and details the findings resulting from an analysis of the data. The data was gathered through questionnaires, interviews and observations of the selected academic libraries' web sites. The findings of the study are presented to answer the research questions. It starts with a description of the profiles of the respondents.

4.2 PROFILES OF RESPONDENTS

4.2.1 Questionnaire Set 1 (Questionnaire for Librarians)

A total of 163 sets of questionnaires were sent to the librarians from the 4 selected public university libraries in Malaysia to find out on the current status, usage, issues and problems faced by librarians pertaining to DRS. A total of 93 respondents (57%) returned the questionnaires, of which 24 (25.8%) were from Tun Abdul Razak Library, UiTM, 35 (37.6%) from University of Malaya (UM) Library, 15 (16.1%) from Tun Seri Lanang Library, UKM and 19 (20.4%) from Sultan Abdul Samad Library, UPM. Table 4.1 shows the break down of respondents.

Table 4.1
Questionnaire Distribution and Response Rate for Librarians

Name of Library	Number of Questionnaires Distributed	Number of Questionnaires Returned	Response Rate (%)
Tun Abdul Razak Library, UiTM	38	24	63%
University of Malaya (UM) Library	48	35	73%
Tun Seri Lanang Library, UKM	41	15	37%
Sultan Abdul Samad Library, UPM	36	19	53%
Total	**163**	**93**	**57%**

4.2.1.1 Demographic Data

This section presents the demographic data of the librarians who participated in this study which covers frequency and percentage distribution of the respondents according to gender, age, position, grade, highest academic qualification, working experience as a librarian, duty as a reference librarian and working experience as reference librarian.

Table 4.2
Demographic Data and Working Experience of Librarians (n=93)

Demographic variable	**Categories**	**Frequency**	**Percentage**
Gender	Male Female	24 69	25.8 74.2
Age	Below 25 26-35 36-45 Above 46	2 46 29 16	2.1 49.5 31.2 17.2
Position	Head of Division Librarian	14 79	15.1 84.9
Grade	S41 S44 S48	73 5 15	78.5 5.4 16.1
Highest Academic Qualification	Master's degree Postgraduate Diploma Bachelor's degree	52 6 35	55.9 6.5 37.6
Working Experience as a Librarian	Below 10 years 10-19 years 20-29 years Above 30	58 18 12 5	62.4 19.3 12.9 5.4
Duty as Reference Librarian	Have Experience No Experience	68 25	73.1 26.9
Working Experience as a Reference Librarian	Below 3 years 3-5 years 6-9 years Above 10 years No response	18 20 15 12 3	26.5 29.4 22.1 17.6 4.4

Table 4.2 shows that there were 24 (25.8%) male and 69 (74.2%) female respondents. This is expected due to the fact that in most Malaysian academic libraries, the number of female librarians are bigger compared to male. Majority of the respondents, that is 46 (49.4%) were between 26-35 years, 29 (31.2%) were between 36-45, 16 (17.2%) were above 46 years and 2 (2.2%) were below 25 years.

In terms of position, 79 (84.9%) were librarians and 14 (15.1%) were Heads of Divisions. Specifically, 73 (78.5%) of them are of Grade S41, 5 (5.4%) were of Grade S44 and 15 (16.1%) were of Grade S48. This reflects that majority of the librarians were from time-based scales and middle management levels. In Malaysian Remuneration System (SSM), Grade 41 is in the lowest ranking, followed by upper Grade 44 and Grade 48 in the category of Management and Professionals. When reviewing their academic qualifications, 52 (55.9%) respondents have Master's degree, while 6 (6.5%) and 35 (37.6%) have Postgraduate Diploma and Bachelor's degree respectively. This shows that most of the librarians in Malaysian academic libraries are highly qualified.

In this study, there were 58 (62.4%) respondents who had working experience below 10 years, 18 (19.4%) 11-19 years, 12 (12.9%) 20-29 years and 5 (5.4%) above 30 years. Some 68 (73.1%) of the respondents have been working in the reference division and 25 (26.9%) have no experience. Of the 68 who have been working as a reference librarian or worked in the reference division, 18 (26.5%) of them have experience below 3 years, 20 (29.4%) have experience between 3-5 years, 15 (22.1%) 6-9 years and 12 (17.6%) experience more than 10 years. Some 3 (4.4%) of the respondents who have been working as a reference librarian did not respond to this question.

4.2.2 Questionnaire Set II (Questionnaire for Students)

A total of 1,000 questionnaires were distributed to students of the four faculties in selected public universities in Malaysia to examine on the awareness, usage, users' perception, users' satisfaction, library's performance, perceived needs, issues and problems faced by students in their use of DRS.

Table 4.3
Questionnaire Distribution and Response Rate for Students

Name of Faculty	Number of Questionnaires Distributed	Number of Questionnaires Returned	Response Rate (%)
FITQS, UiTM	250	113	45.2%
FCSIT, UM	250	121	48.4%
FIST, UKM	250	108	43.2%
FCSIT, UPM	250	105	42.0%
Total	**1,000**	**447**	**44.7%**

FITQS, UiTM = Faculty of Information Technology and Quantitative Sciences, Universiti Teknologi Mara
FCSIT, UM = Faculty of Computer Science and Information Technology, University of Malaya
FIST, UKM = Faculty of Information Science and Technology, Universiti Kebangsaan Malaysia
FCSIT, UPM = Faculty of Computer Science and Information Technology, Universiti Putra Malaysia

A total of 447 (44.7%) questionnaires were returned of which 113 (25.3%) were from the Faculty of Information Technology and Quantitative Sciences, UiTM, 121 (27.0%) from Faculty of Computer Science and Information Technology, UM, 108 (24.2%) from Faculty of Information Science and Technology, UKM and 105 (23.5%) from Faculty of Computer Science and Information Technology, UPM.

4.2.2.1 Demographic Data

This section summarizes the demographic data of the respondents by gender, age, level of study, semester, where they were currently living and mode of study.

Table 4.4
Demographic Data of Students (n=447)

Demographic variable	Categories	Frequency	Percentage
Gender	Male	157	35.1
	Female	290	64.9
Age	Below 20	162	36.2
	20-22	191	42.7
	23-25	61	13.6
	Above 26	33	7.4
Student Level	Undergraduate	399	89.3
	Postgraduate	48	10.7
Semester	Semester 1	34	7.6
	Semester 2	199	44.5
	Semester 3	109	24.4
	Semester 4	47	10.5
	Semester 5	25	5.6
	Semester 6	33	7.4
Currently Living	On Campus	309	69.1
	Outside	138	30.9
Mode of Study	Full Time	406	90.8
	Part Time	41	9.2

Table 4.4 shows that majority of the respondents 290 (64.9%) were female and 157 (35.1%) were male. This is expected due to the fact that the number of female students were larger compared to male student in Malaysian public universities. In terms of age, majority of the respondents 191 (42.7%) belonged to the age group of 20-22 years, followed by 162 (36.2%) of the age group of below 20 years, 61 (13.6%) in the age group of 23-25, and 33 (7.4%) of the age group of 26 years and above.

The largest group of the students 399 (89.3%) were undergraduate and 48 (10.7%) were postgraduate students. In this study, 34 (7.6%) of the students were in semester 1, some 199 (44.5%) semester 2, 109 (24.4%) semester 3, 47 (10.5%) semester 4, 25 (5.6%) semester 5 and 33 (7.4%) semester 6. Most of the students, 309 (69.1%) were staying on campus and 138 (30.9%) outside. In terms of mode of study, 406 (90.8%) of the students were full time and 41 (9.2%) were part time students.

4.2.3 Interview Results

A structured interview was conducted with the Chief Librarians, Head of Reference Divisions and Head of ICT Divisions in the four public academic libraries to collect information on existing library services provided to users. An analysis of the data collected provides the following findings:

4.2.3.1 Demographic

Table 4.5 below illustrates the demographic data of the interview respondents.

Table 4.5
Demographic Data of Interview's Respondents (n=12)

Demographic Variables	Categories	Frequency	Percentage
Gender	Male Female	5 7	41.7 58.3
Position	Chief Librarian Head Division	4 8	33.3 66.7
Age	Below 25 26-35 36-45 Above 46	0 0 2 10	0 0 16.7 83.3
Experience	Below 10 years 10-19 years 20-29 years Above 30 years	0 2 4 6	0 16.7 33.3 50
Highest Academic Qualification	Master Postgraduate Diploma Bachelor's Degree	10 1 1	83.3 8.3 8.3

There were 5 (41.7%) male and 7 (58.3%) female respondents. The majority of the respondents, that is 8 (66.7%) were Head of Divisions and 4 (33.3%) were Chief Librarians. In terms of age, the majority of the respondents, i.e. 10 (83.3%) were above 46 years old and 2 (16.7%) were of age 36-45 years. Most of the respondents, i.e. 6 (50%) have experience above 30 years, 4 (33.3%) 20-29 years and 2 (16.7%) have experience of

10-19 years. In terms of highest academic qualification, 10 (83.3%) have Masters' degree, 1 (8.3%) has postgraduate diploma and 1 (8.3%) has bachelor's degree.

4.2.4 Content Analysis Results

Library Web pages normally provides access to digital services. For the purpose of present study, the researcher explored all the four (4) public academic libraries' Web pages in Malaysia in order to answer the following questions:

a. What are the digital reference services that are provided in selected academic libraries in Malaysia? The researcher identified and assessed the present state of DRS offered in the four public academic libraries under study.
b. How are the digital reference services offered in selected academic libraries in Malaysia? Information that were gathered to evaluate the services such as log records for number of sessions, users, types of questions, resolution and resources used.
c. What are the guidelines for service provision/policy of DRS in selected academic libraries in Malaysia? Related data from the respective websites were collected including response time, types of questions, service behaviours and other guidelines for the service provision of the libraries included in the study.

The information gathered from the content analysis were summarized and analysed to answer the research questions pertaining to current status of digital reference services in academic libraries in Malaysia. The data obtained were also interpreted for a systematic evaluation of DRS in the four selected academic libraries in Malaysia.

4.3 FINDINGS FROM WEB CONTENT ANALYSIS AND INTERVIEWS

4.3.1 Existing status of digital reference services provided by the academic libraries.

This section presents the current status of DRS in 4 selected academic libraries in Malaysia which covers format of DRS offered, staff and administration, services and facilities, types of reference questions and subject areas, policies, training, cooperation and future plan. Most of the data on current status of DRS were obtained from the structured interviews and content analysis of the academic libraries' web sites under study. The researcher investigated what software did the library use, how DRS function within established in-house reference services, how librarians responded to users' queries through online and how the workloads were handled among staff.

4.3.2 Library System's Used

In order to determine the existing status of DRS, the respondents were asked on what library systems they are currently using, the vendors, year of implementation and when did they first used the automated system.

Table 4.6
Library System's Used

Library	Current Library System's Used	Vendor	Year	First Used Automated System
Tun Abdul Razak Library, UiTM	ILMU	Paradigm	2000	1992
University of Malaya (UM) Library	i-LINK	SIRSI	2004	1990
Tun Seri Lanang Library, UKM	VIRTUA	VTLS	2000	1990
Sultan Abdul Samad Library, UPM	VIRTUA	VTLS	2000	1987

Referring to Table 4.6, the study found that Tun Abdul Razak Library, UiTM was using Integrated Library Management Utility (ILMU) supplied by Paradigm Systems Sdn. Bhd.

since 2000 but has first used automated system since 1992. University of Malaya (UM) Library uses i-LINK library system supplied by SIRSI since 2004 and has first used automated system in 1990. Tun Seri Lanang Library, UKM and Sultan Abdul Samad Library, UPM both use VIRTUA library systems supplied by VTLS since 2000. Tun Seri Lanang Library, UKM first used automated system in 1990 whilst Sultan Abdul Samad Library, UPM in 1987.

4.3.3 Electronic Library Services

Electronic library services are the basic requirement for DRS. Findings from the content analysis showed that all the 4 public academic libraries in this study have their own websites as follows:

Table 4.7
Selected Malaysian Public Academic Libraries Websites

Public Universities	**Websites/Library URLs**
Universiti Teknologi Mara (UiTM)	http://www.uitm.edu.my/ptar
Universiti Malaya (UM)	http://www.umlib.um.edu.my
Universiti Kebangsaan Malaysia (UKM)	http://pkukmweb.ukm.my
Universiti Putra Malaysia (UPM)	http://www.lib.upm.edu.my

These four websites provide rich resources for their local holdings, connections to electronic resources and digital collections.

An analysis was made on selected element of the libraries' home pages, such as the presence of online catalogues, links to recommended or dedicated Web sites, interactive services, resources remotely available over the network, and links to other OPACs. Table 4.8 summarizes the services available online for the libraries in the study.

Table 4.8
Electronic Library Services in Selected Malaysian Public Academic Libraries

Library	Catalog on Web	Dedicated Web site	Interactive services	Resources remotely available	Links to other OPACs
Tun Abdul Razak Library, UiTM	Yes	Yes	Yes	Yes	Yes
University of Malaya (UM) Library	Yes	Yes	Yes	Yes	Yes
Tun Seri Lanang Library, UKM	Yes	Yes	Yes	Yes	Yes
Sultan Abdul Samad Library, UPM	Yes	Yes	Yes	Yes	Yes

All the four academic libraries have online public access catalogues (OPACs) to make users aware of their collections. An OPAC can be used by a member of the library's public to search the catalogue database in order to see if the library holds a particular work on a particular subject and be informed of the location of those works.

Academic libraries also have links to Internet resources, Web sites, electronic books and journals which are reserved for specific use. These recommended or dedicated Web sites are compiled by the librarians according to subject areas which reflect the online sources available and courses offered in the universities.

All the four academic libraries in this study offered interactive services to their users. The services include loan status check and fines accrued, online renewal, new acquisition, charged books reservation, purchase suggestion, and inter-library loan request. University of Malaya (UM) Library has an interactive library portal to e-resources and online services which is a user-driven and customizable information service.

The libraries had provided links to subscribed databases such as ACM Digital Library, AIDSearch, ProQuest, Ebscohost, Educational Resources Information Centre (ERIC), etc. Some of the services are restricted to the university community; they require the use of appropriate login names and passwords, for some databases.

All the academic libraries in this study also provide links to other selected library OPACs within and outside the country. This will enable the users to access not only their own academic libraries' resources, but also resources from other libraries globally.

4.3.4 Types/Formats of Digital Reference Services Offered

The main element of any DRS is the answering of users' queries (Chowdhury and Margariti, 2004). The interface should allow users to place queries electronically usually through a Web form, often via a '*Contact Us*' or '*Ask Us*' link in the main menu. In all academic library services observed, there were link for submitting general enquiries and for contacting a librarian.

The types of DRS offered are given in Table 4.9.

Table 4.9
Types of DRS Offered

Library	E-Mail	Web Forms	Ask-A Librarian	FAQs	Others
Tun Abdul Razak Library, UiTM	Yes	Yes	Yes	Yes	Yes (VRF)
University of Malaya (UM) Library	Yes	Yes	No	No	No
Tun Seri Lanang Library, UKM	Yes	Yes	No	Yes	No
Sultan Abdul Samad Library, UPM	Yes	Yes	No	Yes	Yes (DLS)

Note: VRF = Virtual Reference Facilitator
DLS = Distance Learning Services

As shown in Table 4.9 that Tun Abdul Razak Library, UiTM provides e-mail reference, web forms, Ask-A Librarian, FAQs and Virtual Reference Facilitator (VRF). University of Malaya (UM) Library offers e-mail reference and web forms. Tun Seri Lanang Library, UKM provides e-mail reference, web forms and FAQs. Sultan Abdul Samad Library, UPM has e-mail reference, web forms, FAQs and Distance Learning Services.

All academic libraries in this study have created special reference e-mail accounts with an address that identifies the library, that is http://www.uitm.edu.my/ptar for Tun Abdul Razak Library, UiTM, query_perpustakaan@um.edu.my for University of Malaya (UM) Library, kpustaka@pkrisc.cc.ukm.my for Tun Seri Lanang Library, UKM and lib@lib.upm.edu.my for Sultan Abdul Samad Library, UPM.

Users can either click directly on the e-mail addresses on the library's web page which activates e-mail software, or send a message to the e-mail address using their own software. In all academic libraries' web sites in the study, the librarian's individual e-mail addresses were also provided for contacting any of the librarians through e-mail.

In Tun Abdul Razak Library, UiTM there is a special management software called Virtual Reference Facilitator (VRF) that track and store answers to queries to enable them to save materials for future reference. In other libraries under study, there were no management software to track or store answers to queries or to enable them to save material for questions' and answers' archives. The librarians only keep certain queries and answers in their personal computer files that are not shared.

4.3.4.1 Virtual Reference Facilitator (VRF) in Tun Abdul Razak Library, UiTM

Besides offering e-mail reference, web forms and Ask-A Librarian services, Tun Abdul Razak Library, UiTM has a special software known as Virtual Reference Facilitator (VRF) through the main menu of the library's web page.

VRF serves as a platform for users to send reference queries or research title for researching. VRF can be used as a mediator or middle tool between the librarian and the user. User can ask for reference or research work to be done whereby the librarian does the researching. The VRF allows the user view the researches and lets the researchers to be

maintained by the administrators. At the same time the librarian are able to view the details of the researches that they need to work on.

Specifically, VRF has the following functions: (a) able to send in research titles, (b) processing researches, (c) able to cancel the researches, (d) maintaining the attributes in VRF, (e) maintaining categories in VRF, (f) searching researches and experts in VRF and (g) able to view history of research. The following diagrams describe the processes of making new reference and cancellation:

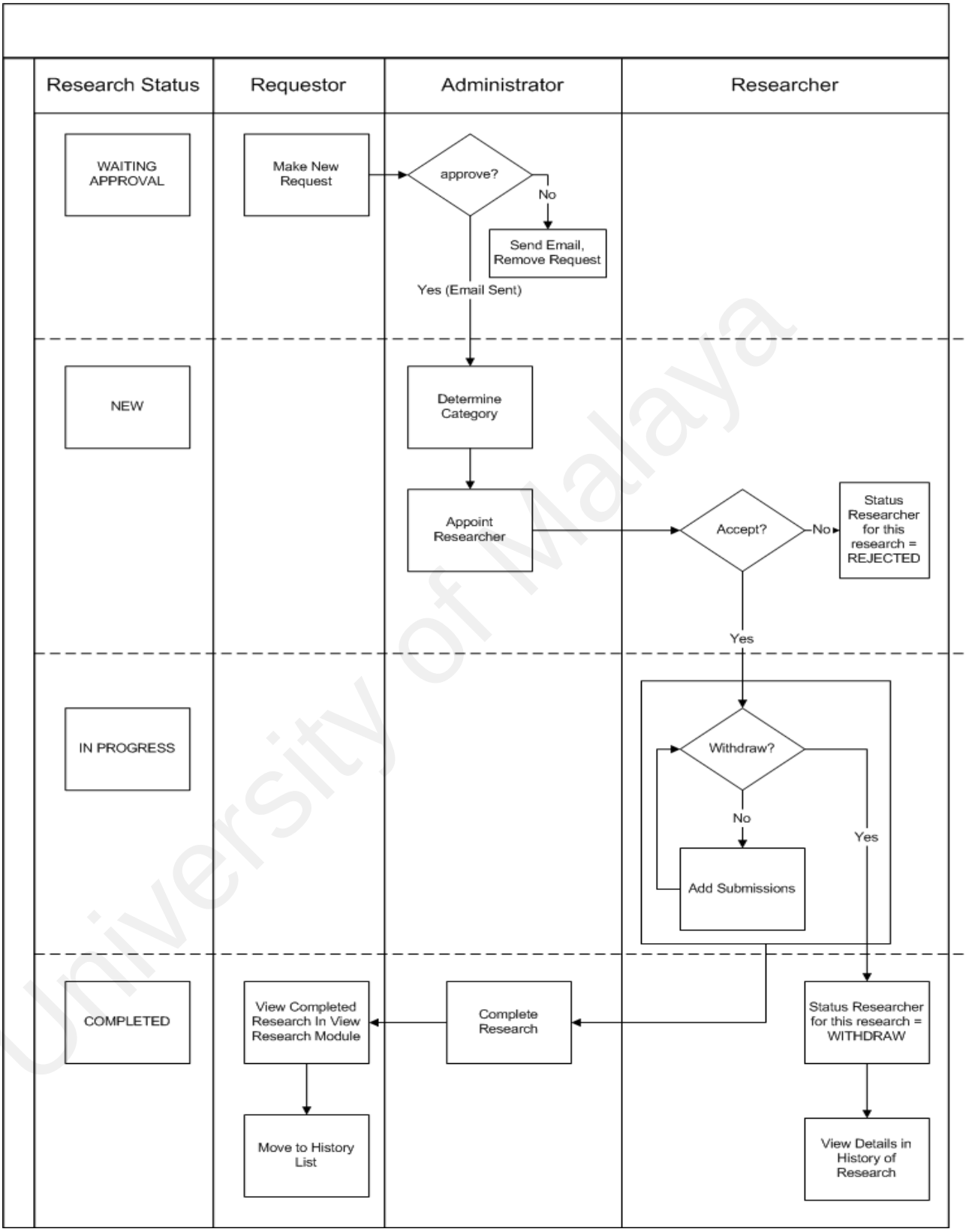

Figure 4.1: Process of Making New Reference

Source: *Virtual Reference Facilitator (VRF): user manual.* (n.d.). Tun Abdul Razak Library, Mara University of Technology: 2.

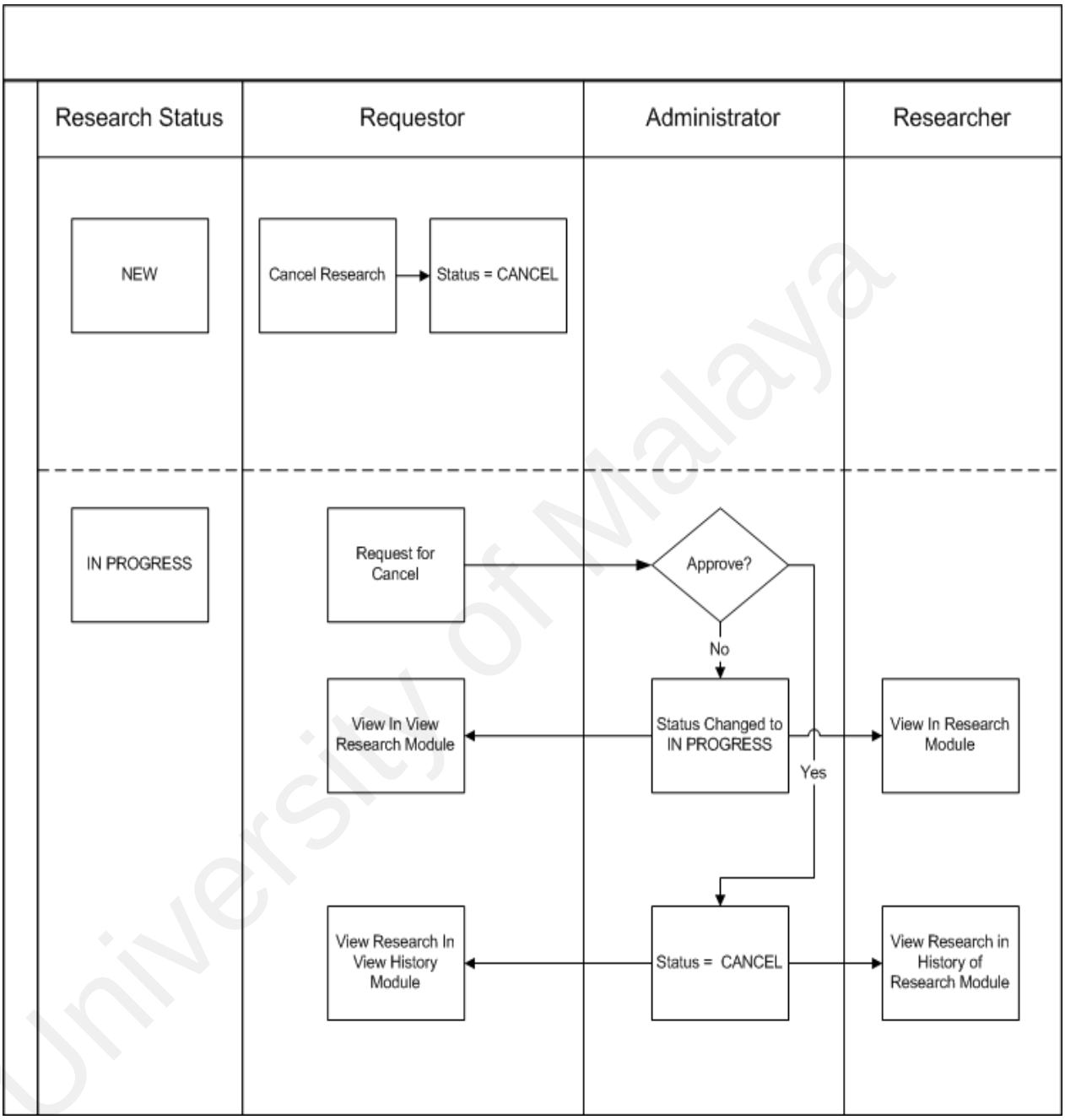

Figure 4.2: Reference Cancellation

Source: *Virtual Reference Facilitator (VRF): user manual.* (n.d.). Tun Abdul Razak Library, Mara University of Technology: 3.

This special software enables the library to track and store answers to queries and the materials would be saved for future reference. Analysis of the software shows that the administrator can view any reference made since the system records the following: users' matrix number, e-mail address, member category, submitted date, research title, research details and librarian's in-charge (see Appendix I).

Table below shows the enquiries recorded through VRF from 2005 to 2007:

Table 4.10
VRF Transactions in PTAR 2005-2007

Year	Enquiries	Research Questions	Cancelled
2005	56	27 (48.2%)	29 (51.8%)
2006	128	91 (71.1%)	37 (28.9%)
2007	175	139 (79.4%)	36 (20.6%)

Source: Information Technology and Systems Division, Tun Abdul Razak Library, UiTM

The number of enquiries increased from 56 in 2005 to 175 in 2007. The librarian in Tun Abdul Razak Library, UiTM responded to the enquiries based on the types of questions received. Only research questions were approved and searched by the service administrator.

Analysed of the log of more than 350 questions asked through VRF revealed that during the first year of the implementation, most of the enquiries 29 (51.8%) were cancelled since the questions were simple and duplicated. However, the percentage of research questions that have been approved increased to 71.1% in 2006 and 79.4% in 2007. In terms of category of users for the year 2007, 143 (81.7%) are undergraduates, 25 (14.3%) postgraduates and 7 (4%) are academic staff. Even though the response time policy was not stated on the library's web page, but from the analysis, in general the service provides quite fast response time. The librarian's in-charge also has guided the requestors by providing the information sources needed in their research.

4.3.4.2 Distance Learning Services in Sultan Abdul Samad Library, UPM

Distance Learning Services provide library services for distance learning students of the university. Through this quick link, the user can access various library services, e-resources and link to distance learning web and others. The user can contact the librarian/library through Ask Us, feedback and suggest a purchase besides accessing online library catalogue as well as online databases.

4.3.5 Staff and Administration

Referring to Table 4.11, the 4 academic libraries in the study have a considerable number of both professionals and non-professionals' staff. Professionals in the context of academic library refer to all the qualified Librarians who hold either bachelors' degree in library or information science or bachelors' degree in other field plus postgraduate diploma or masters' degree in library or information science. Most of the non-professionals consist of Library Assistants, Library Checkers, Administrative Assistants, Technicians and Junior Assistants (PARs).

Table 4.11
Number of Staff

Library	Professionals	Non-professionals
Tun Abdul Razak Library, UiTM	77	336
University of Malaya (UM) Library	48	236
Tun Seri Lanang Library, UKM	41	175
Sultan Abdul Samad Library, UPM	36	98

Tun Abdul Razak Library, UiTM has the largest number of staff, that is 77 professionals and 336 non-professionals, followed by University of Malaya (UM) Library with 48 professionals and 236 non-professionals, Tun Seri Lanang Library, UKM has 41

professionals and 175 non-professionals, and Sultan Abdul Samad Library, UPM has 36 professionals and 98 non-professionals.

4.3.6 Reference Staff

Table 4.12 shows the number of reference staff in the 4 selected academic libraries.

Table 4.12
Reference Staff

Library	Number of Professional Staff	Number of Non-professional Staff	Number of Reference Staff who Answer Reference Questions
Tun Abdul Razak Library, UiTM	4	3	4
University of Malaya (UM) Library	5	3	8
Tun Seri Lanang Library, UKM	5	4	9
Sultan Abdul Samad Library, UPM	10	5	5

Sultan Abdul Samad Library, UPM has 10 professionals, followed by University of Malaya (UM) Library and Tun Seri Lanang Library, UKM with 5 professionals each whilst Tun Abdul Razak Library, UiTM has 4 professionals. In terms of non-professionals, Sultan Abdul Samad Library, UPM has the largest number of non-professionals (5), Tun Seri Lanang Library, UKM (4), Tun Abdul Razak Library, UiTM (3) and University of Malaya (UM) Library (3).

The table further shows that all the reference staff in University of Malaya (UM) Library and Tun Seri Lanang Library, UKM were answering reference questions. In Tun Abdul Razak Library, UiTM, only professionals were answering reference questions. In Sultan Abdul Samad Library, UPM only 5 of the professionals were answering reference questions. Some of these professional staff were also responsible for maintaining the library's web pages.

4.3.7 Reference Services Division

The name given to reference division or unit differs from one library to another as can be seen in Table 4.13 below:

Table 4.13
Name of the Division/Unit that Provides Reference Services

Library	Name of Division/Unit that Provides Reference Service
Tun Abdul Razak Library, UiTM	Information Service Division
University of Malaya (UM) Library	Client Services Division
Tun Seri Lanang Library, UKM	Customer Service Division
Sultan Abdul Samad Library, UPM	Reference Division

Tun Abdul Razak Library, UiTM named the division as Information Service Division, University of Malaya (UM) Library, as Client Services Division, Tun Seri Lanang Library, UKM as Customer Service Division and Sultan Abdul Samad Library, UPM named it as Reference Division. Although the different names given, the main function of the reference divisions were to answer reference questions and to provide readers advisory service to the user.

All the libraries under study have their own written reference policies pertaining to collections and services. Reference collection consists of reference books embracing all disciplines in various forms including encyclopedias, dictionaries, yearbooks, handbooks, almanacs, indexes abstracts, bibliographies and exam papers. These materials are strictly for reference only and cannot be borrowed out from the library.

There were policies stated on the library web sites regarding digital reference services. Table 4.14 shows the policy concerning DRS according to their web pages:

Table 4.14
Policies for Reference Service Provision

Library	Policy
University of Malaya (UM) Library	You will receive a response within 48 hours (excluding weekends and university closures). If your enquiry is urgent, please contact the reference desk for more immediate assistance. Reference and information services are provided by all libraries in the system. Enquiries may be made in person, over the telephone, by fax and through electronic mail. (Available on web site)
Tun Seri Lanang Library, UKM	Our reference librarian will attend to you from 8.30 am to 4.30 pm. What we can do: provide answers to questions or refer you to other possible sources of information if we cannot provide the answer. What we can't do: Undertake urgent request, conduct extensive research for clients, provide advice on medical or legal matter and accept reservations of material. (Available on web site).

There were clearly stated policies in University of Malaya (UM) Library and Tun Seri Lanang Library, UKM concerning reference services and DRS. Interview with Chief of Information Service Division of Tun Abdul Razak Library, UiTM and Chief of Reference Division of Sultan Abdul Samad Library, UPM confirmed that they have the policies concerning DRS but do not stated on the web. For Tun Abdul Razak Library, UiTM the library will reply to the request immediately and the system will give notice depending on the requestor's expected date. Sultan Abdul Samad Library, UPM will reply to the query as soon as possible.

4.3.8 Types of Reference Services Offered

Most of the libraries provided a range of services that are traditionally associated with reference service as shown in table 4.15 in the next page:

Table 4.15
Types of Reference Services Offered

Library	Types of Reference Services Offered
Tun Abdul Razak Library, UiTM	Bibliographic Compilation, Information Literacy Skills, Literature Search, Current Awareness Service, Selective Dissemination of Information, Inter Library Loan/Document Delivery, Indexing and Abstracting, Exhibitions, Reader's Advisory Services
University of Malaya (UM) Library	Bibliographic Compilation, Information Literacy Skills, Literature Search, Selective Dissemination of Information, Inter Library Loan/Document Delivery, Exhibitions, Reader's Advisory Services
Tun Seri Lanang Library, UKM	Bibliographic Compilation, Information Literacy Skills, Literature Search, Current Awareness Service, Selective Dissemination of Information, Inter Library Loan/Document Delivery, Indexing and Abstracting, Exhibitions, Reader's Advisory Services
Sultan Abdul Samad Library, UPM Library	Bibliographic Compilation, Information Literacy Skills, Literature Search, Inter Library Loan/Document Delivery, Indexing and Abstracting, Reader's Advisory Services

Bibliographic compilation, literature search, current awareness service (CAS), Selective Dissemination of Information (SDI), Inter library Loan (ILL), Indexing and Abstracting and Reader's Advisory services are among the services associated with reference services in all academic libraries' under study. Some of the services such as current awareness service (CAS), Selective Dissemination of Information (SDI) and new library acquisition listings have been offered online.

The study found that the reference services were offered by various divisions/units depending on the organizational structures of the academic libraries. In University of Malaya (UM) Library for instance, besides Client Services Division, reference activities were also done by the Research and Academic Services Division. Among the services provided under Research and Academic Services Division are: information searches

services, library orientation programmes, information skills programmes for final and postgraduates students and professional consultancy for Doctor of Philosophy's students and academic staff besides conducting the one-hour credit compulsory course (GXEX 1401: Information Skills). The student also can get the reference services from 3 branch libraries; Za'ba Memorial Library, Tan Sri Profesor Ahmad Ibrahim Law Library and T. J. Danaraj Medical Library besides 15 special libraries throughout the campus.

4.3.9 Answering DRS Questions

Professional staff were assigned to answer digital reference questions in Tun Abdul Razak Library, UiTM, Tun Seri Lanang Library, UKM and Sultan Abdul Samad Library, UPM. They have to response to digital reference enquiry where there were questions posed to the libraries. However, staff had no special management software to assist with tracking or storing answers to queries, or to enable them to save material for future reference. Some librarians keep certain answers in their personal computer files, though these are not shared. There are also separate enquiry services in branch or special libraries throughout the campus. In Tun Abdul Razak Library, UiTM, a professional staff was responsible for maintaining Virtual Reference Facilitator's (VRF) software.

4.3.10 Working Time of Professionals From Other Division

It was found that the professional staff from other divisions of the libraries were assigned to work in the Reference Service Division. They were assigned to work in the Reference Service Division during the following time:

Table 4.16
Working Time of Librarians from Other Divisions

Library	**Time**
Tun Abdul Razak Library, UiTM	After office hours (5.00 pm – 10.00 pm) Public holiday Lunch time (1.00 pm- 2.00 pm)
University of Malaya (UM) Library	After office hours (5.00 pm – 10.00 pm) Weekends (Saturday and Sunday) Friday lunch break
Tun Seri Lanang Library, UKM	After office hours (5.00 pm – 10.00 pm)
Sultan Abdul Samad Library, UPM	After office hours (4.30 pm – 10.00 pm) Weekends (Saturday and Sunday) Friday lunch break

All the academic libraries under study assigned the librarians from other divisions to work after the office hours or night duty. In fact, they also have to work during public holidays, lunch time, weekends (Saturday and Sunday) and Friday lunch break.

4.3.11 Subject Specialists

University of Malaya (UM) Library and Tun Seri Lanang Library, UKM have subjects specialists. University of Malaya (UM) Library has subject specialists in the area of sciences, social sciences and humanities. Tun Seri Lanang Library, UKM has librarians who were subject specialists in the area of sciences, social sciences, economics and management, education, engineering, medical, law, Islamic Studies and Southeast Asian Studies. There were no subject specialist librarian in Tun Abdul Razak Library, UiTM and Sultan Abdul Samad Library, UPM.

4.3.12 Cooperation with Faculties or Other Organizations

Only Tun Seri Lanang Library, UKM was involved in digitization project initiated by National Library of Malaysia by providing access to the International Islamic Digital

Library. All the academic libraries under study have joint a loosely library cooperative group called PERPUN or Standing Conference on National and University Libraries in Malaysia which aimed to enhance cooperation among its members.

Interview with the Head of Client Services Division, University of Malaya (UM) Library clarified that the librarian will forward the questions to the faculties or other organizations if answers were not available in the library. However, Tun Abdul Razak Library, UiTM and Sultan Abdul Samad Library, UPM have no formal cooperation with the faculties/other organizations.

4.3.13 Training

In terms of training, all academic libraries in this study have their own in-house and on-job training programmes. However, a large number of librarians seem to acquire skill by learning themselves.

Table 4.17
How Respondents Acquire Skills (n=77)

Types of Training	Frequency	Percentage	Rank
Continuing Education	34	36.6	3
In-service Training	56	60.2	2
Self-taught	68	73.1	1
Friends	27	29.0	4
Others	2	2.2	5

Note: Respondents are permitted to give more than one answers

As shown in Table 4.17, the majority of the respondents learned to use DRS through self-taught 73.1% (68), 60.2% (56) in-service training, 36.6% (34) continuing education and 29.0% (27) friends. Some 2.2% (2) replies 'others' but did not specify what type of training/skills they received.

4.3.14 Budget

The following is the overall budget for the academic libraries under study:

Table 4.18
Budget for 2006

	PTAR	UML	TSLL	SASL
Library Budget (In Million RM)	20,054,000.00 (excluding emolument)	8,300,00.00 (collection development)	14,903,795.00	8,400,000.00

Note: PTAR = Tun Abdul Razak Library, UiTM
UML = University of Malaya Library
TSLL = Tun Seri Lanang Library, UKM
SASL = Sultan Abdul Samad Library, UPM

PTAR obtained the highest budget for 2006 with the allocation of more than RM 20 millions (excluding emolument), followed by TSLL (RM 14.9 millions), SASL (RM 8.4 millions) and UML (RM 8.3 millions for collection development only).

Interviews with the Chief Librarians in the respective academic libraries under study confirmed that there were no specific budget allocated for reference services' divisions as well as to digital reference services. However, according to Shaifol and Aishah (2005), over the past five years, public academic libraries in Malaysia have been spending between RM 100,000 to RM 1.2 million of purchasing hardware and software for their digital initiatives. More allocation will be allocated in the next few years. With the amount of fund spend, suitable formats of DRS should be implemented in the academic libraries under study.

4.3.15 Reference in Practice

The following is the proportion of time allocated to on a typical day in reference service division:

Table 4.19
Percentage of Time Allocated for Reference Activities

Library	Answering reference queries (in person)	Telephone	Written Response	Library Instruction	DRS
Tun Abdul Razak Library, UiTM	90	5	-	-	5
University of Malaya (UM) Library	40	30	20	-	10
Tun Seri Lanang Library, UKM	50	5	5	35	5
Sultan Abdul Samad Library, UPM	65	5	5	15	10

Table 4.19 shows that highest percentage of time allocated on a typical day in reference service division was answering reference queries (in person) or face-to-face comprising 90% in Tun Abdul Razak Library, UiTM, 65% in Sultan Abdul Samad Library, UPM, 50% in Tun Seri Lanang Library, UKM and 40% in University of Malaya (UM) Library. This is followed by telephone consultancy, written response and library instruction. Digital reference services score lowest percentage in reference activities, that is 5 to 10 percent of the reference activities. Library instructions were conducted by other divisions in Tun Abdul Razak Library, UiTM and University of Malaya (UM) Library.

The statistics obtained from the Information Service Division, Tun Abdul Razak Library, UiTM shows the following:

Table 4.20
Reference Enquiries in Tun Abdul Razak Library, UiTM
in 2005 and 2006

Face-to-face		Telephone		E-mail		Total	
2005	2006	2005	2006	2005	2006	2005	2006
4,557 (70.4%)	3,789 (55%)	1,304 (20.1%)	2,696 (39.2%)	615 (9.5%)	398 (5.8%)	6,476 (100%)	6,883 (100%)

Source: Information Service Division, Tun Abdul Razak Library, UiTM

Table 4.20 indicates that in 2005, of the total of 6,476 enquiries received, 70.4% were face-to-face, 20.1% by telephone and 9.5% e-mail. In 2006, the total enquiries increased to 6,883, whereby 55% were face-to-face, 39.2% by telephone and 5.8% e-mail.

Table below highlights the types of question received through e-mail.

Table 4.21
Types of Questions Via E-mail in Tun Abdul Razak Library, UiTM in 2006

Types of Question	Frequency	Percentage
General Queries	185	46.5
Research Questions	52	13.1
User Guidance	126	31.6
Technical	35	8.8
TOTAL	**294**	**100**

Source: Information Technology and Systems Division, Tun Abdul Razak Library, UiTM

Most of the questions asked are general queries, 46.5% followed by user guidance 31.6%, research questions 13.1% and technical 8.8%.

The statistics obtained from Information Systems and Management Division, University of Malaya (UM) Library shows that in 2007 there were 9,216 queries received through reference desk compared to 10,630 in 2006 and 6,314 queries in 2005. Table 4.22 shows the detail:

Table 4.22
Information Services Statistics in University of Malaya (UM) Library in 2005 to 2007

Category	2005	2006	2007
Undergraduates	2,095	3,101	3,176
Postgraduates	2,022	3,861	3,511
Academic Staff	262	349	250
Visitors	1,141	1,623	908
Telephone	794	1,696	1371
TOTAL	**6,314**	**10,630**	**9,216**

Source: Client Services Division, University of Malaya Library

Undergraduates are the largest group who forwarded the questions to the library followed by postgraduates and visitors in 2005. However, in 2006 postgraduates are the largest group followed by undergraduates and visitors.

Table 4.23
Types of Questions in University of Malaya (UM) Library in 2006 and 2007

Types of Question	2006	2007
General Questions	7,229 (68.1%)	5,375 (58.3%)
Reference Questions	1,149 (10.8%)	1,368 (14.8%)
Research Questions	1,374 (12.9%)	1,527 (16.6%)
Circulation	547 (5.1%)	553 (6.0%)
Membership	331 (3.1%)	393 (4.3%)
TOTAL	**10,630 (100%)**	**9,216 (100%)**

Source: Client Services Division, University of Malaya Library

The table indicates that general questions; 68.1% in 2006 and 58.3% in 2007 were the highest types of question asked followed by research questions; 12.9% in 2006 and 16.6% reference questions.

The data on e-mail queries via University of Malaya (UM) Library's portal was only available from 25 November 2005 to 2006. The data for 2007 was not available due to the technical problem. Only 25 e-mail queries were received in 2005, but increased to 294 queries in the year 2006.

Table 4.24
Types Questions Via E-mail in University of Malaya (UM) Library in 2006

Types of Question	Frequency	Percentage
Feedbacks on Access	192	65.3
General Queries	75	25.5
Research Questions	27	9.2
TOTAL	**294**	**100**

Source: Information Systems Management Division, University of Malaya Library

Analysed of the questions received from the portal shows that the highest number of questions 192 (65.3%) are pertaining to feedbacks on the access of the library's online systems and services, to report or ask about account problems and seeking advise to choose suitable online databases. Some 75 (25.5%) of the questions are pertaining to general reference questions and only 27 (9.2%) are seeking answers to specific research questions.

In terms of response time, the service administrator realized that the questions need to be answered according to the stated policy within 48 hours. Interview with the Chief of the Information Systems Management Division, University of Malaya Library clarified that the queries were responded immediately but in the cases of delay response time of more than 48 hours were due to the library being closed during holidays.

4.3.16 Frequency as the Only Librarian on Duty

Table 4.25 reports the frequency they were the only reference librarian on duty.

Table 4.25
Frequency as the Only Reference Librarian on Duty (n=89)

Frequency	Frequency	Percentage	Rank
Always	20	22.5	2
Frequently	14	15.7	4
Sometimes	38	42.7	1
Rarely	15	16.9	3
Never	2	2.2	5

Missing: 4

The table indicates that 22.5% (20) of the respondents work daily as the Reference Librarian, 15.7% (14) weekly, 42.7% (38) monthly, 16.9% (15) a few times and 2.2% (2) never. The 22.5% (20) of the respondents who worked daily were Reference Librarians

who permanently work in the Reference Service Divisions/Units, whilst the others were on a rotation basis either on-call or on night duty.

In terms of gender, 17 of the reference librarians were female and 3 were male. Most of them (12) were degree holder, 6 of them have Masters' degree and 2 have postgraduate diploma. In terms of age, 10 were of age 26-35, 7 of age 36-45 and 3 of age 46 and above. Majority of them (17) were of Grade S41, 1 of Grade S44 and 2 of Grade S48. The one of Grade S44 and 2 of Grade S48 were Head of Reference Divisions/Units.

4.3.17 Types of Reference Questions and Subject Areas

Table 4.26 depicts the types of questions that the user normally asked during DRS. Majority of the questions asked were specific search questions 68.8% (64), 59.1% (55) directional questions, 57% (53) research questions and 40.9% (38) ready reference questions. Specific research questions require the library to give the user information sources, directional questions are questions on general information or location, whereas research questions are pertaining to subject areas normally asked by researchers.

Table 4.26
Types of Reference Questions Received (n=77)

Types of Questions	Frequency	Percentage	Rank
Directional	55	59.1	2
Ready Reference	38	40.9	4
Specific Search	64	68.8	1
Research	53	57	3

Note: The respondents are permitted to give more than one answers

Table 4.27 reveals that 77.4% (72) of the subject areas asked are pertaining to social sciences, 57% (53) education, 55.9% (52) science and technology, 41.9% (39) arts and humanities, 39.8% (37) engineering, 32.3% (30) computer science, 23.7% (22)

government, 18.3% (17) legal, 11.8% (11) medical and 3.2% (3) others. The subject areas specified under 'others' include agriculture, architecture and Islamic studies.

Table 4.27
Subject Areas Handled by Librarians (n=93)

Subject Areas	Frequency	Percentage	Rank
Social Sciences	72	77.4	1
Education	53	57.0	2
Science and Technology	52	55.9	3
Arts and Humanities	39	41.9	4
Engineering	37	39.8	5
Computers	30	32.3	6
Government	22	23.7	7
Legal	17	18.3	8
Medical	11	11.8	9
Others	3	3.2	10

Note: The respondents are permitted to give more than one answers

4.3.18 Future Plans

All the academic libraries in the study were planning for more sophisticated digital reference services. Overall, the Chief Librarians, Heads of Reference Divisions/Units and IT Divisions interviewed would like to see the improvements of the DRS in their academic libraries. From the interviews, the researcher found that Sultan Abdul Samad Library, UPM was planning for Ask-A Librarian and online chat reference services in the future. University of Malaya (UM) Library and Tun Seri Lanang Library, UKM were planning for online chat reference. Tun Abdul Razak Library, UiTM will give full swing to Virtual Reference Facilitator (VRF) that the library was implementing.

4.4 FINDINGS FROM THE STUDENTS' SURVEY

Section C of the Questionnaire for Students asked the respondents about the awareness of DRS. Data were collected on the awareness of DRS, how did the respondents know about the service, place of access, awareness of university library's web sites and how frequent did they visited the library.

4.4.1 Awareness of DRS

Respondents were asked whether they were aware of their university library offering DRS or not. As can be seen in Table 4.28 that majority of the respondents were aware of their university library offering DRS. There are a total number of 447 students' respondent.

Table 4.28
Awareness of DRS (n=447)

Awareness of DRS	Frequency	Percentage
Yes	301	67.3
No	146	32.7

Further analyses of cross tabulations and Chi-square tests were performed to determine the significant of the awareness of DRS and demographic profiles of the students. The summary of results and findings from Chi-square tests of demographic variables are shown in Table 4.29:

Table 4.29
Demographic Variables and Awareness of DRS

Demographic	χ^2	**df**	**p-value**	**Findings**
Faculty	14.938	3	0.002*	Significant
Gender	2.016	1	0.156	Not significant
Age	13.789	3	0.003*	Significant
Semester	4.428	5	0.490	Not Significant
Level of Study	6.256	1	0.012*	Significant
Mode of Study	1.404	1	0.236	Not Significant
Currently Living	1.157	1	0.282	Not Significant

Note: df = degrees of freedom
*Significant difference at the 0.05 level of significance

The results indicated no significant relationship between gender, semester, mode of study and where the students lived and awareness of DRS. It seems that the awareness of DRS was not influenced by gender, semester, mode of study and where the students lived. Only faculty, age and level of study were found to be significant in determining the awareness of DRS.

Students who are from the Faculty of Information Technology and Quantitative Sciences, UiTM (χ^2=14.938, df=3, p=0.002), students who are younger (χ^2=13.789, df=3, p=0.003), and who are undergraduates (χ^2=6.256, df=1, p=0.012) seems to be more aware of DRS. Details of the results are given in Tables 4.30, 4.31 and 4.32.

Table 4.30 shows the cross tabulation between faculty and awareness of DRS. The Faculty of Information Technology and Quantitative Sciences, UiTM has stated high awareness of DRS (20.4%), followed by Faculty of Computer Science and Information Technology, UM (17.9), Faculty of Computer Science and Information Technology, UPM (15.4%) and Faculty of Information Science and Technology, UKM (13.6%).

Table 4.30
Cross Tabulation Between Faculties and Awareness of DRS (n=447)

Faculty	Awareness of DRS				Total	
	Yes		No			
	Freq	%	Freq	%	Freq	%
FITQS, UiTM	91	20.4	22	4.9	113	25.3
FCSIT, UM	80	17.9	41	9.1	121	27.1
FIST, UKM	61	13.6	47	10.6	108	24.2
FCSIT, UPM	69	15.4	36	8.1	105	23.4
Total	301	67.3	146	32.7	447	100

Note: χ^2 =14.938, df=3, p=0.002
FITQS, UiTM = Faculty of Information Technology and Quantitative Sciences, Universiti Teknologi Mara
FCSIT, UM = Faculty of Computer Science and Information Technology, University of Malaya
FIST, UKM = Faculty of Information Science and Technology, Universiti Kebangsaan Malaysia
FCSIT, UPM = Faculty of Computer Science and Information Technology, Universiti Putra Malaysia

Table 4.31 shows cross tabulation between age level and awareness of DRS. Age level of below 20 stated highest percentage of awareness (27.3%), followed by age level of 20 to 22 (26.2%), 23 to 25 (7.8%) and above 26 (6.0%).

Table 4.31
Cross Tabulation Between Age Level and Awareness of DRS (n=447)

Age	Awareness of DRS				Total	
	Yes		No			
	Freq	%	Freq	%	Freq	%
Below 20	122	27.3	40	8.9	162	36.2
20-22	117	26.2	74	16.6	191	42.7
23-25	35	7.8	26	5.8	61	13.6
Above 26	27	6.0	6	1.3	33	7.4

Total	301	67.3	146	32.7	447	100

Note: χ^2 =13.789, df=3, p=0.003

Table 4.32 shows cross tabulation between level of study and awareness of DRS. Undergraduates stated highest level of awareness (58.4%) compared to postgraduates (8.9%).

Table 4.32
Cross Tabulation Between Level of Study and Awareness of DRS (n=447)

Level of Study	**Awareness of DRS**				**Total**	
	Yes		**No**			
	Freq	**%**	**Freq**	**%**	**Freq**	**%**
Undergraduate	261	58.4	138	30.9	399	89.3
Postgraduate	40	8.9	8	1.8	48	10.7
Total	301	67.3	146	32.7	447	100

Note: χ^2 =6.256, df=1, p=0.012

4.4.2 Source of Respondents Knowledge About DRS

Table 4.33 presents data on how the respondents knew about the services.

Table 4.33
Source of Respondents Knowledge About DRS (n=301)

How do you know about DRS	**Freq**	**%**	**Rank**
Library Web site	235	52.6	1
Friends	163	36.5	2
Electronic discussion/E-mail	99	22.1	3
Information Literacy Skills	64	14.3	4
Library Promotion	41	9.2	5
Others	14	3.1	6

Note: Respondents are permitted to give more than one answers

The study revealed that out of 301 who were aware of DRS, majority of the respondents 235 (52.6%) found it on the library web sites, 163 (36.5%) from friends, 99 (22.1%) heard about it through electronic discussion/e-mail, 64 (14.3%) through information literacy skills' programmes, 41 (9.2%) from library promotion and 14 (3.1%) from 'others'. 'Others' include obtaining information through reading and lecture.

4.4.3 Place of Access

Table 4.34 shows where did the respondents access their library's electronic resources.

Table 4.34
Place of Access (n=447)

Place of Access	Freq	%	Rank
Library	265	59.2	1
Faculty	229	51.2	2
Campus Hostel	138	31.9	3
Home	94	21.0	4
Others	46	10.3	5

Note: Respondents are permitted to give more than one answers

A majority of the respondents 265 (59.2%) access the library's electronic resources from library, 229 (51.2%) from faculty, 138 (31.9%) campus hostel, 94 (21%) from home and 46 (10.3%) from 'others'. 'Others' include from office and cyber café.

The data obtained from the place of access, was cross tabulated against the student level: undergraduate and postgraduate. The result shows the following:

Table 4.35
Place of Access and Student Level

Place of Access	χ^2	**df**	**p-value**	**Findings**
Library	10.572	1	0.001*	Significant
Faculty	8.505	1	0.004*	Significant
Campus hostel	1.204	1	0.272	Not Significant
Home	4.902	1	0.027*	Significant
Others	.223	1	0.637	Not Significant

Note: df = degrees of freedom
*Significant difference at the 0.05 level of significance

The result shows a significant relationship between place of access from the library (χ^2=10.572, df=1, p=0.001), faculty (χ^2=8.505, df=1, p=0.004), and home (χ^2=4.902, df=1, p=0.027) and student level. Only campus hostel and 'others' were found not significant in determining place of access and student level.

Note: Respondents are permitted to give more than one answer

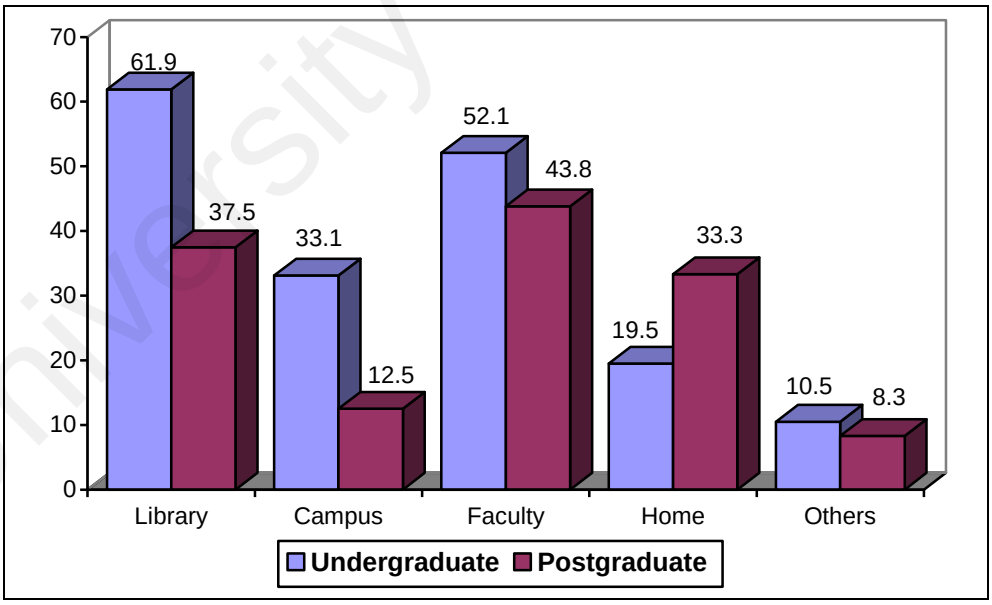

Figure 4.3
Place of Access by Student Level (n=447)

As can be seen from Figure 4.3, higher percentage of undergraduates compared to postgraduates accessed the library's electronic resources from the library 247 (55.2%), campus hostel 208 (46.5%) and faculty 132 (30.5%).

4.4.4 Awareness of University Library Web Site

As shown in Table 4.36, majority of the respondents were aware of their university library's web site.

Table 4.36
Awareness of University Library Web Sites (n=447)

Awareness of university library's web sites	Frequency	Percentage
Yes	373	83.4
No	74	16.6

The data of awareness of university library's web sites were cross tabulated with the demographic profiles of the students to determine the significant relationship between the two variables. The summary of results and findings from Chi-square tests are shown in Table 4.37:

Table 4.37
Demographic Variables and Awareness of University Library's Web Sites

Demographic variable	χ^2	df	p-value	Findings
Faculty	24.439	3	0.000*	Significant
Gender	5.768	1	0.016*	Significant
Age	11.899	3	0.008*	Significant
Semester	1.771	5	0.880	Not Significant
Level of Study	5.974	1	0.015*	Significant
Mode of Study	2.789	1	0.095	Not Significant
Currently Living	.352	1	0.553	Not Significant

Note: df = degrees of freedom
*Significant difference at the 0.05 level of significance

The results indicated a significant relationship between faculty (χ^2=24.439, df=3, p=0.000), gender (χ^2=5.768, df=1, p=0.016), age (χ^2=11.899, df=3, p=0.008) and level of study (χ^2=5.974, df=1, p=0.015) and awareness of university's library web sites. The awareness of university's library web sites was not influenced by semester (χ^2=2.725, df=5, p=0.742), mode of study (χ^2=2.789, df=1, p=0.095) and where the students lived (χ^2=.352, df=1, p=0.553).

Table 4.38
Awareness of University Libraries' Web Sites by Faculty (n=447)

Faculty	Awareness				Total	
	Yes		No			
	Freq	%	Freq	%	Freq	%
FITQS, UiTM	107	23.9	6	1.3	113	25.3
FCSIT, UM	104	23.3	17	3.8	121	27.1
FIST, UKM	76	16.9	32	7.2	108	24.2
FCSIT, UPM	86	19.2	19	4.3	105	23.4
Total	373	83.4	74	16.6	447	100%

Note: χ^2 =24.439, df=3, p=0.000
FITQS, UiTM = Faculty of Information Technology and Quantitative Sciences, Universiti Teknologi Mara
FCSIT, UM = Faculty of Computer Science and Information Technology, University of Malaya
FIST, UKM = Faculty of Information Science and Technology, Universiti Kebangsaan Malaysia
FCSIT, UPM = Faculty of Computer Science and Information Technology, Universiti Putra Malaysia

Table 4.38 above highlights that Faculty of Quantitative Science and Information Technology, UiTM stated high awareness of university library web sites (23.9%), followed Faculty of Computer Science and Information Technology, UM (23.3%), Faculty of Computer Science and Information Technology, UPM (19.2%), and Faculty of Information Science and Technology, UKM (16.9%).

Table 4.39
Awareness of University Library's Web Sites by Gender (n=447)

Gender	Awareness of University Library's Web Site				Total	
	Yes		No			
	Freq	%	Freq	%	Freq	%
Male	122	27.3	35	7.8	157	35.1
Female	251	56.1	39	8.8	290	64.9
Total	373	83.4	74	16.6	447	100

Note: χ^2 =7.105, df=1, p=0.008

In terms of gender, as shown in Table 4.39 female respondents were more aware of university library web sites (56.1%) compared to male (27.3%). It was found that 86.6% of the female were aware of the university's library web sites compared to 77.7% of male respondents.

The data obtained from the awareness of university library's web sites were cross tabulated with the awareness of DRS. The study found a significant relationship between the two variables (χ^2=1.828, df=1, p=0.000). The awareness of DRS was influenced by awareness of university library's web sites. Table 4.39 shows that from 373 who were aware of university libraries' web sites, 301 (67.3%) were aware of DRS and 0 (0%) were not. Only 72 (16.1%) of the respondents who were aware of the university library's web sites were not aware of DRS. Some 74 (16.6%) of the respondents who did not aware of university library's web sites, were also unaware of DRS.

Table 4.40
Awareness of University Library's Web Sites and Awareness of DRS (n=447)

Awareness of DRS	Awareness of University Library's Web Site				Total	
	Yes		No			
	Freq	%	Freq	%	Freq	%
Yes	301	67.3	0	0	301	67.3
No	72	16.1	74	16.6	146	32.7
Total	373	83.4	74	16.6	447	100

Note: χ^2 =1.828, df=1, p=0.000

4.4.5 Frequency of Library Visit

The frequency of respondents' physically visit the library is presented in Table 4.41. The study found that majority of the respondents, that is 142 (31.8%) visited the library a few times a semester (rarely), 125 (28.0%) visited the library a few times a month (seldom), 87 (19.5%) over 2 times a week (frequently), 47 (10.5%) daily (always) and 46 (10.3%) 'never'.

Table 4.41
Frequency of Library Visit (n=447)

How often did you physically visit the library	Frequency	Percentage	Rank
Always (Daily)	47	10.5	4
Frequently (Over 2 times a week)	87	19.5	3
Seldom (A few times a month)	125	28.0	2
Rarely (A few times a semester)	142	31.8	1
Never	46	10.3	5

Further analyses of cross tabulations were performed to determine the significant of the library visit and demographic profiles of the students. The summary of results and findings from Chi-square tests of demographic variables are shown as follows:

Table 4.42
Demographic Variables and Frequency of Library Visits

Demographic	χ^2	**df**	**p-value**	**Findings**
Faculty	61.802	12	0.000*	Significant
Gender	3.201	4	0.525	Not significant
Age	33.150	12	0.001*	Significant
Semester	25.156	20	0.196	Not Significant
Level of Study	6.904	4	0.141	Not Significant
Mode of Study	10.779	4	0.029*	Significant
Currently Living	11.518	4	0.021*	Significant

Note: df = degrees of freedom
*Significant difference at the 0.05 level of significance

The study found that frequency of library visits is dependent on faculty (χ^2=61.802, df=12, p=0.000), age χ^2=33.150, df=12, p=0.001), mode of study (χ^2=10.779, df=4, p=0.029) and where they lived (χ^2=11.518, df=4, p=0.021). The frequency of library visits was not influenced by gender (χ^2=3.201, df=4, p=0.525), semester (χ^2=25.156, df=20, p=0.196) and level of study (χ^2=6.904, df=4, p=0.141).

Table 4.43 shows that Faculty of Information Technology and Quantitative Sciences, UiTM has the highest percentage of respondents who 'always' visit the library (3.6%), followed by Faculty of Computer Science and Information Technology, UPM (1.3%), Faculty of Computer Science and Information Technology (1.2%) and Faculty of Information Science and Technology, UKM (0.9 %).

Table 4.43
Frequency of Library Visit by Faculty (n=447)

Frequency of Library Visit		Faculty				Total
		FITQS, UiTM	FCSIT, UM	FIST, UKM	FCSIT, UPM	
Always	Freq	24	8	6	9	47
	%	3.6	1.2	0.9	1.3	10.3
Frequently	Freq	38	16	21	12	87
	%	5.7	2.4	3.1	1.8	21.6
Seldom	Freq	24	43	38	30	135
	%	3.6	6.4	5.7	4.5	32.2
Rarely	Freq	13	39	34	48	134
	%	1.9	5.8	5.1	7.2	27.2
Never	Freq	14	15	9	6	44
	%	2.1	2.2	1.3	0.9	8.7
Total	Freq	113	121	108	105	447
	%	16.9	18.0	16.1	15.7	100

Note: χ^2=61.802, df=12, p=0.000
FITQS, UiTM = Faculty of Information Technology and Quantitative Sciences, Universiti Teknologi Mara
FCSIT, UM = Faculty of Computer Science and Information Technology, University of Malaya
FIST, UKM = Faculty of Information Science and Technology, Universiti Kebangsaan Malaysia
FCSIT, UPM = Faculty of Computer Science and Information Technology, Universiti Putra Malaysia

The results as shown in Table 4.44 significantly indicated that the frequency of library visit was influenced by the age levels. The higher the age level of the respondents, the frequency of library visit will become lower.

Table 4.44
Frequency of Library Visit by Age Level (n=447)

Frequency of Library Visit		Age Level				Total
		<20	20-22	23-25	>26	
Always	Freq	25	15	6	1	47
	%	5.6	3.4	1.3	0.2	10.5
Frequently	Freq	43	29	11	4	87
	%	9.6	6.5	2.5	0.9	19.5
Seldom	Freq	40	60	17	8	125
	%	9.0	13.4	3.8	1.8	28.0
Rarely	Freq	42	70	20	10	142
	%	9.4	15.7	4.5	2.2	31.8

Never	Freq %	12 2.7	17 3.8	7 1.5	10 2.2	46 10.3
Total	Freq %	162 36.2	191 42.7	61 13.6	33 7.4	447 100

Note: χ^2 =58.523, df=12, p=0.000

Table 4.45
Frequency of Library Visit by Mode of Study (n=447)

Frequency of Library Visit		**Mode of Study**		**Total**
		Full Time	**Part Time**	
Always	Freq %	44 9.8	3 0.7	47 10.5
Frequently	Freq %	84 18.8	3 0.7	87 19.5
Seldom	Freq %	115 25.8	10 2.2	125 28.0
Rarely	Freq %	126 28.2	16 3.6	142 31.8
Never	Freq %	37 8.3	9 2.0	46 10.3
Total	Freq %	406 90.8	41 9.2	447 100

Note: χ^2 =10.779, df=4, p=0.029

In terms of mode of study, as shown in Table 4.45 above, the study found that out of 47 respondents who 'always' visit the library, 44 (93.6%) of them were full time students.

Table 4.46
Frequency of Library Visit by Currently Living (n=447)

Frequency of Library Visit		Currently Living		Total
		On Campus	Outside	
Always	Freq	37	10	47
	%	8.3	2.2	10.5
Frequently	Freq	70	17	87
	%	15.7	3.8	19.5
Seldom	Freq	84	41	125
	%	18.8	9.2	28.0
Rarely	Freq	91	51	142
	%	20.4	11.4	31.8
Never	Freq	27	19	46
	%	6.0	4.3	10.3
Total	Freq	309	138	447
	%	69.1	30.9	100

Note: χ^2=11.518, df=4, p=0.021

The study also found that the frequency of library visit was also depending on where the students lived. Table 4.46 shows that higher number of on campus students 84 (18.8%) who 'seldom' visited the library.

The frequency of library visits has a correlation with DRS in the sense that if students make more visits to the library, this imply that the usage of DRS will be less.

4.5 DIGITAL REFERENCE SERVICES USED BY THE LIBRARIANS AND STUDENTS

Section C of the Questionnaire to Librarians and Section D of the Questionnaires to Students asked questions about the usage of DRS. The questionnaire for librarians focused on whether they have been answering reference questions through any of DRS format, usage of DRS among librarians, how long have been using DRS and frequency of using DRS. The questionnaire for students focused on usage of different formats of DRS,

frequency of use, time of using, importance of DRS and the reason for not using the service.

4.5.1 Usage of Digital Reference Services (DRS) Among Librarians

4.5.1.1 Answering Reference Questions

Respondents were asked whether they have been answering reference questions through any of the DRS formats or not. It is clear from Table 4.47 that majority of the respondents have been answering reference questions through DRS format.

Table 4.47
Answering Reference Questions (n=93)

Have you been answering reference questions through any of DRS format?	**Frequency**	**Percentage**
Yes	77	82.8
No	16	17.2

The data was cross-tabulated to identify the significant of answering reference questions and demographic profiles of the librarians. The summary of results and findings from Chi-square tests of demographic variables are shown in Table 4.48:

Table 4.48
Demographic Variables and Answering Reference Questions

Demographic	χ^2	**Df**	**p-value**	**Findings**
Library	7.430	3	0.059	Not Significant
Gender	1.380	1	0.240	Not significant
Age	2.236	3	0.525	Not Significant
Position	0.099	1	0.754	Not Significant
Grade	1.140	2	0.566	Not Significant
Academic qualification	5.350	2	0.069	Not Significant

Note: df = degrees of freedom

The results indicated no significant relationship between all the demographic variables and answering reference questions. Therefore, answering reference questions was not influenced by all the demographic variables ($p>0.05$): library ($\chi^2=7.430$, df=3, $p=0.059$), gender ($\chi^2=1.380$, df=1, $p=0.240$), age ($\chi^2=2.236$, df=3, $p=0.525$), position ($\chi^2=0.099$, df=1, $p=0.754$), grade ($\chi^2=1.140$, df=2, $p=0.566$) and academic qualification ($\chi^2=5.350$, df=2, $p=0.069$).

4.5.1.2 Usage of DRS Among Librarians

The respondents who have been answering reference questions through DRS were further asked to indicate the appropriate services that they have used. The results as presented in Table 4.49 shows that 73.1% (68) of the respondents used e-mail reference, 32.3% (30) web forms, 26.9% (25) Ask-A-Librarian service, 1.1% (1) online chat reference, 4.3% (4) Collaborative DRS and 3.2% (3) others. The format specified under 'others' was Frequently Asked Questions (FAQs).

Table 4.49
Usage of DRS Among Librarians (n=77)

Format of DRS Used	Frequency	Percentage of Respondents Using Service	Rank
E-mail Reference	68	73.1	1
Web Forms	30	32.3	2
Ask-A-Librarian	25	26.9	3
Online Chat Reference	1	1.1	6
Collaborative DRS	4	4.3	4
Others	3	3.2	5

Note: Respondents are permitted to give more than one answers

Further analysis of cross tabulation and Chi-square tests were performed to determine the significant of usage of e-mail, web forms and Ask-A Librarian and demographic profiles of librarians.

Table 4.50
Usage of DRS by Library (n=77)

Usage of DRS		Library				Total
		PTAR	UML	TSLL	SASL	
		F (%)	F (%)	F (%)	F (%)	F (%)
E-mail reference	Yes	19 (20.4)	28(30.1)	10(10.8)	11(11.8)	68(73.1)
	No	5 (5.3)	7(7.6)	5(5.4)	8(8.6)	25(26.9)
Web forms	Yes	13(13.9)	10(10.8)	1(1.1)	6(6.5)	30(32.3)
	No	11(11.8)	25(26.9)	14(15.0)	13(14.0)	63(67.7)
Ask-A Librarian	Yes	11(11.8)	8(8.6)	3(3.2)	3(3.2)	25(26.9)
	No	13(14)	27(29)	12(12.9)	12(12.9)	68(73.1)
Online chat	Yes	0(0)	1(1.1)	0(0)	0(0)	1(1.1)
	No	24(26.1)	34(36.9)	15(16.3)	19(20.6)	92(99.9)
Collaborative	Yes	3(3.2)	0(0)	1(1.2)	0(0)	4(4.3)
	No	21(22.6)	35(37.6)	14(15.1)	19(20.4)	89(95.7)
Others	Yes	2(2.16)	0(0)	1(1.1)	0(0)	3(3.2)
	No	22(23.7)	35(37.6)	14(15.1)	19(20.4)	90(96.8)

Note: F = Frequency
PTAR = Tun Abdul Razak Library, UiTM TSLL = Tun Seri Lanang Library, UKM
SASL = Sultan Abdul Samad Library, UPM UML = University of Malaya Library

The study found no significant relationship between all the demographic profiles and usage of e-mail. The usage of e-mail was not influenced by all the demographic variables ($p>0.05$): library ($\chi^2=4.762$, df=3, $p=0.190$), gender ($\chi^2=2.310$, df=1, $p=0.129$), age ($\chi^2=1.077$, df=3, $p=0.783$), position ($\chi^2=0.066$, df=1, $p=0.798$), grade ($\chi^2=2.185$, df=2, $p=0.335$) and academic qualification ($\chi^2=2.011$, df=2, $p=0.366$).

The results indicated no significant relationship between gender ($\chi^2=0.017$, df=1, $p=0.896$), age ($\chi^2=6.294$, df=3, $p=0.098$), position ($\chi^2=0.847$, df=1, $p=0.357$), grade

(χ^2=1.969, df=2, p=0.374) and academic qualification (χ^2=0.738, df=2, p=0.691). Only library was found to be significant in the usage of web forms (χ^2=9.989, df=3, p=0.019).

The study found no significant relationship between demographic profiles and usage of Ask-A Librarian service. The usage of Ask-A Librarian was not influenced by all the demographic variables (p>0.05): library (χ^2=6.225, df=3, p=0.101), gender (χ^2=0.086, df=1, p=0.769), age (χ^2=2.362, df=3, p=0.501), position (χ^2=0.024, df=1, p=0.877), grade (χ^2=0.465, df=2, p=0.792) and academic qualification (χ^2=1.370, df=2, p=0.504).

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4.5.1.3 Length of Time Using DRS by Librarian

Table 4.51 shows that 39% (30) have been using DRS for more than 5 years, 18.2% (14) 4 years, 18.2% (14) 3 years, 9.1% (7) 2 years and 15.6% (12) below 1 year.

Table 4.51
Length of Using DRS (n=77)

	Frequency	Percentage	Rank
Above 5 Years	30	39.0	1
4 Years	14	18.2	2
3 Years	14	18.2	2
2 Years	7	9.1	4
Below 1 Year	12	15.6	3

In terms of how long have been using web as a resource for answering reference questions, Table 4.52 shows that 39.1% (27) have been using it for more than 5 years, 15.9% (11) 4 years, 18.8% (13) 3 years, 10.1% (7) 2 years and 15.9% (11) below 1 year.

Table 4.52
How Long Have Been Using Web (n=69)

	Frequency	Percentage	Rank
Above 5 Years	27	39.1	1
4 Years	11	15.9	3
3 Years	13	18.8	2
2 Years	7	10.1	4
Below 1 Year	11	15.9	3

Missing: 24

4.5.1.4 Frequency of Using DRS

In terms of frequency of using DRS to answer reference questions, as shown in Figure 4.53 that 8.7% (8) of the respondents have always used, 18.5% (17) frequently, 35.9% (33) sometimes, 19.6% (19) rarely and 17.4% (16) never.

Table 4.53
Frequency of Using DRS (n= 93)

	Frequency	Percentage	Rank
Always	8	8.7	5
Frequently	17	18.5	3
Sometimes	33	35.9	1
Rarely	19	19.6	2
Never	16	17.4	4

In terms of frequency of using web to answer reference questions, as shown in Figure 4.54 that 6.7% (6) of the respondents have always used, 21.1% (19) frequently, 34.4% (31) sometimes, 23.3% (21) rarely and 14.4% (13) never.

Table 4.54
Frequency of Using Web (n= 90)

	Frequency	Percentage	Rank
Always	6	6.7	5
Frequently	19	21.1	3
Sometimes	31	34.4	1
Rarely	21	23.3	2
Never	13	14.4	4

Missing: 3

4.5.2 Usage of DRS Among Students

4.5.2.1 Usage of DRS

Respondents were asked to tick the appropriate formats of reference service/digital reference services that they have used.

Table 4.55
Usage of DRS (n=447)

Reference Services/DRS	Frequency	Percentage	Rank
Face-to-face consultation	251	56.2	1
Telephone consultation	28	6.3	5
Correspondence	27	6.0	6
E-Mail reference	87	19.5	4
Web form	126	28.2	2
Ask-A Librarian	120	26.8	3
Online chat reference	22	4.9	7

Note: Respondents are permitted to give more than one answers

Referring to Table 4.55, the study found that face-to-face consultation were used by majority of the respondents 251 (56.2%), telephone consultation 28 (6.3%) and correspondence 27 (6.0%). Some 87 (19.5%) used e-mail reference, web forms 126

(28.2%), Ask-A Librarian 120 (26.8%) and online chat reference were used by 22 (4.9%) of the respondents.

The data obtained from the usage of DRS was cross tabulated against the level of students; postgraduates and undergraduates.

Table 4.56
Usage of DRS by Student Level (n=447)

Usage of DRS		Student Level				Total
		Postgraduate		Undergraduate		
		Freq	%	Freq	%	Freq (%)
Face to face	Yes	25	5.6	226	50.6	251(56.2)
	No	23	5.1	173	38.7	196(43.8)
Telephone	Yes	9	2.0	19	4.3	28(6.3)
	No	39	8.7	380	85.0	419(93.7)
Correspondence	Yes	1	0.2	26	5.8	27(6.0)
	No	47	10.5	373	83.5	420(94.0)
E-mail Reference	Yes	8	1.8	75	16.8	83(18.6)
	No	40	8.9	324	72.5	364(81.4)
Web Form	Yes	9	2.0	117	26.2	126(28.2)
	No	39	8.7	282	63.1	321(71.8)
Ask-A Librarian	Yes	12	2.7	108	24.1	120(26.8)
	No	36	8.1	291	65.1	327(73.2)
Online Chat	Yes	1	0.2	21	4.7	22(4.9)
	No	47	10.5	378	84.6	425(95.1)

The study found the following reference services did not significantly vary between student level: face-to-face (χ^2=.362, df=1, p=0.548), correspondence (χ^2=1.484, df=1, p=0.223), e-mail reference (χ^2=.514, df=1, p=0.473), web forms (χ^2=2.366, df=1, p=0.124), Ask-A Librarian (χ^2=.093, df=1, p=0.760) and online chat reference (χ^2=.926, df=1, p=0.336). Regarding telephone reference, undergraduate were most likely to have used the service with 4.3% (19) having used it, while only 2.0% (9) of postgraduate had used it (χ^2=14.278, df=1, p=0.01).

4.5.2.2 Frequency of Use

Table 4.57 indicates the frequency of use of DRS among students' respondents during the semester of study.

Table 4.57
Frequency of Use (n=301)

	Frequency	Percentage	Rank
Always	18	6.0	5
Frequently	46	15.2	4
Sometimes	98	32.6	1
Rarely	89	29.6	2
Never	50	16.6	3

The table shows that 18 (6.0%) of the respondents always used DRS, 46 (15.2%) frequently, 98 (32.6%) sometimes, 89 (29.6%) of the respondents used DRS rarely and 50 (16.6 %) never used DRS.

Further analysis of cross tabulations were performed to determine the significant of frequency of use and demographic profiles of the students. The summary of results and findings from Chi-square tests of demographic variables are shown as follows:

Table 4.58
Demographic Variables and Frequency of Use

Demographic	χ^2	df	p-value	Findings
Faculty	29.717	20	0.075	Not Significant
Gender	4.965	5	0.420	Not Significant
Age	28.861	15	0.017*	Significant
Semester	25.025	25	0.461	Not Significant
Level of Study	8.373	5	0.137	Not Significant
Mode of Study	3.041	5	0.694	Not Significant
Currently Living	12.436	5	0.029*	Significant

Note: df = degrees of freedom
*Significant difference at the 0.05 level of significance

The results indicated a significant relationship between age (χ^2=28.861, df=15, p=0.017) and currently living (χ^2=12.436, df=5, p=0.029) and the frequency of DRS use. It was found that there were no significant relationship between faculty (χ^2=29.717, df=20, p=0.075), gender (χ^2=4.965, df=5, p=0.420), semester (χ^2=25.025, df=25, p=0.461), level of study (χ^2=8.373, df=5, p=0.137) and mode of study (χ^2=3.041, df=5, p=0.694) and frequency of use of DRS.

The frequency of DRS use were cross tabulated with frequency of Internet use.

Table 4.59
Cross Tabulation Between Frequency of DRS Use and Frequency of Internet Use (n=447)

Frequency of Internet Use		**Frequency of DRS Use**					**Total**
		Always	**Freq**	**Seldom**	**Rare**	**Never**	
Always	Freq	16	32	76	68	143	335
	%	3.6	7.2	17.0	15.2	31.9	74.9
Frequently	Freq	2	14	18	20	38	92
	%	0.4	3.1	4.0	4.5	8.5	20.5
Sometimes	Freq	0	0	3	1	12	16
	%	0	0	0.6	0.2	2.7	3.6
Rarely	Freq	0	0	1	0	3	4
	%	0	0	0.2	0	0.7	0.9
Total	Freq	18	46	98	89	196	447
	%	4.0	10.3	21.9	19.9	43.8	100

Note: χ^2=20.134, df=12, p=0.065

Table 4.59 shows that majority of the respondents who 'always' use Internet, 'never' use DRS (31.9%), 17.0% 'sometimes', 15.2 'rarely', 7.2% 'frequently' and 3.6% 'always' use DRS. It was found that there was no significant difference between frequency of DRS use and frequency of Internet use (χ^2=20.134, df=12, p=0.065).

The frequency of DRS use were also cross tabulated with average hours of using Internet. Table 4.60 shows that only 1.1% of the respondents who 'always' use DRS use Internet for more than 10 hours per week, 1.5% 4-6 hours, 0.7% 7-9 hours and 0.7% less

than 3 hours. The study found no significant difference between frequency of DRS use and average hours of using Internet (χ^2 =10.391, df=12, p=0.582).

Table 4.60
Cross Tabulation Between Frequency of DRS Use and Average Hours of Using Internet

Average Hours of Using Internet		Frequency of DRS Use					Total
		Always	Freq	Seldom	Rare	Never	
< 3 hours	Freq	3	13	26	13	57	112
	%	0.7	2.9	5.8	2.9	12.7	25.0
4-6 hours	Freq	7	16	26	31	58	138
	%	1.5	3.6	5.8	6.9	13	30.9
7-9 hours	Freq	3	4	11	17	28	63
	%	0.7	0.9	2.5	3.8	6.3	14.1
> 10 hours	Freq	5	13	35	28	53	134
	%	1.1	2.9	7.8	6.3	11.8	30.0
Total	Freq	18	46	98	89	196	447
	%	4.0	10.3	21.9	19.9	43.8	100

Note: χ^2=10.391, df=12, p=0.582

4.5.2.3 Time of Using

This question tried to find out the most popular time of asking questions through DRS. Table 4.61 below presents the time the respondents would most likely ask a question through digital reference channel.

Table 4.61
Time of Using (n=301)

Time	Frequency	Percentage	Rank
12.00 am – 6.00 am	27	9.0	4
6.00 am – 12.00 am	26	8.6	5
12.00 pm – 6.00 pm	85	28.2	2
6.00 pm – 12.00 am	31	10.3	3
Not sure	132	43.9	1

Table 4.61 shows that 27 (9.0%) of the respondents used the service from 12.00 am to 6.00 am, 26 (8.6%) used the service from 6.00 am to 12.00 noon, 85 (28.2%) from 12.00 to 6.00 pm, 31 (10.3%) from 6.00 pm to 12.00 midnight and 132 (43.9%) were not sure of the time they used DRS. The data on time of using were cross tabulated with usage of different formats of DRS. The study found no significant difference between time of using and usage of different formats of DRS.

4.5.2.4 Importance of DRS

Table 4.62 presents the respondents perception on the value/importance of DRS.

Table 4.62
Rate of Value/Importance of DRS

DRS Format	n	Very Important	Important	Somewhat Important	Not Important	Not Important at All
E-Mail Ref	447	112 (25.1%)	210 (47%)	69 (15.4%)	6 (1.3%)	4 (0.9%)
Web Forms	447	117 (26.2%)	208 (46.5%)	77 (17.2%)	2 (0.4%)	4 (0.9%)
AskA Lib.	447	105 (23.5%)	180 (40.3%)	107 (23.9%)	12 (2.7%)	5 (1.1%)
Online Chat	447	5 (12.3%)	154 (34.5%)	130 (29.1%)	32 (7.6%)	7 (1.6%)

The study found that highest percentage of the respondents that is 210 (47%) regard e-mail to be important, followed by 112 (25.1%) very important and 69(15.4%) neutral. Only 6 (1.3 %) considered e-mail to be not important and 4 (0.9%) not important at all.

For web forms, majority of the respondents that is 208 (46.5%) regard web forms to be important, 117 (26.2%) very important, and 77 (17.2%) neutral. Only 2 (0.4%) considered web forms as not important and 4 (0.9%) not important at all.

For Ask-A Librarian, highest percentage of the respondents that is 180 (40.3%) found the service to be important, 107 (23.9%) neutral, and 105 (23.5%) very important. Only 12 (2.7 %) regard Ask-A Librarian as not important and 5 (1.1%) not important at all.

In terms of online chat, highest percentage of the respondents that is 154 (34.5%) regard it as important, 130 (29.1%) neutral, 32 (7.2%) not important, 5 (12.3%) not important and 7 (1.6%) not important at all.

Table 4.63
Mean Scores and Standard Deviations of Importance of DRS

Format of DRS	N	Mean	Std. Deviation	Rank
E-Mail Reference	447	3.63	1.43	2
Web Forms	447	3.70	1.35	1
Ask-A Librarian	447	3.56	1.36	3
Online Chat	447	3.02	1.53	4

Table 4.63 displays the mean of importance ratings for importance of various formats of DRS which ranged from 3.70 to 3.02. Web forms scored the highest mean 3.70, followed by e-mail reference 3.63, Ask-A Librarian 3.56 and online chat 3.02. The standard deviation for web forms is 1.35, e-mail 1.43, Ask-A Librarian 1.36 and online chat 1.53.

An independent-samples *t* test analysis was conducted to measure the importance of DRS and gender of students, level of students and where they lived. A criterion of less than 0.05 was used to determine the significance of how the students' respondents rate the value or importance of DRS.

Table 4.64
T Test on Importance of DRS by Gender

DRS	Male (Mean)	Female (Mean)	*t* value	*P* value	Findings
E-mail	3.46	3.64	-1.565	0.087	Not Sig.
Web Forms	3.60	3.68	-0.739	0.006*	Sig.
AskA Librarian	3.50	3.57	-0.642	0.019*	Sig.
Online Chat	2.86	3.03	-1.351	0.032*	Sig.

Note: *The test is significant at p=0.05.

The results of the *t* test found that web forms, Ask-A Librarian and online chat formats showed significant difference at p=0.05. There was statistically significant difference between male and female students regarding the perception toward the importance of web forms (t=-0.739, p=0.006), Ask-A Librarian (t=-0.642, p=0.019) and online chat (t=-1.351, p=0.032). There was no statistically significant difference between male and female students regarding the perceptions on the importance of e-mail (t=-1.565, p=0.087).

The results in Table 4.65 indicated that there was statistically difference between postgraduates and undergraduates regarding the perception on the importance of e-mail (t=-3.15, p=0.002), web forms (t=-3.79, p=0.000), Ask-A Librarian (t=-2.67, p=0.008) and online chat (t=-3.65, p=0.000). It suggests that undergraduates perceived the importance of DRS more than postgraduates.

Table 4.65
T Test on Importance of DRS by Student Level

DRS	PG (Mean)	UG (Mean)	*t* value	*P* value	Findings
E-mail	3.16	3.65	-3.15	0.002*	Sig.
Web Forms	3.18	3.74	-3.79	0.000*	Sig.
AskA Librarian	3.20	3.60	-2.67	0.008*	Sig.
Online Chat	2.47	3.06	-3.65	0.000*	Sig.

Note: *The test is significant at p=0.05.
PG = postgraduates
UG = undergraduates

Referring to Table 4.66 there was no statistically significant difference between on campus student and outside campus students on the importance of e-mail (t=0.900, p=0.369), web forms (t=1.617, p=0.106), Ask-A Librarian (t=1.72, p=0.085) and online chat (t=1.19, p=0.231).

Table 4.66
T Test on Importance of DRS by Currently Living

DRS	On Campus (Mean)	Outside Campus (Mean)	*t* value	*P* value	Findings
E-mail	3.61	3.51	0.900	0.369	Not Sig.
Web Forms	3.72	3.54	1.617	0.106	Not Sig.
AskA Librarian	3.61	3.41	1.72	0.085	Not Sig.
Online Chat	3.03	2.88	1.19	0.231	Not Sig.

Note: *The test is significant at p=0.05.

An ANOVA analysis was conducted to measure the importance of DRS and demographic variables of students including faculties, age and semester. A criterion of less than 0.05 was used to determine the users' perception toward the services.

Table 4.67
ANOVA Test on Importance of DRS by Faculties

		Sum of Squares	df	Mean Square	*F*	*P* value	Findings
E-mail	B	18.015	4	4.504	2.207	0.067	Not Sig.
	W	1257.133	445	2.041			
	T	1375.148	446				
Web Forms	B	8.979	4	2.245	1.210	0.305	Not Sig.
	W	1233.750	445	1.855			
	T	1242.730	446				
AskA Librarian	B	10.264	4	2.566	1.329	0.258	Not Sig.
	W	1283.708	445	1.930			
	T	1293.972	446				
Online Chat	B	6.745	4	1.686	0.731	0.541	Not Sig.
	W	1534.962	445	2.308			
	T	1541.707	446				

Note: *The test is significant at p=0.05
B = Between groups
W= Within groups
T = Total

Table 4.67 indicates no statistical difference on the importance of DRS by faculties: E-mail reference (F (3, 446)=2.207, p=0.067), web forms (F (4, 445)=1.210, p=0.305), Ask-A Librarian (F (4, 445)=1.329, p=0.258), online chat (F (4, 445)= 0.731, p=0.541).

The ANOVA result in Table 4.68 indicates a significant difference on importance of DRS by age levels of students. The ANOVA for all the following were significant: e-mail (F (3, 446)=5.131, p=0.002), web forms (F (3, 446)=10.040, p=0.000), Ask-A Librarian (F (3, 446)=7.878, p=0.000) and online chat (F (3, 446)=5.218, p=0.001).

Table 4.68
ANOVA Test on Importance of DRS by Age

		Sum of Squares	df	Mean Square	*F*	*P* value	Findings
E-mail	B	31.065	3	10.355	5.131	0.002*	Sig.
	W	1344.083	445	2.018			
	T	1375.148	446				
Web Forms	B	53.771	3	17.924	10.040	0.000*	Sig.
	W	1188.959	445	1.785			
	T	1242.730	446				
AskA Librarian	B	44.346	3	14.782	7.878	0.000*	Sig.
	W	1248.626	445	1.876			
	T	1293.972	446				
Online Chat	B	35.408	3	11.803	5.218	0.001*	Sig.
	W	1506.300	445	2.262			
	T	1541.707	446				

Note: *The test is significant at p=0.05
B = Between groups
W= Within groups
T = Total

Based on the findings on ANOVA analysis showed that there were significant difference on the importance of DRS by age level of students. Interpretation may be made that age levels of students influence the use of various formats of DRS.

Table 4.69
ANOVA Test on Importance of DRS by Semester

		Sum of Squares	df	Mean Square	*F*	*P* value	Findings
E-mail	B	2.141	5	0.428	0.207	0.960	Not Sig.
	W	1373.007	444	2.068			
	T	1375.148	446				
Web Forms	B	5.690	5	1.138	0.611	0.692	Not Sig.
	W	1237.040	444	1.863			
	T	1242.730	446				
AskA Librarian	B	12.215	5	2.443	1.266	0.277	Not Sig.
	W	1281.757	444	1.930			
	T	1293.972	447				
Online Chat	B	19.342	5	3.868	1.687	0.135	Not Sig.
	W	1522.365	444	2.293			
	T	1541.707	446				

Note: *The test is significant at p=0.05
B = Between groups
W= Within groups
T = Total

Table 4.69 shows no statistical difference on the importance of DRS by semesters of the students: E-mail reference (F (5, 444)= 0.207, p=0.960), web forms (F (5, 444)=0.611, p=0.692), AskA Librarian (F (5, 444)= 1.266, p=0.277) and online chat (F (5, 444)=1.687, p=0.135).

4.5.2.5 Reasons for Not Using the Service

Table 4.70 below shows the reasons of the respondents who did not use the services.

Table 4.70
Reasons for Not Using the Service (n=300)

Reasons	Frequency	Percentage	Rank
Do not need for it	84	28.0	1
Don't Know How to Use	77	25.7	2
Not Interested	71	23.7	3
Complicated	68	22.6	4

Note: Respondents are permitted to give more than one answers

The reasons were 84 (28.0%) do not need for it, 77 (25.7%) do not know how to use, 71 (23.7%) not interested and 68 (22.6%) complicated.

The data obtained from the reason for not using the services were then cross tabulated against student level. The study found no significant relationship between student level and why they do not use the service ($p>0.05$).

Table 4.71
Reasons for Not Using the Service by Student Level (n=447)

Reasons		Student Level				Total
		Postgraduate		Undergraduate		
		Freq	%	Freq	%	Freq (%)
Do Not Need For It	Yes	10	2.2	74	16.6	84 (18.8)
	No	38	8.5	325	72.7	363 (81.2)
Not Interested	Yes	7	1.6	64	14.3	71 (15.9)
	No	41	9.2	335	74.9	376 (84.1)
Don't Know How To Use	Yes	5	3.3	72	13.9	77 (17.2)
	No	43	9.6	327	73.2	370 (82.8)
Complicated	Yes	3	0.7	65	14.5	68 (15.2)
	No	45	10.1	334	74.7	379 (84.8)

4.6 EFFECTIVENESS OF DIGITAL REFERENCE SERVICES OFFERED BY ACADEMIC LIBRARIES IN MALAYSIA

In this study, there are three major factors used by the researcher to measure the effectiveness of the services: users' perception, users' satisfaction and library's performance.

4.6.1 Users' Perception

4.6.1.1 Quality of Service

In this section, respondents were asked to rate the quality of service or information they acquire from DRS.

Table 4.72
Quality of Service (n=299)

	Frequency	Percentage	Rank
Very high quality	14	4.7	3
High quality	115	38.5	2
Somewhat high quality	163	54.5	1
Poor quality	5	1.7	4
Very poor quality	2	0.7	5

Missing 2

The study found that majority of the respondents, 163 (54.5%) regard the service as somewhat high quality, 115 (38.5%) high quality and 14 (4.7%) as very high quality. It is also found that 5 (1.7%) of the respondents regard the service as poor quality and 2 (0.7%) as very poor quality.

4.6.1.2 Usability of DRS

Respondents were also asked to rate the usability of DRS that is shown in the following table:

Table 4.73
Usability of Service (n=300)

	Frequency	Percentage	Rank
Very Easy	23	7.7	3
Easy	108	36.0	2
Somewhat easy	145	48.3	1
Difficult	22	7.3	4
Very Difficult	2	0.7	5

Missing 1

The study found that 145 (48.3%) respondents regard the usability as somewhat easy, 108 (36.0%) as easy, 23 (7.7%) as very easy. Some 22 (7.3%) of the respondents regard the

usability of DRS as difficult and 2 (0.7%) as very difficult. Based on the statistical results, a conclusion is drawn that most of the respondents regard DRS as easy to use.

4.6.1.3 Typical Access Time

The respondents were asked to rate the typical access time of DRS.

Table 4.74
Typical Access Time (n=299)

	Frequency	Percentage	Rank
Very Fast	13	4.3	4
Fast	77	25.8	2
Somewhat Fast	170	56.9	1
Slow	37	12.4	3
Very Slow	2	0.7	5

Missing 2

The study found that majority of the respondents 170 (56.9%) rated it as somewhat fast, 77 (25.8%) as fast and 13 (4.3%) as very fast. Some 37 (12.4%) of the respondents rate it as slow and 2 (0.7%) as very slow. It can be concluded that they regard DRS as fast.

Table 4.75 shows the mean scores and standard deviations of the users' perception of DRS.

Table 4.75
Mean Scores and Standard Deviations of Users' Perception

	N	Minimum	Maximum	Mean	Std. Deviation
Quality of service/information acquire from digital reference services	299	1	5	3.44	0.644
Usability of digital reference service	300	1	5	3.42	0.765
Typical access time in using the digital reference service	299	1	5	3.20	0.735

For users' perception, the mean scores ranged from 3.44 to 3.20. Quality of service score highest mean (3.44), followed by usability (3.42) and typical access time (3.20).

An independent-samples *t* test analysis was conducted to measure the users' perception and gender of students, level of students and where they lived. A criterion of less than 0.05 was used to determine the significance of the users' perception toward the services.

Table 4.76
T Test on Users' Perception by Gender

DRS	Male (Mean)	Female (Mean)	*T* value	*P* value	Findings
Quality of Service	3.09	3.09	0.002	0.782	Not Sig.
Usability	3.13	3.04	0.963	0.265	Not Sig.
Access Time	2.83	2.87	-0.426	0.228	Not Sig.

Note: *The test is significant at p=0.05.

The results summerised in Table 4.76 using independent-samples *t* test revealed that there were no significant difference between the male and female students in terms of their perceptions of the following: quality of service (t=0.002, p=0.782), usability (t=0.963, p=0.265) and access time (t=-0.426, p=0.228). This could mean that both gender equally accepted on quality of service, usability and access time.

Table 4.77
T Test on Users' Perception by Student Level

DRS	PG (Mean)	UG (Mean)	*T* value	*P* value	Findings
Quality of Service	2.48	3.20	-5.775	0.01*	Sig.
Usability	2.57	3.16	-4.611	0.01*	Sig.
Access Time	2.47	2.92	-3.666	0.01*	Sig.

Note: *The test is significant at p=0.05. PG=Postgraduate UG=Undergraduate

The results summerised in Table 4.77 using independent-samples *t* test revealed that mean differences between the postgraduates and undergraduates in terms of their perceptions were statistically significant as follows: quality of service (t=-5.775, p=0.00), usability (t=-4.611, p=0.00) and access time (t=-3.666, p=0.00).

Table 4.78
T Test on Users' Perception by Currently Living

DRS	On Campus (Mean)	Outside Campus (Mean)	*T* value	*P* value	Findings
Quality of Service	3.19	2.92	2.919	0.001*	Sig.
Usability	3.16	2.91	2.632	0.000*	Sig.
Access Time	2.94	2.72	2.303	0.000*	Sig.

Note: *The test is significant at p=0.05.

In terms of quality of service, usability and access time, Table 4.78 showed that the mean differences between on campus students and outside were statistically significant at p=0.05.

An ANOVA analysis was conducted to measure the users' perception and demographic variables of students including faculties, age and semester. A criterion of less than 0.05 was used to determine the users' perception toward the services.

Table 4.79 indicates a significant difference on users' perception in terms of usability of the services (F (4, 445)=3.034, p=0.017) and access time (F (4, 445)=3.883, p=0.004) by the five faculties. There was no statistically significant difference between faculties regarding users' perception (F (4, 445)=1.703, p=0.147).

Table 4.79
ANOVA Test on Users' Perception by Faculties

		Sum of Squares	df	Mean Square	*F*	*P* value	Findings
Quality of Service	B	9.451	4	2.363	1.703	0.147	Not Sig.
	W	922.436	445	1.387			
	T	931.887	446				
Usability	B	17.196	4	4.299	3.034	0.017*	Sig.
	W	942.220	445	1.417			
	T	959.416	446				
Access Time	B	20.496	4	5.124	3.883	0.004*	Sig.
	W	877.595	445	1.320			
	T	898.091	446				

Note: *The test is significant at p=0.05
B = Between groups
W= Within groups
T = Total

The ANOVA result in Table 4.80 indicates a significant difference on users' perception by age level as shown by the F statistics: quality of service (F (3, 446)=14.898, p=0.001), usability (F (3, 446)=15.842, p=0.001) and access time (F (3, 446)=6.284, p=0.001).

Table 4.80
ANOVA Test on Users' Perception by Age Level

		Sum of Squares	df	Mean Square	*F*	*P* value	Findings
Quality of Service	B	58.605	3	19.535	14.898	0.001*	Sig.
	W	873.281	445	1.311			
	T	931.887	446				
Usability	B	63.904	3	21.301	15.842	0.001*	Sig.
	W	895.512	445	1.345			
	T	959.416	446				
Access Time	B	24.722	3	8.241	6.284	0.001*	Sig.
	W	873.369	445	1.311			
	T	898.091	446				

Note: *The test is significant at p=0.05
B = Between groups
W= Within groups
T = Total

Table 4.81
ANOVA Test on Users' Perception by Semester

		Sum of Squares	df	Mean Square	*F*	*P* value	Findings
Quality of Service	B	6.147	5	19.535	0.882	0.493	Not Sig.
	W	925.740	444	1.311			
	T	931.887	446				
Usability	B	10.232	5	21.301	1.432	0.211	Not Sig.
	W	949.184	444	1.345			
	T	959.416	446				
Access Time	B	11.391	5	8.241	1.706	0.131	Not Sig.
	W	886.700	444	1.311			
	T	898.091	446				

Note: *The test is significant at p=0.05
B = Between groups
W= Within groups
T = Total

The ANOVA result as shown in Table 4.81 indicates no significant difference between the users' perception by semesters: quality of service (F (5, 444)=0.882, p=0.493), usability (F (5, 444)=1.432)=1.432), p=0.211) and access time (F (5, 444)=1.706, p=0.131).

4.6.2 Users' Satisfaction

In order to investigate how satisfied the users were with DRS, the survey asked the respondents to indicate their level of satisfaction of each of the formats of DRS, i.e. e-mail reference, web forms and Ask-A Librarian.

4.6.2.1 Users' Satisfaction of E-mail Reference

Table 4.82 shows the users' satisfaction of e-mail reference provided by the academic libraries.

Table 4.82
User Satisfaction of E-Mail Reference

Variables	n	Level of Satisfaction					M	SD
		VS F (%)	S F (%)	SS F (%)	U F (%)	VU F (%)		
Access	87	8(9.2)	46(52.9)	27(31.0)	4(4.6)	2(2.3)	3.59	.816
Availability	87	7(8.0)	41(47.1)	31(35.6)	6(6.9)	2(2.3)	3.50	.814
Accuracy	87	7(8.0)	38(43.7)	39(44.8)	2(2.3)	1(1.2)	3.54	.715
Current Information	87	9(10.3)	40(46.0)	32(36.8)	5(5.7)	1(1.2)	3.58	.796
Response Time	87	5(5.7)	36(41.4)	38(43.7)	7(8.0)	1(1.2)	3.42	.775
Answer Given	87	3(3.4)	38(43.7)	36(41.4)	8(9.2)	2(2.3)	3.39	.793

Note: Measurement was done on a 5-point interval scale in which 1 = very unsatisfied to 5 = very satisfied

VS=Very satisfied S=Satisfied SS=Somewhat satisfied U=Unsatisfied VU=Very unsatisfied
M=Mean SD=Standard Deviation

Majority of the respondents were satisfied with e-mail reference in terms of access (52.9%), availability (47.1%), current information (46.0%) and answers given (43.7%).

Specifically, majority of the respondents were satisfied (52.9%), followed by somewhat satisfied (31.0%), very satisfied (9.2%), unsatisfied (4.6%) and very unsatisfied (2.3%) in terms of access. With regards to availability, majority of the respondents were satisfied (47.1%), followed by somewhat satisfied (35.6%), very satisfied (8.0%) and unsatisfied (6.9%) and very unsatisfied (2.3%).

Majority of the respondents were somewhat satisfied (44.8%) and satisfied (43.7%), followed by very satisfied (8.0%), unsatisfied (2.3%) and very unsatisfied (1.2%) in terms of accuracy. In terms of current information, majority of the respondents were satisfied

(46.0%), followed by somewhat satisfied (36.8%), very satisfied (10.3%), unsatisfied (5.7%) and very unsatisfied (1.2%).

In terms of response time, majority of the respondents were somewhat satisfied (43.7%), followed by satisfied (41.4%), unsatisfied (8.0%) and very unsatisfied (1.2%). With regards to answers' given, majority of the respondents were satisfied (43.7%), somewhat satisfied (41.4%), unsatisfied (9.2%), very satisfied (3.4%) and very unsatisfied (2.3%). The mean scores of user satisfaction of e-mail reference ranged from 3.58 for access to 3.39 for answers' given.

4.6.2.2 Users' Satisfaction of Web Forms

Table 4.83 in the following page shows the users' satisfaction of web forms provided by the academic libraries. Majority of the respondents were satisfied with web forms in terms of access (50.0%), availability (50.8%), accuracy (54.0%), current information (46.8%) and response time (43.7%).

Specifically, majority of the respondents were satisfied (50.0%), followed by somewhat satisfied (37.3%), very satisfied (6.3%) and unsatisfied (6.3%) in terms of access. With regards to availability, majority of the respondents were satisfied (50.8%), followed by somewhat satisfied (34.1), unsatisfied (7.9%) and very satisfied (7.1%).

Majority of the respondents were satisfied (54.0%), followed by somewhat satisfied (34.9%), very satisfied (5.6%) and unsatisfied (5.6%) in term of accuracy. In terms of current information, majority of the respondents were satisfied (46.8%), followed by somewhat satisfied (32.5%), very satisfied (11.9%), unsatisfied (7.9%) and very unsatisfied (0.8%).

Table 4.83
User Satisfaction of Web Forms

Variables	n	Level of Satisfaction					M	SD
		VS F (%)	S F (%)	SS F (%)	U F (%)	VU F (%)		
Access	126	8(6.3)	63(50.0)	47(37.3)	8(6.3)	0(0)	3.56	.703
Availability	126	9(7.1)	64(50.8)	43(34.1)	10(7.9)	0(0)	3.58	.737
Accuracy	126	7(5.6)	68(54.0)	44(34.9)	7(5.6)	0(0)	3.60	.679
Current Information	126	15(11.9)	59(46.8)	41(32.5)	10(7.9)	1(0.8)	3.60	.850
Response Time	126	8(6.3)	55(43.7)	51(40.4)	11(8.7)	1(0.8)	3.46	.806
Answer Given	126	6(4.8)	53(42.1)	52(41.2)	13(9.5)	2 (1.6)	3.41	.793

Note: Measurement was done on a 5-point interval scale in which 1 = very unsatisfied to 5 = very satisfied

VS=Very satisfied S=Satisfied SS=Somewhat satisfied U=Unsatisfied VU=Very unsatisfied
M=Mean SD=Standard Deviation

In terms of response time, majority of the respondents were satisfied (43.7%), followed by somewhat satisfied (40.4%), unsatisfied (8.7%), very satisfied (6.3%) and very unsatisfied (0.8%). With regards to answers' given, majority of the respondents were satisfied (42.1%), somewhat satisfied (41.2), unsatisfied (9.5%), very satisfied (4.8%) and very unsatisfied (1.6%). The mean scores of user satisfaction of Web forms ranged from 3.60 for accuracy and current information to 3.41 for answers' given.

4.6.2.3 Users' Satisfaction of Ask-A Librarian

Table 4.84 shows the users' satisfaction of Ask-A Librarian provided by the academic libraries.

Table 4.84
User Satisfaction of Ask-A Librarian

Variables	N	Level of Satisfaction					M	SD
		VS F (%)	S F (%)	SS F (%)	U F (%)	VU F (%)		
Access	120	10(8.3)	58(48.3)	44(36.6)	7(5.8)	1(0.8)	3.58	.776
Availability	120	10(8.3)	60(50.0)	43(35.8)	6(5.0)	1(0.8)	3.60	.765
Accuracy	120	8(6.7)	61(50.8)	48(40.0)	3(2.5)	0(0)	3.60	.672
Current Information	120	9(7.5)	61(50.8)	44(36.7)	6(5.0)	0(0)	3.58	.721
Response Time	120	10(8.3)	51(42.5)	49(40.8)	10(8.3)	0(0)	3.48	.785
Answer Given	120	10(8.3)	49(40.8)	52(43.3)	7(5.8)	2(1.6)	3.47	.795

Note: Measurement was done on a 5-point interval scale in which 1 = very unsatisfied to 5 = very satisfied

VS=Very satisfied S=Satisfied SS=Somewhat satisfied U=Unsatisfied VU=Very unsatisfied
M=Mean SD=Standard Deviation

Majority of the respondents were satisfied with Ask-A librarian in terms of access (48.3%), availability (50.0%), accuracy (50.8%) and current information (50.8%).

Specifically, majority of the respondents were satisfied (48.3%), followed by somewhat satisfied (36.6%), very satisfied (8.3%), unsatisfied (5.8%) and very unsatisfied (0.8%) in term of access. With regards to availability, majority of the respondents were satisfied (50.0%), followed by somewhat satisfied (35.8%), very satisfied (8.3%), unsatisfied (5.0%) and very unsatisfied (0.8%).

Majority of the respondents were satisfied (50.8%), somewhat satisfied (40.0%), very satisfied (6.7%), and unsatisfied (2.5%) in terms of accuracy. In terms of current

information, majority of the respondents were satisfied (50.8%), followed by somewhat satisfied (36.7%), very satisfied (7.5%), and unsatisfied (5.0%).

In terms of response time, majority of the respondents were satisfied (42.5%), followed by somewhat satisfied (40.8%), unsatisfied (8.3%), and very satisfied (8.3%). With regards to answers' given, majority of the respondents were somewhat satisfied (43.3%), satisfied (40.8%), very satisfied (8.3%), unsatisfied (5.8%) and very unsatisfied (1.6%). The mean scores of user satisfaction of Ask-A librarian ranged from 3.60 for availability and accuracy to 3.47 for answers' given.

4.6.3 Library's Performance

The study found that most of the respondents also agree that the libraries have provided sufficient access to electronic resources, information literacy skills' programmes, guidance and training on how to use DRS.

Table 4.85
Library's Performance

	n	Strongly Agree	Agree	Somewhat Agree	Disagree	Strongly Disagree
Library provide sufficient access to electronic resources	301	22 (7.3%)	180 (59.8%)	86 (28.6%)	11 (3.7%)	2 (0.7%)
Librarians offer sufficient information literacy skills	301	21 (7.0%)	125 (41.5%)	131 (43.5%)	22 (7.3%)	2 (0.7%)
Library provide sufficient guidance and training	301	18 (6.0%)	120 (39.9%)	117 (38.9%)	44 (14.6%)	2 (0.7%)

Table 4.85 shows that majority of the respondents, that is 180 (59.8%) 'agree' that the library has provided sufficient access to electronic resources, followed by 'somewhat agree' 86 (28.6%), 'strongly agree' 22 (7.3%), 'disagree' 11 (3.7%) and 'strongly disagree' 2 (0.7%).

In terms of information literacy skills, majority of the respondents, that is 131 (43.5%) 'somewhat agree', followed by 'agree' 125 (41.5%), 'disagree' 22 (7.3%), 'strongly agree' 21 (7.0%) and 'strongly disagree' 2 (0.7%).

In terms of library provide sufficient guidance and training, 120 (39.9%) of the respondents 'agree', followed by 117 (38.9%) 'somewhat agree', 44 (14.6%) 'disagree', 18 (6.0%) 'strongly agree' and 2 (0.7%) 'strongly disagree'.

Table 4.86
Mean Scores and Standard Deviations of Library's Performance

	n	Minimum	Maximum	Mean	Std. Dev.
Library provide sufficient access to electronic resources	301	1	5	3.69	0.687
Librarians offer sufficient information literacy skills	301	1	5	3.46	0.759
Library provide sufficient guidance and training	301	1	5	3.35	0.827

Table 4.86 displays the means of library's performance which ranged from 3.69 to 3.35. Library provide sufficient access to electronic resources scored the highest mean 3.69, followed by librarians offer sufficient information literacy skills 3.46 and library provide sufficient guidance and training 3.35.

The standard deviations for library provide sufficient access to electronic resources is 0.687, librarians offer sufficient information literacy skills 0.759 and library provide sufficient guidance and training 0.827. This performance still leaves much room for improvements.

4.7 PERCEIVED NEEDS FOR DIGITAL REFERENCE SERVICES AMONG UNIVERSITY STUDENTS IN MALAYSIA

Section H of the Questionnaire to Students identified the perceive needs for DRS. The questionnaire concentrates on the options for assistance that the students would likely choose first when searching materials for research paper/project, the reference services that will be most heavily used in the next five years and to choose a statement that describe the future.

4.7.1 Options for Assistance

In this section, respondents were asked on the options of assistance that they would most likely choose when locating materials for a research project. They were asked to choose which one of the choices they would like to choose first.

Table 4.87
Options for Assistance (n=447)

	Frequency	Percentage	Rank
Face-to-face Consultation	210	47.0	1
Telephone Consultation	34	7.6	4
E-Mail Reference	132	29.5	2
Online Chat Reference	59	13.2	3
Others	12	2.7	5

Table 4.87 shows that majority of the respondents would like to choose face-to-face consultation 210 (47.0%). It was followed by e-mail reference 132 (29.5%), online chat reference 59 (13.2%), telephone consultation 34 (7.6%) and 'others' 12 (2.7%). 'Others' include the use of other electronic resources in libraries.

The data obtained from options for assistance was cross tabulated against the student level: undergraduate and postgraduate. The result shows that the following options of reference services did not significantly vary between student level: e-mail reference (χ^2 =0.561, df=1, p=0.454), and online chat reference (χ^2=0.378, df=1, p=0.539). The study found significant relationship between student level and the options for assistance of face-to-face consultation (χ^2=2.940, df=1, p=0.086) and telephone consultation (χ^2=12.599, df=1, p=0.002).

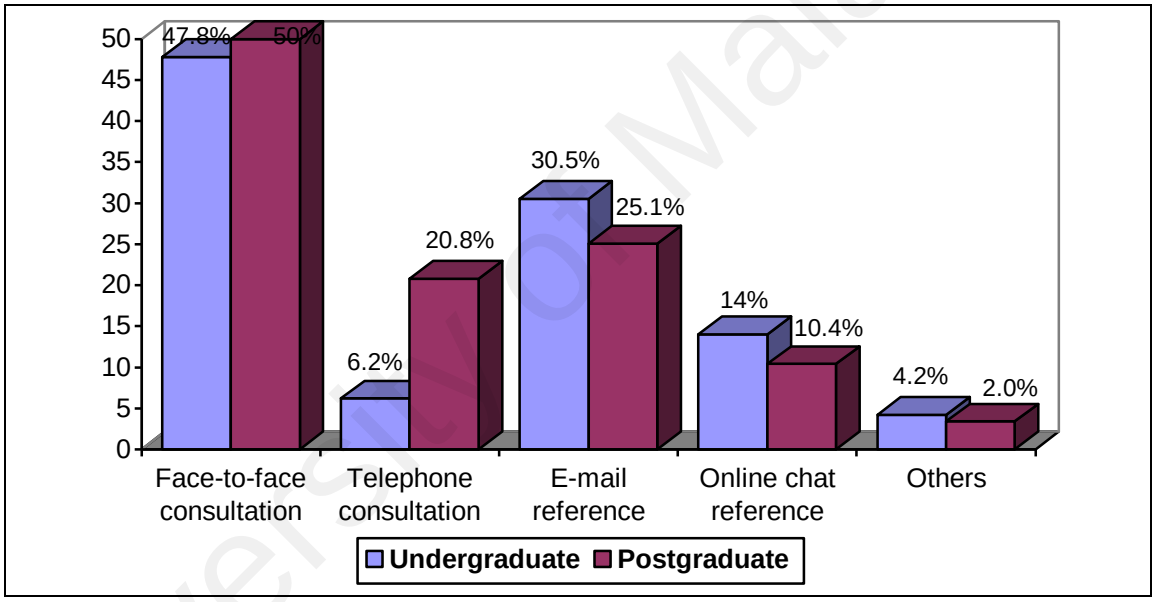

Figure 4.4
Options for Assistance – Student Level

Figure 4.4 indicates that higher percentage of undergraduates (50%) would like to use face-to-face compared to postgraduates (47.8%). Some (30.5%) of undergraduates and (25.1%) postgraduates would like to use e-mail reference.

4.7.2 Most Heavily Used In Five Years

Respondents were asked to predict the most heavily used of reference services in the next five years.

Table 4.88
Most Heavily Used in Five Years

	Frequency	Percentage	Rank
Face-to-face Consultation	120	26.8	4
Telephone Consultation	64	14.3	5
E-Mail Reference	167	37.4	3
Online Chat Reference	191	42.7	1
Video Conferencing	163	36.5	2
Others	28	6.3	6

Note: Respondents are permitted to give more than one answers

The study found that 191 (42.7%) of the respondents choose online chat reference, 163 (36.5%) respondents choose video conferencing and 163 (37.4%) choose e-mail reference. It was followed by face-to-face consultation 163 (24.3%), telephone consultation 64 (14.3%) and others 28 (6.3%).

The data obtained from most heavily used in five years was cross tabulated against the student level: undergraduate and postgraduate. The result shows that there were no significant relationship between students and the most heavily used in five years of the following formats: face-to-face consultation (χ^2=1.795, df=1, p=0.180), telephone (χ^2=0.861, df=1, p=0.353), e-mail reference (χ^2=3.671, df=1, p=0.055), online chat reference (χ^2=0.591, df=1, p=0.442), video conferencing (χ^2=.631, df=1, p=0.427).

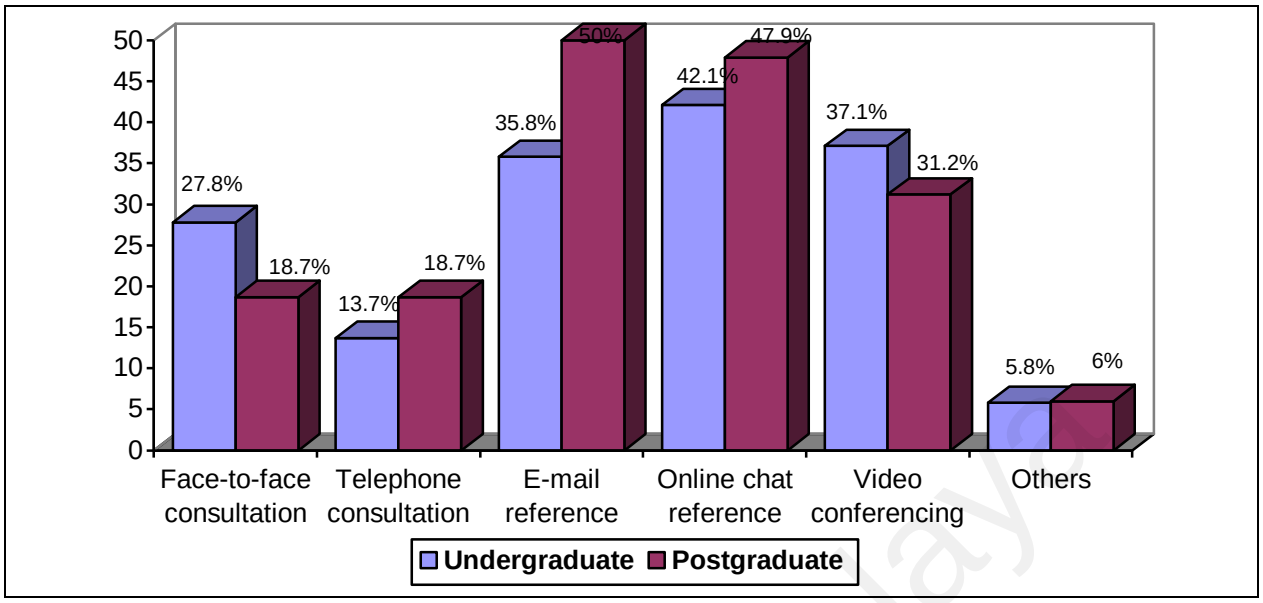

Figure 4.5
Most Heavily Used in 5 Years – Student Level

Figure 4.5 shows that higher percentage of postgraduate 24 (50%) were using e-mail reference compared to undergraduate 143 (35.8%).

4.7.3 Best Describe the Future

The respondents were also asked to give their perception to describe the future.

Table 4.89
Best Describe the Future (n=447)

Statements	Frequency	Percentage
As technology makes more information accessible, people will need less human help in doing research	329	73.6
As technology makes more information accessible, people will need more human help in doing research	90	20.1
No human help at all	15	3.4

Missing 13

The study found that 329 (73.6%) of the respondents thought that as technology makes more information accessible, people will need less human help in doing research. Some 90 (20.1%) thought that as technology makes more information accessible, people will need more human help in doing research, whilst 15 (3.4%) thought no human help at all.

The data obtained from best describe the future were cross tabulated against the level of students: postgraduates and undergraduates. The result shows that there is no significant relationship between level of students and best describe the future (χ^2=8.011, df=3, p=0.046).

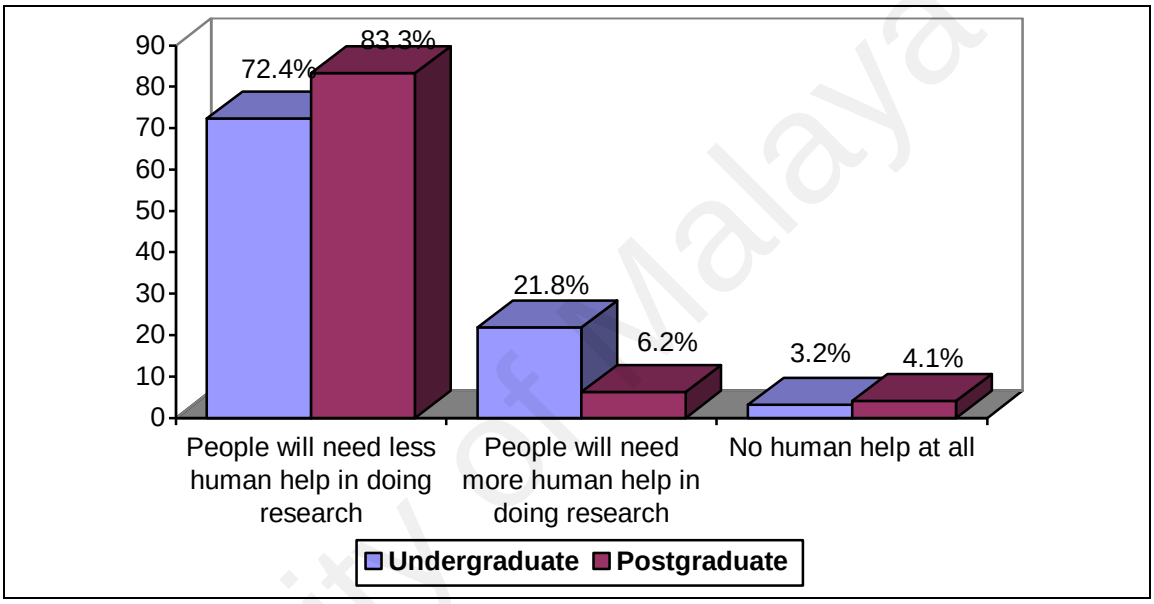

Figure 4.6
Best Describes the Future – Student Level

Figure 4.6 shows that higher percentage of postgraduates 40 (83.3%) compared to 289 (72.4%) of undergraduates predicted that people will need less human help in doing research.

4.8 Issues and problems faced by the librarians and users in relation to digital reference services

4.8.1 Benefits for Librarians

The respondents were asked to tick what they thought the benefits of DRS from the multiple answers listed. The responses with regard to the benefits of DRS to the librarians are reflected in Table 4.90:

Table 4.90
Benefits of DRS from Librarians' Perception (n=93)

Benefits (Multiple Answers Possible)	Frequency	Percentage	Rank
Faster Access to Information	80	86.0	1
Convenience	73	78.5	2
Time saver	73	78.5	2
Questions Can be asked at Any Location/time (24/7)	72	77.4	3
New Options for Answering Reference Questions	66	71.0	4
Active Learning Promotion	63	67.7	5
Cheaper than Using Telephone	55	59.1	6
Benefits to Particular Group of Users	54	58.1	7
More time for thought and reflection	48	51.6	8
Providing More Complete Answers	46	49.5	9
More Personalized Services	46	49.5	9
Workload Can be Distributed Among Staff	43	46.2	10
Increase Motivation	32	34.4	11

The findings showed that majority of the respondents regard DRS having benefit of faster access to information 80 (86%). It was followed by convenience 73 (78.5%), time-saver 73 (78.5%), any location at any time 72 (77.4%), new options 66 (71%), active learning promotion 63 (67.7%), cheaper than using telephone 55 (59.1%), more time for thought 48 (51.6%), complete answers 46 (49.5%), more personalized services 46 (49.5%), workload can be distributed 43 (46.2%) and increase motivation 32 (34.4%).

4.8.2 Problems for Librarians

Respondents were also asked to indicate the problems/limitations of DRS. The responses with regard to the problems/limitations of DRS to the librarians are reflected in the following table:

Table 4.91
Problems in the Use of DRS (n=93)

Problems (Multiple Answers Possible)	Frequency	Percentage	Rank
Infrastructure/System Instability	71	76.3	1
Staff Need to be Trained	70	75.3	2
Action-oriented	62	66.7	3
No Face-to-face Interaction	57	61.3	4
Absence of Human Element	55	59.1	5
Difficult to Conduct Interview	51	54.8	6
Limited Explanation	50	53.8	7
Information Overload	41	44.1	8
Misuse of Service	36	38.7	9
Time Consuming	26	28.0	10

The study found that 71 (76.3%) of the respondents have the problem of Infrastructure/System Instability. It was followed by staff need to be trained 70 (75.3%), action-oriented 62 (66.7%), no face-to-face interaction 57 (61.3%), absence of human element 55 (59.1%), difficult to conduct interview 51 (54.8%), limited explanation 50 (53.8%), information overload 41 (41.1%), misuse of service 36 (38.7%) and time consuming 26 (28%).

4.8.3 Benefits for Students

The students were asked to tick of what they thought the benefits of DRS from the multiple answers listed.

Table 4.92
Benefits of DRS from Students' Perception (n=447)

	Frequency	Percentage	Rank
Faster Access to Information	358	80.1	1
Time Saver	337	75.4	2
Convenience	330	73.8	3
Can be submitted at any location/time (24/7	228	51.0	4
Cheaper than using telephone	223	49.9	5
Active learning promotion	181	40.5	6
Benefits to particular users	175	39.1	7
More personalized services	166	37.1	8
Providing more complete answers	163	36.5	9
New Options for answering reference	162	36.2	10
More Time for Thought and reflection	120	26.8	11
Increase Motivation	111	24.8	12

The findings showed that majority of the respondents regard DRS having benefit of faster access to information 358 (80.1%). It was followed by time saver 337 (75.4%), convenience 330 (73.8%), questions can be submitted at any location/time (24/7) 228 (51.0%), cheaper than using telephone 223 (49.9%), active learning promotion 181 (40.5%), give benefits to particular users 175 (39.1%), more personalized services 166 (37.1%), providing more complete answers 163 (36.5%), new options 162 (36.2%), more time for thought and reflection 120 (26.8%) and increase motivation 111 (24.8%).

4.8.4 Problems for Students

The students were also asked to indicate the problems/limitations of DRS.

Table 4.93
Problems in the Use of DRS from Students' Perception (n=447)

Problems (Multiple Answers Possible)	Frequency	Percentage	Rank
Limited Explanation	254	56.8	1
No Face-to-face Interaction	218	48.8	2
Absence of Human Element	208	46.5	3
Information Overload	194	43.4	4
Infrastructure/System Instability	190	42.5	5
Misuse of Service	183	40.9	6
Time Consuming	154	34.5	7
Others	10	2.2	8

The study found that 254 (56.8%) of the respondents have the problem of limited explanation. It was followed by no face-to-face interaction 218 (48.8%), absence of human element 208 (46.5%), information overload 194 (43.4%), infrastructure/system instability 190 (42.5%), misuse of service 183 (40.9%), time consuming 154 (34.5%) and 'others' 10 (2.2%). 'Others' include the answers were too general.

4.9 Improvement of digital reference services from the perception of librarians and students

In the final sections of both of the questionnaires, the respondents were asked to give comments and suggestions for improvement of DRS in their libraries.

4.9.1 Librarians' Comments

A total of 44 respondents (47%) gave their comments and suggestions, and the data were categorized and tabulated as follows:

Table 4.94
Librarians' Comments on DRS (n=44)

No.	Comments	Number of Respondents (%)	Rank
1.	Training is needed to develop skills on DRS	12 (27.3)	1
2.	Upgrade the systems and infrastructures	10 (22.7)	2
3.	Marketing and promotion of the services to the user	9 (20.5)	3
4.	Enhance cooperation among staff/faculty	4 (9.0)	4
5.	Academic libraries should implement more sophisticated format of DRS	3 (6.8)	5
6.	The staff need support from top management	2 (4.5)	6
7.	The library users are ignorant of e-development in libraries	1 (2.3)	7
8.	DRS is suitable for public universities with huge student population like UiTM	1 (2.3)	7
9.	DRS seems to be up to preferences and individual interest	1 (2.3)	7
10.	DRS can help users in research activities	1 (2.3)	7

Most of the comments (27.3%) expressed the need for training to develop skills on DRS, suggestions to upgrade the systems and infrastructures (22.7%) and marketing and promotion of the services (20.5%). The other popular comments and suggestions are: enhance cooperation among staff/faculties (9.0%), academic libraries should implement more sophisticated format of DRS (6.8%), the staff need support from top management (4.5%), DRS is suitable for public universities with huge student population (2.3%), the library users are ignorant of e-development in libraries (2.3%), DRS seems to be up to preferences and individual interest (2.3%), and DRS can help users in research activities (2.3%).

4.9.2 Students' Comments

From the responses to the open-ended questions that asked for comments and suggestions for improving the DRS, a total of 125 respondents (27.9%) gave their comments and suggestions for improving DRS. The data were categorized and tabulated as follows:

Table 4.95
Students' Comments on DRS (n=125)

No.	Comments	Number of Respondents (%)	Rank
1.	Library should educate/train students/users to use DRS	23 (18.4)	1
2.	Promote DRS to the students/users	18 (14.4)	2
3.	Improve infrastructures/systems in the library	13 (10.4)	3
4.	Library should give more guidance to students/users	11 (8.8)	4
5.	DRS is useful for distance learning's students	10 (8.0)	5
6.	Library should provide online chat reference and web cam services	10 (8.0)	5
7.	DRS is good for learning	7 (5.6)	6
8.	Make it more efficient and effective	6 (4.8)	7
9.	Provide more computer facilities in the laboratories	5 (4.0)	8
10.	Change the working culture of the librarian	5 (4.0)	8
11.	Improve the time of answering users' query/faster response time	5 (4.0)	8
12.	User need more user friendly service	4 (3.2)	9
13.	Detail/clear answers are needed	4 (3.2)	9
14.	Library should provide clear and correct answers to the users	2 (1.6)	10
15.	DRS should meet the users' need	2 (1.6)	10

Most of the students' comments stressed on the need for the library to educate/train users to use DRS (18.4%), suggestions to promote DRS to the students/users (14.4%), improve

infrastructures/systems in the library (10.4%), provide more guidance to students (8.8%) and useful for distance learning's students (8%).

The other comments are: library should provide online chat reference and web cam services (8%), DRS is good for learning (5.6%), make it more efficient and effective (4.8%), provide more computer facilities in the laboratories (4%), change the working culture of the librarian (4%), user need more user friendly service (3.2%), improve the time of users' query (4%), detail answers are needed (3.2%), DRS should meet the users' need (1.6%) and library should provide clear and correct answer to the user (1.6%).

4.10 SUMMARY OF RESULTS

The key findings of the study revealed that all the four public academic libraries in Malaysia have implemented asynchronous DRS in the forms of e-mail and web forms. The implementation of DRS in the academic libraries under study can be seen from the existing reference policies and practices in the academic libraries under study. None has implemented synchronous DRS in the forms of online chat and video conferencing but all academic libraries under study were planning for more sophisticated digital reference services in the future. A majority of the students (67.3%) were aware of the university library offering DRS. A majority of the librarians (82.8%) have been using DRS in answering reference questions. E-mail reference have been used by 73.1% of librarians and 19.5% of students, web forms have been used by 32.3% of the librarians and 28.2% of the students, Ask-A librarian have been used by 26.9% of the librarians and 26.8% of students. The digital reference services are effective form of service delivery in Malaysian academic libraries based on the findings on users' perception, users' satisfaction and library's performance. A majority of the respondents would choose a traditional reference (47%), but predicted online chat reference (42.7%), video conferencing (36.5%) and e-mail

reference (37.4%) to be most heavily used in the next five years. A majority of librarians and students regard DRS having benefit of faster access to information, time saving and convenience. Most respondents expressed the need for training to develop skills for librarians and user education programmes for students.

4.11 CONCLUSION

This chapter has presented the analyses of data collected in this research. The two survey questionnaires have given the profiles of both librarians and students in the four public academic universities in Malaysia. Data analysis of the interviews and observations were combined with the survey questionnaires to answer the research questions. Although all types of DRS were defined, there were a few indications through the analysis of data that there were confusion among the respondents. For instance, the study finding reported that 1 (1.1%) of the librarians' respondents and 22 (4.9%) of the students' respondents have used online chat reference even though the academic libraries under study were not offering the service. The researcher assumed that the students may have used the online chat reference through '*Yahoo Messenger Chat Room*' or other free chat rooms available through Internet such as *AOL chat room, ICQ chat room and MySpace chat* by making appointment with the librarian before they use the services. Even with this weakness, the result of the survey has opened different approaches of enquiry that shows the potential of online chat reference to compete. The following chapter will further discuss the findings of this study.

CHAPTER 5

SUMMARY, DISCUSSIONS AND CONCLUSIONS

5.1 INTRODUCTION

This chapter summarises how the research was carried out and highlights the findings presented earlier in Chapter 4. It is followed by discussions/interpretation of results, implications, recommendations and suggestions for the further research. Lastly, conclusions are made to reach the end of the study.

5.2 SUMMARY OF THE STUDY

The main objective of the study was to identify the existing status of DRS in selected academic libraries in Malaysia. The research also aimed at finding out the awareness, usage, effectiveness and perceived needs, besides highlighting the issues and problems faced by librarians and users pertaining to DRS.

The case study method was used and data was collected through survey questionnaires, interviews and content analysis. The research questions were formulated to answer the research problem based on the objectives of study. The sample for the questionnaires comprised of 163 librarians and 1,000 students from 4 selected public universities in Malaysia, namely Universiti Teknologi Mara (UiTM), University of Malaya (UM), Universiti Kebangsaan Malaysia (UKM) and Universiti Putra Malaysia (UPM). The response rate was 93 (57%) for librarians and 447 (44.7%) for students. The data collected was analyzed using the Statistical Package for the Social Sciences (SPSS) version 12.0.

A structured interview was conducted with the Chief Librarians, Chief of Reference Divisions and Chief of IT Divisions/Units in 4 selected universities in Malaysia (N=12) to collect information on existing library services provided to users. Content analysis were made to record the services available, to note how the services were offered, and to view the guidelines for service provision/policy.

5.3 SUMMARY AND DISCUSSION OF FINDINGS

The significant findings of the study include the following:

5.3.1 Existing status of DRS in academic libraries in Malaysia.

From the content analysis of web sites, all the four public university libraries in Malaysia have implemented asynchronous digital reference services (DRS). In all the four academic libraries observed, the interfaces allowed the researcher to place queries electronically through a web form via '*Contact Us*' or '*Ask Us*' link in the main menu. The study found that they have implemented at least e-mail reference and web forms. UiTM provides Ask-A Librarian services to their users.

UiTM also has a special software or service known as Virtual Reference Facilitator (VRF) while UPM has Distance Learning Services (DLS) that offers DRS. FAQs were provided in Tun Abdul Razak Library, UiTM, Tun Seri Lanang Library, UKM and Sultan Abdul Samad Library, UPM. In University of Malaya (UM) Library, the FAQs was under construction at the time of the data collection in March 2005 until June 2008.

None has implemented synchronous DRS in the forms of online chat reference and video-conferencing. However, University of Malaya (UM) Library, Tun Seri Lanang

Library, UKM and Sultan Abdul Samad Library, UPM were planning for online chat reference in the near future.

5.3.1.1 Current Status of DRS

The study found that all the four academic libraries under study have had implemented automated library systems for more than ten years. Sultan Abdul Samad Library, UPM first used automated system in 1987, followed by University of Malaya (UM) Library and Tun Seri Lanang Library, UKM in 1990 and Tun Abdul Razak Library, UiTM in 1992. The automated library systems were upgraded in 2000 in Tun Abdul Razak Library, UiTM, Tun Seri Lanang Library, UKM and Sultan Abdul Samad Library, UPM and 2004 in University of Malaya (UM) Library.

The introduction of automated library systems and subsequently the upgrading of the systems enabled the academic libraries to offer more sophisticated electronic services to remote users or researchers such as the provision of online catalogues, links to recommended or dedicated web sites, interactive services and resources remotely available.

All academic libraries in this study are expanding the services by providing remote reference assistance. However, the study has shown that the availability of DRS was still limited to asynchronous transactions (communication between users and librarians was experienced by time delay) in the forms of e-mail reference, web forms and Ask-A Librarian.

This finding is in line with Tennant (2004) who noted that online reference in the early days mostly consisted of e-mail reference. Most libraries were not seriously thinking about delivering DRS until recently. However, the findings contradict with

Maharana and Panda (2005) where they found video conferencing service being used in 6 (46.1%) libraries and online chat reference have been implemented by 3 (23%) libraries from the 13 academic libraries in India.

5.3.1.2 Types/Formats of DRS Offered

From the analysis of the content of each library's web site, it is observed that all the four public academic libraries in Malaysia provide asynchronous DRS in the forms of e-mail references and web forms. There were links for submitting general enquiries to the libraries in the academic libraries main menu. Users can click on a button on the libraries' web sites which pops up a form where the questions can be typed in. Librarians' e-mail addresses were also provided for contacting the librarians in all the academic libraries' web sites.

The findings are similar to Tenopir (2001) and Tenopir and Ennis (2002) who found almost all (99%) of the academic libraries in their studies in USA offered e-mail reference. This study's finding also concurs with the findings of Chowdhury and Margariti (2004) who found that e-mail was the major technology used in providing digital reference services in five premier libraries in Scotland.

As noted by Tenopir and Ennis (2002) that libraries adopted digital information sources and services rapidly due to the availability of the Internet particularly the web. Digital sources have brought changes in reference services which have helped the reference librarians to provide better services.

Reference through web forms that are available in all the academic libraries under study allows users to provide further and more structured details about their information

needs. However, as noted by Roesch (2006) that this form of digital reference is unsuitable for more complex needs, such as detailed research queries for example.

Tun Abdul Razak Library, UiTM provides Ask-A Librarian services to their users. Ask-A Librarian was a more sophisticated asynchronous DRS compared to e-mail and web forms that provides quick reference service and the basic answers to brief factual questions.

Tun Abdul Razak Library, UiTM (PTAR) has a special software or service known as Virtual Reference Facilitator (VRF). Interestingly, the process of questions and answers in VRF is quite similar to the process of General Digital Reference Model developed by Lankes (1998) and Virtual Reference Desk (1998) which consists of the following steps: question acquisition, triage, answer formulation, tracking and resource creation. However, the service has only recorded 56 queries in 2005, 128 queries in 2006, and 175 queries in 2007 which are considered low compared to the student population. In University of Malaya Library, only 25 e-mail queries were received in 2005 and 294 queries in 2006.

Only Sultan Abdul Samad Library, UPM has the software that specially caters for distance learning students. FAQs were provided in Tun Abdul Razak Library, UiTM, Tun Seri Lanang Library, UKM and Sultan Abdul Samad Library, UPM.

5.3.1.3 Staff and Administration

In terms of reference staff, Sultan Abdul Samad Library, UPM has a largest number of professional staff (10) followed by University of Malaya (UM) Library and Tun Seri Lanang Library, UKM (5 each) and Tun Abdul Razak Library, UiTM (4). All the staff (professionals and non-professionals) in the reference divisions of the University of

Malaya (UM) Library and Tun Seri Lanang Library, UKM are answering reference questions. In the reference divisions of Tun Abdul Razak Library, UiTM and Sultan Abdul Samad Library, UPM only professionals are answering reference questions. The academic libraries in this study have employed the professional as well as non-professional staff based on the requirements of the divisions and also the number of students' enrolment in the university.

The divisions that provide DRS differs from one library to another depending on the organizational structures of the academic libraries under study. Tun Abdul Razak Library, UiTM offers the service under Information Service Division. University of Malaya (UM) Library offers the service under Client Services Division. Tun Seri Lanang Library, UKM offers the service under Customer Service Division. Sultan Abdul Samad Library, UPM provides the service under Reference and Information Management Division. It has becoming the trend for academic libraries in Malaysia and elsewhere to name the division that can show the concentration on customer and user oriented services.

The study found that most of the libraries provided a range of services that are traditionally associated with reference services. However, reference activities were also done by various divisions/units depending on the organizational structures of the academic libraries. This finding is positive which shows the expansion of the radius of reference services to the whole library.

The finding revealed that the librarians from other divisions of the libraries were assigned to work in the Reference Service Divisions during the following time: after office hours, public holiday, weekends and Friday lunch break. This finding is encouraging since all the academic librarians need to be exposed to the public services in

the library and their duties would not limited to technical divisions such as cataloguing and acquisition divisions.

5.3.1.4 Policies

There were clearly stated policies on the provision of DRS in two public academic libraries, i.e. University of Malaya (UM) Library and Tun Seri Lanang Library, UKM. The policy in University of Malaya (UM) Library stated that the library will give a response to any request within 48 hours. Tun Seri Lanang Library, UKM will attend to the requestor only during the office hours. However, the library will ignore urgent request, conduct extensive research for clients, provides advice on medical and legal matters. Interviews with the heads of ICT Divisions in Tun Abdul Razak Library, UiTM and Sultan Abdul Samad Library, UPM confirmed that the two libraries will reply immediately to the requests made through DRS.

There was no stated policy on what are the necessary staffing levels, qualification of staff, privacy and training in all the four academic libraries. Except in Tun Seri Lanang Library, UKM, there was no policy on types of question answered. This implies that some academic libraries were not stressing on the proper management and organization of DRS. It should be noted that policies must be flexible enough to allow for the changing needs of the users and technological developments (Kasowitz, Bennett and Lankes, 2000).

5.3.1.5 Frequency of Librarian on Duty

The study found that about 15.7-22.5% of the respondents work daily or weekly as the Reference Librarian and the majority 42.7% worked on a monthly basis. This reflects the

overall percentage of librarian working in the reference division. All librarians from other divisions should be given more opportunity to work in the Reference Division so that they could answer reference queries and their duty would be more challenging.

5.3.1.6 Types of Reference Questions and Subject Areas

The study found that 68.8% of the reference questions received by the librarians were specific search questions, 59.1% directional questions, 57% research questions and 40.9% ready reference questions. The findings are encouraging, especially since majority of the questions received by reference librarian (68.8%) were specific search besides 57% research questions. This shows that the users including students were conducting research activities in various areas in the major universities in Malaysia. However, this finding contradicts with the studies by Chowdhury and Margariti (2004) and Kibbee (2006) who found that enquiries handled by libraries are relatively low-level i.e. directional questions and ready reference questions.

In terms of subject areas, 77.4% of the subject areas asked were pertaining to social sciences, 57% education, 55.9% science and technology, 41.9% arts and humanities. This reflects that majority of the library users were from social science related faculties compared to those from science and technology related faculties.

5.3.1.7 Reference in Practice

The reference in practice has shown an increase rate of e-mail references from the log records of University of Malaya Library and Tun Abdul Razak Library, UiTM. The statistics obtained from the academic libraries under study have proven that although less time allocated for answering DRS in their library activities, but it has shown an

increasing rate of demand. This finding is similar to Janes and Hill (2002) who found the strong demand for DRS from users who could not benefit much from traditional face-to-face reference service. This study's finding also concurs with Johnson, Newton and Reid (2004) who found that the volume of enquiries received by library by e-mail reference grew rapidly.

5.3.1.8 Future Plan

All the academic libraries in the study were planning for more sophisticated digital reference services. All the academic libraries in this study that have implemented asynchronous DRS in the forms of e-mail reference and web forms were planning for synchronous DRS in the form of online chat reference.

This is in line with rapid developments of other online services in academic libraries in the country. The Chief Librarians and Heads of Reference Divisions/Units interviewed agreed that online chat reference has great potential for teaching information literacy skills as well as can play a key role in the context of new e-learning developments.

The Chief Librarian in one of the academic libraries under study said, '*We are planning for more effective reference services including digital or virtual reference services. Besides Ask-A Librarian, we are planning to implement online chat reference since the library has to support e-learning and the increase rate of students in the university*'.

5.3.2 Awareness of the students on the availability of digital reference services in academic libraries in Malaysia.

The study found that majority of the respondents, that is 301 (67.3%) were aware of their university library's offering DRS and 146 (32.7%) were not. Only faculty, age level and level of study were found to be significant in determining awareness of DRS. With regard to the awareness of university libraries' web sites, the study found that 373 (83.4%) of the respondents were aware and 74 (16.6%) were not. The demographic factors of faculty, age and level of study were found to be significant in determining awareness of university libraries' web sites. The findings are similar with Aman (2004) who found that 70% of the respondents knew the existence of university libraries' web sites. Also concur with Harrison and Hughes (2001) who found that 35% of the respondents did not know of their university libraries' web sites and 33% did not aware of the existence of web-based catalogue.

The study found that high percentage of the respondents, that is 31.8% visited the library a few times a semester (rarely), 28% a few times a month (seldom), 19.5% over 2 times a week (frequently), 10.5% visited the library everyday (always) and 10.3% never. This finding is consistent with the study by Zaiton, Kaur and Zanaria (2003) who found that majority of the library users visit the library at least once a month. Majority of the respondents were not physically present within the library building since the networked environment has allowed users to access information online.

The study also found that majority of the respondents, that is 59.2% access the library's electronic resources from the library, 51.2% from the campus hostel, 31.9% from the faculty, 21% from home and 10.3% from others which include from office and

cyber cafe. The study found a significant relationship between place of access from the library, faculty and home and student level. This finding is similar to that of Foley (2002) who found that 69% of the respondents were on-campus when they sent enquiries through DRS. Higher percentage of undergraduates' students access from library, campus hostel and faculty since they were doing full-time and most them were staying in campus. Higher percentage of postgraduates' students access from home, office and cyber café since most them were working and doing the course on part-time basis.

5.3.3 Usage of DRS by librarians and students of universities in Malaysia.

The results of the study shows that high percentage of librarians have been using DRS. Some 77 (82.8%) of the librarian have been using DRS while 16 (17.2%) were not. The survey has proven that 68 (73.1%) of the librarians have used e-mail reference, 30 (32.3%) web forms, 25 (26.9%) Ask-A Librarian, 1 (1.1%) online chat reference, 4 (4.3%) collaborative and 3 (3.2%) FAQs.

The study found that the percentage of students that have been using DRS was lower than the percentage of the librarians. Some 126 (28.2%) of the students in this study have used web forms, 120 (26.8%) Ask-A Librarian services, 87 (19.5%) e-mail reference, and 22 (4.9%) online chat reference.

5.3.3.1 Usage of DRS Among Librarian

The study found that 82.8% of the librarians have been answering reference questions through DRS formats while 17.2% did not. Some 73.1% of the respondents used e-mail reference, 32.3% web forms, 26.9% Ask-A Librarian service. The finding shows that

most of the librarians are using DRS and the most important thing to response to questions posed by the users. There were, however a small percentage of librarian who did not answer reference questions through DRS.

The finding is quite similar to that of Janes (2002) who found that some 78.8% of the librarians surveyed had used e-mail while only 46.6% used web forms. E-mail reference was used by most of the Librarians since the format was the oldest and well established in Malaysian academic libraries compared to web forms and Ask-A Librarian.

5.3.3.2 Usage of DRS Among Students

The study found that 28.2% of the students have been using web forms, 26.8% Ask-A Librarian service, 19.5% e-mail and 4.9% online chat reference. However most of the respondents were still using face-to-face consultation (56.2%), telephone (6.3%) and correspondence (6.0%).

This result is not satisfactory since the students of IT related faculties should have good computing skills and better exposure to online services compared to students from other faculties. The general assumption is that computer science students are more likely to use online services (Roesnita, 2005). Lower percentage of students using DRS was based on the lack of promotion and user education programmes in the academic libraries under study. However, the finding concurs with Coffman and Arret (2004) who noted that users' usage of DRS was far from impressive.

In terms of frequency of DRS usage among students, high percentage of the students, that is 98 (32.6%) sometimes used, 89 (29.6%) rarely used, 50 (16.6%) never used, 46 (15.2%) frequently and 18 (6.0%) always used. Most respondents were not sure of the time of using DRS, that is 132 (43.9%), 85 (28.2%) from 12.00 pm to 6.00 pm, 31

(10.3%) from 6.00 pm to 12.00 am, 27 (9.0%) from 6.00 am to 12.00 am and 26 (8.6%) from 12.00 am to 6.00 am.

One of the advantages of DRS is that students and users can ask for such services from a remote location at any time of the day. However, the finding shows a usage pattern that is quite similar to the timing of usage of traditional reference services in libraries. High percentage of respondents were 'not sure' of the time they used DRS (43.9%) since they used it at any time that they wanted to use the services.

In terms of importance of DRS, majority of the respondents regard DRS as important. Web forms scored the highest mean 3.70 followed by e-mail reference 3.63, Ask-A Librarian 3.56 and online chat 3.02. With regards to reasons of the respondents who did not using the services, 84 (18.8%) were not interested, 77 (17.2%) did not know how to use, 71 (15.9%) do not need for it and 68 (15.2%) regard it as complicated.

An independent *t* test analysis on the importance of DRS and student level shows a significant different at p=0.05 of e-mail, web forms, Ask-A Librarian and online chat. The results of ANOVA on the importance of DRS and students' age level shows statistically significant different at p=0.05 level.

5.3.4 Effectiveness of DRS offered by academic libraries in Malaysia.

The DRS provided are fairly effective for ICT-based students in 4 Malaysian major academic libraries. This can be seen from: (a) students' perception, (b) students' satisfaction and (c) library's performance. The mean scores for students' perception ranged from 3.44 for quality of service, 3.42 for usability and 3.20 in terms of typical access time. The mean scores for students' satisfaction ranged from 3.59 to 3.39 for e-mail reference, 3.56 to 3.41 for web forms and 3.58 to 3.47 for Ask-A Librarian. In terms

of library's performance, the mean scores ranged from 3.64 for sufficient access to electronic resources, 3.38 for sufficient information literacy skills and 3.31 for sufficient guidance and training. The results show that there is room for further improvements.

5.3.4.1 Students' Perception

A large proportion of students' respondents regarded DRS as 'somewhat high quality' in terms of quality of service, usability and typical access time.

In terms of quality of service, the study found that majority of the students' respondents, that is 163 (54.5%) regard the service as somewhat high quality, 115 (38.5%) high quality and 14 (4.7%) as very high quality. The mean score for the quality of service is 3.44 with the standard deviation of 0.644.

In terms of usability of service, majority of the respondents, that is 145 (48.3%) regard the usability as somewhat easy, 108 (36%) as easy, 23 (7.7%) very easy, 22 (7.3%) difficult, and 2 (0.7%) very difficult. The mean score is 3.42 with the standard deviation of 0.765.

With regards to the typical access time, majority of the respondents 170 (56.9%) rated it as somewhat fast, 77 (25.8%) as fast, 37 (12.4%) slow, 13 (4.3%) very fast and 2 (0.7%) very slow. The mean score is 3.20 with the standard deviation of 0.735.

These findings are not satisfactory and should be of concern of the library management. The image of the academic libraries are significantly affected if users' perception are negative with the services provided.

5.3.4.2 Students' Satisfaction

User satisfaction can be seen from the measurement of access, availability, accuracy, currency of information, response time, answers' given through various DRS channels. The majority of the respondents were satisfied with the available formats of DRS in terms of access, availability, accuracy, current information and answers given.

Specifically, the mean scores of users' satisfaction for e-mail reference ranged from 3.59 for access to 3.39 for answers given. The mean scores of users' satisfaction for web forms ranged from 3.56 for accuracy and 3.41 for answers given. The mean scores for Ask-A Librarian ranged from 3.58 for availability and 3.47 for answers given.

The findings of the study pertaining to users' satisfaction have shown that most of the students are able to obtain information from some sources provided through DRS. The study also indicated that information can be found or located at some location or place, besides the ability of the service to provide information without mistake with latest information and sufficient answers given. The findings are similar to VandeCreek (2006) who found majority of the respondents were satisfied overall with DRS at Northern Illinois University (NIU).

5.3.4.3 Library's Performance

The study found that most of the respondents agree that the library have provided sufficient access to electronic resources, information literacy skills' programmes and guidance and training on how to use DRS. In terms of sufficient access to electronic resources, 59.8% of the respondents agree, 28.6% somewhat agree and 7.3% strongly agree. The mean score is 3.69 with the standard deviation of 0.687. In terms of sufficient information literacy skills, 43.5% of the respondents somewhat agree, 41.5% agree and

7.0% strongly agree. The mean score is 3.46 with the standard deviation of 0.759. In terms of sufficient guidance and training, 39.9% of the respondents agree, 38.9% somewhat agree and 6.0% strongly agree. The mean score is 3.35 with the standard deviation of 0.827.

5.3.5 Perceived needs of DRS among university students in Malaysia.

The findings revealed that majority of the respondents would like to choose face-to-face consultation, that is 210 (47.0%), followed by e-mail reference 132 (29.5%), online chat reference 59 (13.2%) and telephone consultation 34 (7.6%). For the future, the respondents predicted that online chat reference would be most heavily used, that is 191 (42.7%), followed by e-mail reference 167 (37.4%) and video-conferencing 163 (36.5%).

This finding is similar to Johnson (2004) who found that the survey respondents reported prior use of face-to-face reference and a desire to use this service first when pursuing research topics respondents forecast DRS would be the most heavily used in future. Concerning prediction for the future, majority of the respondents (73.6%) describe that as technology makes more information accessible, people will need less human help in doing research. That is why synchronous DRS should be tied in with other library online services as respondents seem to change.

5.3.5 Issues and problems faced by the librarians and users in relation to DRS.

The study noted a number of benefits of DRS from both librarians and students. A majority of the librarians (86%) regard DRS having benefit of faster access to information, followed by convenience and time-saving (both 78.5%), questions can be asked at any locations at any time (77.4%), new options (71%), active learning promotion

(67.6%), cheaper than using telephone (59.1%), more time for thought and reflection (51.6%), providing more complete answers (49.5%), more personalized services (49.5%), workload can be distributed (46.2%) and increase motivation (34.4%).

The majority of the students also regard DRS having benefit of faster access to information (79.7%), followed by time saver (74.5%), convenience (73%), cheaper than using telephone (52.7%), questions can be submitted at any location/time (49%), active learning promotion (39.4%), give benefits to particular users (36.8%), new option (36.4%), more personalized services (35.8%), providing more complete answers (34.9%), (36.4%), more time for thought and reflection (26.6%) and increase motivation (22.2%).

Both librarians and students reported problems of infrastructure/system instability. The study found that a majority of the librarians (76.3%) have had problems of infrastructure/system instability, followed by the staff need to be trained (75.3%), the services need action-oriented (66.7%), no face-to-face interaction (61.3%), absence of human element (59.1%), difficult to conduct interview (54.8%), limited explanation (53.8%), information overload (41.1%), misuse of service (38.7%) and time consuming (28%).

A majority of the students had the problems of limited explanation (54.3%), followed by no face-to-face interaction (46.7%), information overload (46.3%), absence of human element (46%), infrastructure/system instability (42.8%), misuse of service (40.6%) and time consuming (32.8%).

5.3.6.1 Benefits

It cannot be denied that technology is creating faster ways for librarians as well as for students in accessing information from remote locations. The study revealed that majority

of the respondents regard DRS having benefit of faster access to information; that is 86% for librarians and 79.7% for students. It was followed by convenience; 78.5% for librarians and 73% for students and time saver; 78.5% for librarians and 74.5% for students. The other benefits found: questions can be submitted at any location/time (77.4% for librarians and 49% for students), cheaper than using telephone (59.1% for librarians and 52.7% for students), providing more complete answers (49% for librarians and 34.9% for students), benefit for particular group of users (58.1% for librarians and 36.8% for students) and increase motivation (34.4% for librarians and 22.2% for students).

The findings are similar to Johnson, Newton and Reid (2004) who noted DRS as time saver, cheap and provide extra choice to users. Also concurs with Lam (2002) who wrote that DRS offer users the convenience of asking for information.

Interestingly, the researcher found that before the existence of DRS, students with reference queries have two options: ask their questions in person or face to face while visiting the library or calling the librarian at the reference desk. Whatever is the option decided, the questions could only be asked during the library's office hours. This traditional reference model was satisfactory when the students researched in the library, but today many users use the Internet to research at home or from their office. Using DRS certainly will increase as the amount of information available remotely and as more people take advantage of distance education.

5.3.6.2 Problems

The study found that lack of adequate infrastructure and systems instability are the main problems in implementing DRS in academic libraries from the perception of the

librarians' (76.3%). The librarians in this study were worried about the infrastructure since practically they were working with the systems and were facing the technical problems.

Interview with the Chief Librarians and Head of Reference Divisions and IT Units in Tun Seri Lanang Library, UKM and Sultan Abdul Samad Library, UPM confirmed that lack of infrastructure, systems instability, inadequate of information technology (IT) support and technical expertise are the main problems in implementing DRS.

The other main problems faced by the librarians include inadequate training (75.3%), the service need to be action-oriented (66.7%), no face-to-face interactions (61.3%), absence of human elements (59.1%), difficult to conduct interview (54.8%) and limited explanation (53.8%).

However, the highest percentage of students (54.3%) regard limited explanation as the main problem, followed by no face-to-face interaction (46.7%), information overload (46.3%), and absence of human element (46%). Although students can access various online resources from the academic libraries, they still need in-depth guidance, face-to-face interaction and human elements from the librarian.

5.3.7 Improvement of DRS from the perception of librarians and students.

The study found that most of the librarians' expressed the need for training to develop skills on DRS (27.3%), suggestions upgrade the systems and infrastructures (22.7%), marketing and promotion (20.5%) and cooperation (9.0%).

The students' comments focused on the need for user education/training (18.4%), promotion (14.4%), improve infrastructures (10.4%), more guidance to students (8.8%),

useful for distance learning students (8.0%) and provide more sophisticated services (6.8%).

5.4 IMPLICATIONS

The findings of this study have described the present situation of DRS in selected academic libraries in Malaysia. The findings have some important implications for the following groups: (a) Malaysian Ministry of Higher Education, (b) University administrators/Chief Librarians, (c) Reference librarians/librarians, and (d) Users/students.

5.4.1 Malaysian Ministry of Higher Education

It is hoped that the findings of the study can be a useful guide for the Ministry of Higher Education and the university administrators to implement new policies, as well as to update the existing policies and standards for the provision of academic library services in the country.

In parallel with the country's aspiration of developing selected universities into research universities, as well as developing world-class universities and becoming educational hub in the region, universities in this country must have good support systems. These support systems must include online library and information services in line with current developments. It is regrettable that the current status of DRS in academic libraries in Malaysia is limited to asynchronous transactions in the forms of e-mail, web forms and Ask-A Librarian.

5.4.2 University Administrators/Chief Librarians

For the university administrators, especially the Chief Librarians who are involved in planning and implementing online services in academic libraries, this research has provided insights into a range of digital reference services' format that can assist students' in their learning process.

Leadership is a key factor to improvement and effectiveness in the institutions of higher learning. Chief Librarians play a crucial role in establishing new systems and policies as well as a positive and healthy work environment for better organizational performance. According to Lankes et al. (2003), the development of DRS appears to be largely based on the interests and vision of service providers.

The Chief Librarians also should realize that the library staff need support from top management in implementing DRS as commented by 4.5% of the librarians. As suggested by librarians about their training needs, suggestions to upgrade the system, marketing and promotion of the services, cooperation and the need for more sophisticated services, all require attention and decision making from the Chief Librarian.

In line with this, Koenig (2006) suggested that information professionals have to anticipate larger and more leadership roles. Stepping into these roles will require great attention to and immersion in the context of the organization: (a) to gain the necessary knowledge of context, and (b) to communicate with the organization and to make it aware of the capabilities and contributions of the information professional.

This study further provides some insights on user feedback on their perceptions, satisfaction and library's performance. The assessment of students' satisfaction and the ability of the library to fulfill the users' needs are useful in the strategic planning and development of the academic libraries in the future. User feedback is therefore important

for performance indicator, providing not only evidence of user satisfaction but also an indication of continual improvement measures of how successful the library's performance has been providing support for teaching, learning and research (Zaiton, Kaur and Zanaria, 2003: 2). However, as this study is based on students from the ICT faculties, the results may not be applicable to students from other faculties.

5.4.3 Reference Librarians/Librarians

This research provides academic librarians (particularly those working in the Reference Division/unit) with snapshots of the DRS formats that can be used by students and at the same time can increase students' knowledge, awareness and motivation.

The working culture of the librarian could be changed to suit the new services which require the librarian to be more proactive and action-oriented. They also have to provide more personalized and user friendly services. Since the findings showed that only 26.9% of the librarians used Ask-A Librarian, 32.3% web forms and 74.2% e-mail reference, the academic libraries should take steps to encourage all the librarians to use various DRS formats for answering reference questions and communications. This indication to use e-mails rather than the other channels maybe due to many reasons which may include lack of opportunities to be involved especially if they are not reference librarians or the lack of training to handle enquiries in this mode. The process of solving problems would be time consuming if done manually but the advancement of ICT have allowed the libraries and other organizations to get things done faster. Although it will burden the library with the implementation of DRS, it will be regarded as an impetus to help them to improve their service and encourage them to work harder in this new environment. Reference librarians need to be committed to provide the most effective

assistance besides showing professional courtesy and respect when answering reference questions.

The study revealed that highest percentage of students' respondents, that is 54.3% regard limited explanation as the main problem in their DRS usage, followed by no face-to-face interaction (46.7%), information overload (46.3%) and absence of human element (46%). These findings clearly show that professional reference librarians were still needed to handle complicated searches, to help users deal with information overload as well as to cater for human element aspects.

The reference librarians should also realised that DRS should meet the users' information needs. This is related to the process of research creation in General Digital Reference Model (Lankes, 1988) that use tracking data to build or expand collections and better meet users' information needs.

However, there are also interesting implications for the future when 73.6% of the respondents predicted that people would need less human help when doing research projects in the future. This finding shows that technology can empower people to be independent and can provide more efficient and effective ways to communicate.

5.4.4 Users/Students

For the students/users, the study findings revealed that they should work hard to move forward in the ICT era. The study shows that with the development of information and communication technology, people could find out the answers or what is happening on all parts of the world in just seconds. DRS as a main component of online library facilities need to be exploited by the students in their learning process.

Despite the availability of various formats of DRS, the services were found to be under-used by the students, that is 19.5% for e-mail reference, 26.8% for Ask-A Librarian and 28.2% for web forms. This should be cause for concern as their underused maybe due to their unawareness and if this is so then the libraries need to market this service more aggressively.

5.4.5 DRS for Teaching, Learning and Research

The study found that 13.6% of the student's comment stressed on DRS was good for learning and it was very useful especially for distance learning's students. Therefore, the findings can also be used as inputs on how far ICT can be used in teaching and learning. DRS hold great promise in enhancing learning as well as improving the quality of education. There are a number of learning characteristics that can be identified in DRS in enhancing learning especially in the institution of higher learning such as active learning promotion, interactivity, instructive and can increase motivation.

DRS can help to develop active learning which is characterized by participation on the part of the learner. It should provide opportunities for an effective reference interview, where students can communicate necessary information to experts or specialists in various subjects and to clarify vague user questions. Digital reference also can play a vital role in user's teaching and learning process by providing access to current information and expertise. Quality digital reference services can offer more to users than straight and factual answers; they guide them in subject knowledge as well as information literacy. At the same time these would be expected to increase motivation among lectures and students in the universities.

The researcher felt that DRS also can help users in research activities. In the process of doing research, the researchers would like to seek information resources besides asking question pertaining to their subject areas. Since questions can be asked at anytime and anywhere, DRS offers great potential in enhancing research in the higher educational institution. This is in line with the government's policy to inculcate a new research culture among academics in the universities in Malaysia.

5.5 RECOMMENDATIONS

Based on the research findings, some recommendations are put forward which could be used by Malaysian academic libraries as a guide to provide standard DRS services.

5.5.1 Towards the Implementation of Synchronous DRS

Based on the research findings, the researcher feels that there would be tremendous digital benefits if there is an appropriate implementation of DRS throughout the higher learning institutions in the country. Since the academic libraries in the study have already implemented DRS in the forms of e-mail reference and web forms, the library administration have to enhance the existing services besides consideration of offering synchronous or real time DRS.

Since the study findings indicated that the majority of the respondents were satisfied with the overall performance of DRS, the academic libraries in this study can use this survey results to improve the existing services and to implement the more sophisticated services – online chat reference and video-conferencing.

The study also noted that a high percentage of the librarians and students respondents agreed on the benefits and advantages of implementing DRS such as faster access to information (86% for librarians and 80.1% for students), convenience (78.5%

for librarians and 73.8% for students) and time saver (78.5% for librarians and 75.4% for students).

There is a need to implement more sophisticated DRS, such as online chat reference and video-conferencing. The study found that 29.5% of the respondents would like to choose e-mail reference and 13.2% online chat reference in their options for assistance when locating materials for a research project. Furthermore, 42.7% of the respondents predicted online chat reference and 36.5% video-conferencing would be the most heavily used in the next five years. The respondents also regard that as technology makes more information accessible, people will need less human help in doing research (73.6%). Based on the findings, the researcher felt that they are predicting a revolution in the way reference services are provided.

Meola and Stormont (2002) noted the reasons for offering live virtual reference services such as follows: answer questions with faster response time, serve users where they are searching, can conduct virtual reference interview, serve distance learners and pursue marketing and relationship building. Since many of the academic libraries in United States have implemented synchronous DRS in the forms of online chat reference and video-conferencing, the academic libraries in Malaysia should follow the trends. The study also found that 8% of the students commented that the academic libraries should provide online and videoconferencing or web cam services.

By using online chat reference, librarians could conduct reference interviews with remote researchers using chat, which is online, real-time conversation between two or more people using a computer and the Internet. Ford (2003) study on the differences between face-to-face and computer-mediated reference interactions found that online chat reference services hold promise for better question negotiation.

Using video-conferencing for reference interviews is where video and audio are delivered in real time to and from the library over the Internet. The only way to conduct remote reference interviews with both audio and video is to use video-conferencing. Conducting reference interviews without seeing or hearing the other party can be very difficult.

Since the academic libraries in this study have used the established library systems supplied by well known vendors such as Paradigm, SIRSI and VTLS, the academic libraries in this study are expected to succeed in enhancing the present DRS as well as to implement more sophisticated digital reference services.

The challenges that the academic libraries may face among others are generating initial and continued support, coping with additional workload, finding qualified technical personnel, controlling costs and setting funding, understanding copyright and licences besides trouble-shooting of various technical difficulties.

5.5.2 Enhancing the Role of DRS

The Chief Librarians need to give more important role to reference services where the services provided should be attractive, effective, evaluated, marketed, integrated, professional, institutionalized, value-based and appropriate. Providing DRS would add value particularly to reference services and thus would assist academic library users in teaching and learning process. This is in line with the opinions of the Chief Librarians, Heads of Reference Divisions and IT Divisions that they were planning for more sophisticated DRS and they also agreed that online chat reference has great potential for teaching information literacy skills and can play role the new e-learning environment.

All the academic libraries in this study need to establish and follow the guidelines and standards in their operations. For proper implementation of DRS, the academic librarians in this study need to refer to *IFLA Digital Reference Guidelines* (Latest Revision on 6th March 2008) that highlight the direction and guidelines for DRS according to international standard.

The activities of PERPUN (Conferences of University Libraries and National Library of Malaysia) should be enhanced and extended to DRS, not only limited to digitized their theses collection, examination questions, final year projects, staff publications, photographs, seminar papers and university publications.

The *Standard for Private University Libraries* published by Sub-Committee of Standards for Private University and College Libraries of PERPUN (1999) need to be updated to include issues pertaining to digital reference services to be implemented. The public academic libraries in this study also can adopt the standards and guidelines for service provision from this publication.

One important aspect that needs to be considered by the academic libraries is to identify who is in the front-line or at the public service point offering the service. The academic libraries need to employ professional staff dealing with users' enquiries and should not rely totally on clerical staff. Proper sub-division of duties need to be done by the library administration so that enquiries would not go unanswered. Reference work and information literacy skills classes should be done by different librarians. This also can avoid heavy workload and stress among staff.

All the academic libraries in this study should consider the realities of many students who are participating in distance learning programmes and they need access to the library's materials and reference services. Since UPM, UiTM and UKM have their

own distance learning students, the universities should have the services to assist this group of students. As suggested by Cassell (1999), the academic libraries need to form a department that provides services to distance students with a librarian responsible for the service.

The academic libraries in the study also should make the FAQs available so that students would be able to know, for example about hour of services, various types of sources and services available or about any particular topic that are useful to the users.

5.5.3 Marketing and Promotion of DRS

There is a need to have a systematic marketing and promotion programmes since the study found that 32.7% of the students were not aware of the services. The librarians need to explain the benefits of using all formats of DRS available in their library to the users. Users also must be thoroughly trained in order to reap the advantages over the disadvantages of DRS.

The study further found that only 9.2% of the respondents who were aware of DRS, obtained the information from library promotion. It was also noted that a considerable number of respondents raised the issue of marketing and promoting the services to the user. The study found that 20.5% of the librarians' and 14.4% of the users suggesting the library to promote the service to the user. The responsibilities of the academic library managers include to promote and encourage the use of all library services including DRS. The academic libraries in this study spends millions of ringgit on the electronic resources and services including DRS, but they were the least used. The study found that face-to-face reference were used by majority of the respondents (63.6%). The percentage of students' selecting face-to-face reference was generally double that of

the DRS. Therefore, the introduction of DRS requires users be informed of its existence by means of well coordinated promotional programmes.

The challenge for academic libraries is to ensure that their primary users, especially students know that their libraries offer value-added online information service. An awareness of the availability and potential contributions of DRS are important for continual use of the services. Effort should be made to publicise the services such as advertising it in the university's newsletter or the library's newsletter, e-mailing the users, and displaying posters in strategic locations on the campus area. Promoting the use of DRS can also be done by distributing brochures which contain information about DRS services available in the libraries and how to use them.

5.5.3 Staff Training for DRS

The study findings show that 27.3% of the librarians expressed the need for training to develop skills on DRS. To make staff feel confident of using the equipment as well as to persuade positive attitude and enthusiasm towards the use of DRS, adequate training should be conducted in public academic libraries in Malaysia.

All the academic libraries in the study had their own in-house and on-job training programmes. However, a high percentage of librarians acquired skills by learning themselves (81.7%) and through friends (34.4%). Staff training for DRS applications in academic libraries in Malaysia should cover all categories of personnel including professionals and non-professionals. Staff who are likely to be at a public service point or in the front line where users might seek help (staff in reference divisions) should be trained in-depth on DRS applications and formats because in implementing the new systems, more students will need help and consultation from library staff. However

according to Johnson, Newton and Reid (2004) training for DRS should not be focused solely on those staff selected to deal with enquiries. E-reference service can only function effectively if the reference, acquisition and collection development and technical services of the library work closely together.

There should be a staff responsible for coordinating the staff training programme on DRS applications by assessing needs, implementing activities, providing assistance to library staff in development of training plans and materials and evaluating the effectiveness of the programme on a continuing basis. The best person to handle this task in academic libraries in Malaysia is the Deputy Chief Librarian. All library staff have responsibility for their own growth and development and should therefore be open and responsive to participation in training activities on DRS practices. It is essential to ensure that all staff are comfortable and effective in their role in supporting the DRS.

Librarian's reference skills are readily transferable to the needs of digital reference work and some authors make the point that traditional reference must form the basis for the provision of reference in electronic environment (Gross, McClure and Lankes, 2001). However, there are a number of features of DRS that require additional training such as good written communication skills, keyboard skills, specialized knowledge, interview techniques, effective management of user expectations and demands, and technical troubleshooting. Librarians also need to be impressed on the importance of reading widely so that they can answer questions posed to them.

Vendors of DRS products may provide training in the use of the software but it is better for the library administrator to identify potential in-house trainers and develop their expertise in training methods. The experience in training for DRS can be enhanced by

contacting others working in the field, not only through professional publications and by attending conferences but also by examining their web sites.

5.5.4 The Need for User Education

The training of the end users in the use of DRS and online resources should be one of the central activities in academic libraries so that students and other users can effectively search and utilized these resources. The findings of the study revealed that although they can access to DRS, most students, that is 47% still prefer to use face-to-face formats. In UiTM, only 175 queries were received through Virtual Reference Facilitator (VRF) for the whole 2007. One possible reason for this might be due to the lack of knowledge about their availability and/or unfamiliarity with their capabilities and proper use.

The academic libraries need to provide a well-organised user education programmes and online tutorials to improve users' information skills and to ensure they make full use of the available technologies, resources and services. Users should be trained and exposed to various formats, benefits and effectiveness of DRS in their search for current and up-to-date information. Such user education programme may help library users learn the effective use of DRS.

Since 59.1% of the questions received by the reference librarian were directional questions, besides 40.9% ready reference questions, there is also a need to educate the users on asking serious reference questions, instead of simple frivolous enquiries that can be done by themselves with knowledge of library use.

A total of 18.4% of the students' comments suggested the library to educate the users. Those academic libraries that have introduced access to DRS to the public should make an effort to educate users on how to use it. They should avoid user from having any

difficulty in adapting to this new technology or service. Therefore user education programmes should emphasis on persuading positive attitude and making them feel confident of using DRS. User education requires a continued commitment of scarce time in order to do it thoroughly.

Koenig (2006) stressed that user training and education was very important for the information professional in the new information world but it was still very much under-recognised. Manda (2005) suggested that before any new technology can be effectively and efficiently utilized those who will be using it have to acquire the skills to do so.

The user education programmes in Malaysian public academic libraries have evolved through the years. What were considered effective at that time may not be suitable in the years to come (Juhana, 1996: 40). Therefore, the contents of the syllabus of information skills' programme should be reviewed and updated to include the aspects of DRS.

Since the results of this study revealed that the usage of DRS even among information management and computer science students were low, it is suggested that early exposure to ICT and information literacy skills should be given to students before they enter university. These moves will require teachers to be more proactive in using ICT in line with the Smart School project aspiration. However, teachers first must be equipped with adequate ICT knowledge and skills.

5.5.5 Cooperative DRS

The study found that there were no formal cooperation between the academic libraries under study and other organizations if answers were not available in the library. Some 9.0% of the librarians also commented on the need to enhance cooperation among

staff/librarian. In addition, although DRS is associated with 24/7 service model, this level of service is often impossible for individual libraries to implement (Berube, 2003).

Based on these issues and statement, the researcher felt that all the academic libraries in Malaysia should co-operate with each other in offering the digital reference services. Collaborative DRS provides many benefits, such as allowing individual institutions to share expertise and resources, expanding hours of service and providing access to a larger collection of knowledge (e.g., question-answer archives). This is also in line with The Honorable Prime Minister who urged developing countries to work closely together to implement ICT projects to achieve the United Nations' Millennium Development Goal (MDG) by 2015 (*The Star* 20.6.2006: 8).

5.5.6 Subject Specialist

The study indicated that majority of the enquiries handled by libraries are concerning specific knowledge domain. Majority of the librarians under study handled specific search questions (68.8%) and research questions (57%). The study further found that there was no subject specialist in Tun Abdul Razak Library, UiTM and Sultan Abdul Samad Library, UPM since most of the librarians were degree holders in the area of information management. In University of Malaya (UM) Library and Tun Seri Lanang Library, UKM most of the librarians were degree holders in various subject areas with postgraduate diploma in library science or masters' degree in information management.

Academic libraries in Malaysia should consider to employ subject specialists to fulfill the requirement of DRS as a service that connects the user with the experts of specialist in a variety of subject areas (Wasik, 2004 and Lankes, 1998). Librarians providing digital reference services should have the necessary knowledge and educational

background in the service's given subject area or skill in order to qualify as an expert. Specific levels of knowledge, skill, and experience are determined by each service and its related discipline or field.

5.5.7 Clear Response Policy

The study found that there were policies on the provision of DRS in University of Malaya (UM) Library and Tun Seri Lanang Library, UKM. However, clearer policies should be drafted by the service providers to include among others the parameters of services such as when the services are available, what the service provides, service behaviours and who can access such services. Besides, clearer communication also should occur either before or at a start of every DRS transaction in order to reduce opportunities for user confusion and inappropriate inquiries.

The initial screen of DRS should welcome the users to the service, for example:

> '*Welcome to Ask-A Librarian, bringing the resources of academic library to your home desktop. We are accessible at all hours of the day and night and we will deliver a response to your enquiry direct to your desktop*' (ask-a-librarianorg.uk/aboutask.html).

Then, the users were asked to mail the library the question and the library will send an answer within two working days, for example. Before the users ask the question, the library should tell the user about the service, tips on asking questions, some questions and answers, participating libraries, other online enquiry services and so on.

The reference librarians need to respond as quickly as possible to all the questions that are assigned since the users need prompt answer. As commented by 5.8% of the students' respondents that the library should improve the response time and detail answers were needed. Based on these statements, the person responsible for answering reference questions in DRS must be a professional staff as well as properly trained.

5.5.8 Upgrading the Systems and Infrastructures

The academic libraries need to upgrade the systems and infrastructures, for instance upgrading the server and usage of wireless systems. As suggested by 76.3% of the librarians, the academic libraries in Malaysia should stabilize the systems and infrastructures of the services since the librarians found that it was the main problem in implementing DRS. The academic libraries also need to employ or increase their own IT staff that would solve any technical problem or troubleshooting. In fact, users should be given guidelines on handling technical problem.

In relation to this, the accreditation panels of various programmes of studies should be aware of the responsibility and accountability of the academic libraries in those universities to provide sufficient library facilities and services.

5.6 PROPOSED GUIDELINES FOR AN EFFECTIVE DRS

Figure 5.1 illustrates the factors which should be considered by libraries when providing DRS. The factors are derived from the literature as well as from the findings of the survey and interviews.

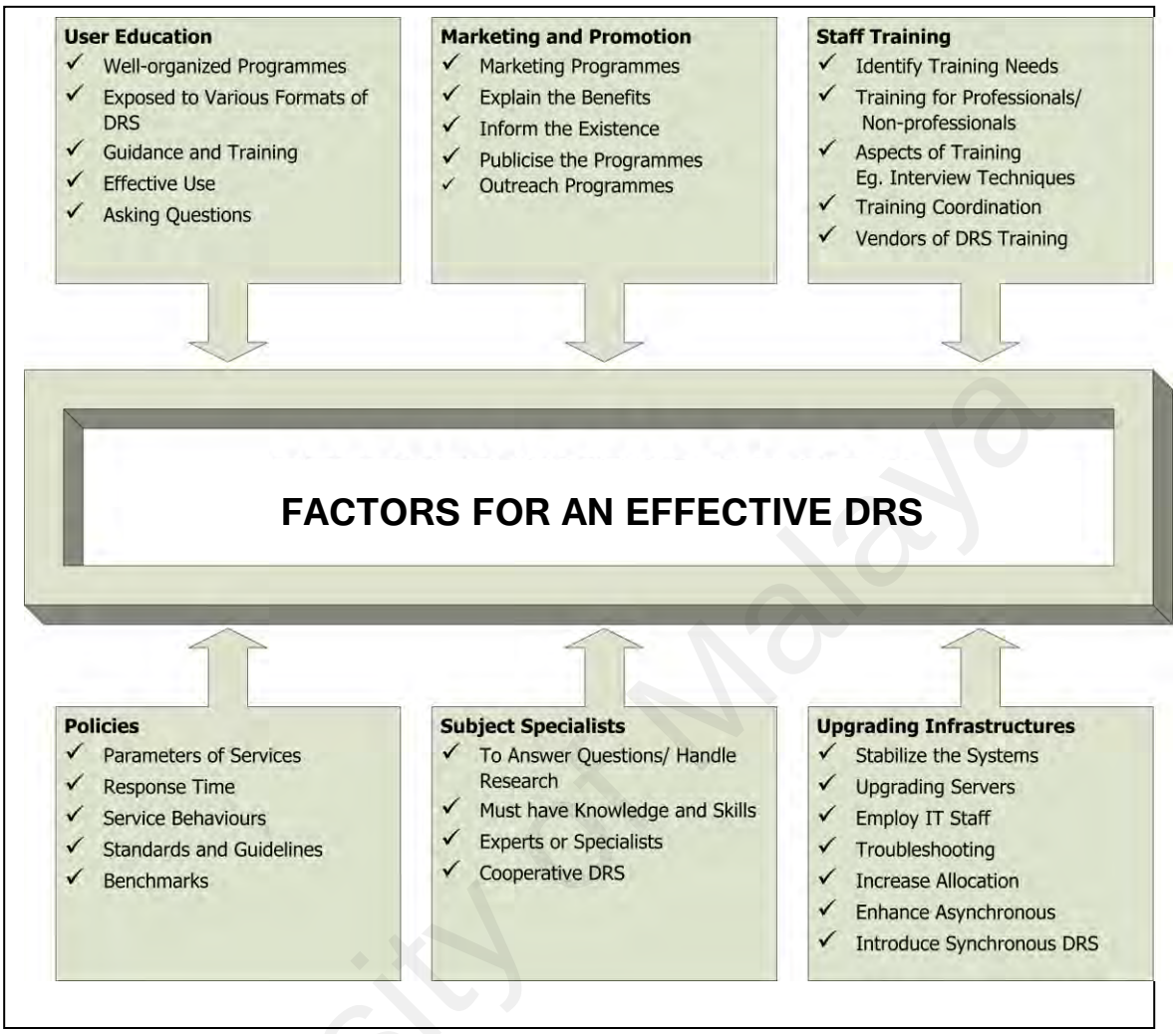

Figure 5.1
Factors to be Considered when Providing DRS Based on Research Findings

Based on the research findings, the researcher has proposed a systems model indicating factors that should be considered by librarians when embarking a DRS. In this research, the respondents have given their responses with regards to the research questions. The results of the study have shown the current status, awareness, usage, effectiveness and perceived needs of DRS in academic libraries in Malaysia. The implementation of DRS should be more effective if the following factors are being considered:

a. marketing and promotion

Marketing and promotion activities should be done systematically whereby the programmes need to be publicized. The users need to be explained on the benefits and be informed on the existence of various formats of services besides including outreach programmes.

b. staff training

Staff training involves identifying training needs, training for both professional and non-professionals, suitability of aspects of training, training coordination and also training programme involving vendors of DRS. Librarians need to be aware of the guidelines as well as their code of ethics, efforts must be made to implement them. Training and research awareness will lead to improved professional behaviours. The library staff as a whole can be given a detailed information session on any particular DRS.

c. user education

User education programmes should emphasize on well-organized programmes, expose students to various formats of DRS, guidance and training, effective use of DRS and training students how to ask questions. It can be integrated into the information skills sessions for both undergraduate and postgraduate students in the respective universities.

d. subject specialists

Subject specialists are needed to answer any questions/ handle research questions. The professionals must be knowledgeable and skillful, referring the questions to experts or specialist and implementing cooperative DRS to share expertise and resources.

e. policies, and

The policies should clarify the parameter of services, response time, service behaviours, standards, guidelines and benchmarks for the quality of DRS. The service should be intended to their own students, faculty and staff and other affiliates of the university. General guidelines for example, provide prompt replies to all requests and in terms of content the library has to respond in an informative and objective way. The librarian also need to identify his/herself, use spelling, grammar and capitalization appropriately.

f. upgrading infrastructures.

Upgrading infrastructures involve the aspects of stabilizing the system, upgrading the servers, employ the IT staff, troubleshooting, increase allocation, enhancing asynchronous DRS and introducing synchronous DRS. Users should be given guidelines on handling technical problems.

Implementing and applying this framework will involve a considerable amount of work which will, however to be successful in long term. DRS should have conceptual model that can act as a guideline for the service administrators of DRS to meet users' needs in a more effective manner. This will reflect the new role and function of information professional especially the reference librarian in the digital environment. Without clear understanding of the framework model would cause those services struggle and sometime fail altogether.

This model was shown and explained to all the Chief Librarians of the four university libraries under study and they commented favourably on it. A formal validation of this model is beyond the scope of the study and is left for the future research.

5.7 FUTURE RESEARCH

This study has examined the DRS in selected academic libraries in Malaysia. In doing the study, it has also revealed several aspects of DRS in academic libraries in Malaysia which require further studies. Among them are:

a. The results of the study suggest a need for a more detailed coverage of DRS in academic libraries which will include other public universities, teacher training institution libraries, private universities and colleges in Malaysia. The provision of DRS in other libraries should also be examined to give a more comprehensive picture of the services, and reveal issues and challenges that may not be evident from these four libraries.

b. Further research also should include students from other faculties such as from social sciences and humanities, science and technology faculties. Besides students, lecturers as well as general staff can also be involved in the research. This further research should be carried out to examine the level of awareness, usage, effectiveness and perceived needs of students as well as lecturers from different faculties, besides general staff.

c. Comparative studies between United States/United Kingdom or other countries and Malaysia in terms of DRS in academic libraries. Further research should be carried out to study the difference between the DRS offered in those countries and Malaysia. The comparative study of the existing status of DRS in different countries for instance will help to understand what the academic libraries in this country are lagging behind and how it can be improved.

d. Study on assessment and evaluations of DRS implemented in public academic libraries and other libraries are needed in order to improve the quality of the services and to ascertain the strengths and weaknesses of the different formats of DRS. This study is to

focus on the process of implementation besides examining the services' impact to the users and services' administrators.

e. Finally, further research is required to set some common standards or benchmarks for the quality of DRS in academic libraries in Malaysia. By studying the logs for the user transaction, one can understand the components that occur during the question-answering process. The standard for service development or management aspect involves decisions made in creating and maintaining the services which will effect overall quality of the services. The researcher feels that the study involving standards and benchmarks is important to be carried out when in the near future several libraries is expected to join up to collaborate in DRS, all partners then have to agree on only one or single set of performance indicators.

5.8 CONCLUDING STATEMENT

The study has examined the current status of DRS in academic libraries in Malaysia. It has provided data on the extent to which format of DRS has contributed to reference services in digital environment. This study has revealed several important profiles and practices of librarians and students from computer science and information technology backgrounds with regard to DRS in academic libraries. The study has contributed to the understanding of the awareness, usage, effectiveness and perceived needs of DRS in academic libraries in Malaysia. The effective use of DRS in academic libraries will help to increase motivation and a lifelong of learning.

The researcher hopes that the findings of this study will contribute positively towards the development of digital reference services, as well as other aspects of online services, in academic libraries in Malaysia and internationally. The contribution of the

study also can be seen in terms of providing relevant data and information pertaining to the body of knowledge on DRS to various parties, especially to the Malaysian Ministry of Higher Education, university administrators, academic librarians and students. In a broader sense, it is hoped the findings of this study will contribute towards the excellence of academic library services in the country in line with the Government's aspiration of making Malaysia an educational hub of the region as well as developing world-class universities. Finally, the study also hopes to stimulate future research pertaining to digital reference services, both by researchers and practitioners.

BIBLIOGRAPHY

Abdoulaye, K. and Majid, S. (2000). 'Use of Internet for reference services in Malaysian academic libraries.' *Online Information Review*, 24 (5): 381-389.

Abels, E. G. (1996). 'The e-mail reference interview.' *RQ*, 35 (3): 345-358.

Adida Mohd Amin, Lisdar Abdul Wahid and Rafidah Abdul Aziz (2003). 'Roles and functions of information professionals in digital libraries.' *Kekal Abadi,* 22 (2): 7-13.

Al-Hawamdeh, S. and Hart, T. L. (2002). *Information and knowledge society*. Singapore: McGraw-Hill.

Aman, M. (2004). 'Use of Malaysian academic library websites by university students.' *Information Development,* 20 (1): 67-72.

'Answers.com.technology.' Available at *http:www.answers.com/topic/content-analysis?cat=technology*. Accessed June 13, 2008.

Archer, S. B. and Cast, M. 'Going where the questions are: using media to maintain personalized contact in reference service in medium-sized academic libraries.' *The Reference Librarian*, 31 (65): 39-50.

Arms, W. Y. (2001). *Digital libraries*. Cambridge: MIT Press.

Badilah Saad, Shahar Banun Jaafar and Chew, W. F. (1996). 'Malaysian libraries for national development: a country report.' Paper presented at the *Tenth Congress of Southeast Asian Libraries (CONSAL X),* 21 – 25 May 1996, Kuala Lumpur.

Badu, E. E. and Markwei, E. D. (2005). 'Internet awareness and use in the University of Ghana.' *Information Development,* 21 (4): 260-268.

Bailin, A. and Grafstein, A. (2005). 'The evolution of academic libraries: the networked environment.' *The Journal of Academic Librarianship,* 31 (4): 317-323.

Bane, A. F. and Milheim, W. D. (1995). 'Internet insights: how academics are using the Internet.' *Computers in Libraries*, 15 (2): 32-36.

Bell, R. T. and Jariah Mohd Jan (eds.). (2003). *Guide to the preparation of research reports, dissertations and theses*. Kuala Lumpur: Institute of Postgraduate Studies, University of Malaya.

Berg, B. L. (2001). *Qualitative research methods for the social sciences*. 4th ed. London: Allyn & Bacon.

Bertot, J. C., McClure, C. R. and Ryan, J. (2001). *Statistics and performance measures*

for public library networked services. Chicago: American Library Association.

Berube, L. (2003). 'Digital reference overview: an issue paper from the Networked Services Policy Task Group.' Available at *http://www.ukoln.ac.uk/public/nsptg/ virtual/.* Accessed May 14, 2004.

Blumenstyk, G. (2001). 'Libraries offer online reference services to one another.' *Chronicle of Higher Education*. Available at *http//chronicle.com/free/2001/ 05/2001052201.htm*. Accessed August 9th, 2004.

Booth, W. C., Colomb, G. G. and Williams, J. M. (1995). *The craft of research.* Chicago: The University of Chicago Press.

Bopp, R. E. and Smith, L. C. (eds.). (2001). *Reference and information services: an introduction*. 3rd ed. Colorado: Libraries Unlimited, Inc.

Braun, L. W. (2002). 'Redefining reference in the electronic age'. Available at *http://www.lleonline.com.* Accessed October 18, 2002.

Brause, R. S. (2000). *Writing your doctoral dissertation; invisible rules for success* London: Falmer Press.

Braxton, S. M. and Brunsdale, M. (2004). 'E-mail reference as a substitute for library Receptionist'. *The Reference Librarian*, 85: 19-31.

Breeding, M. (2001). 'Providing virtual reference services: libraries are finding ways to expand services to remote users'. *Information Today*, 18 (4): 42-43.

Broughton, K. (2001). 'Our experiment in online, real-time reference.' *Computers In Libraries*, 21(4): 1-5.

Bryman, A. (1989). *Research methods and organizational studies.* London: Unwin Hyman.

Bryman, A. (2004). *Social research methods.* 2nd ed. Oxford: Oxford University Press.

Bunge, C. A. (1999). 'Reference services.' *Reference Librarian*, vol. 66: 185-199.

Bunge, C. A. and Bopp, R. E. (2001). 'History and varieties of reference services'. In Bopp, R. E. and Smith, L. C. (eds.). (2001). *Reference and information services: an introduction.* 3rd ed. Colorado: Libraries Unlimited, Inc.: 3-27.

Burke, L. (2003). 'The future role of librarians in the virtual library environment'. *The Australian Library Journal,* 51 (1): 1-16.

Busha, C. H. and Harter, S. P. (1980). *Research methods in librarianship: techniques and interpretation.* Orlando, Florida: Academic Press, Inc.

Campbell, J. D. (1992). 'Shaking the conceptual foundations of reference: a perspective.' *Reference Services Review*, 20: 29-36.

Carlson, J. (2001). 'CDRS: Collaborative Digital Reference Service.' Available at *http://www.sls.lib.il..us/reference/por/features/2001/cdrs.html.* Accessed October 19, 2004.

Cassell, K. A. (1999). *Developing reference collections and services in an electronic age.* New York: Neal-Schuman Publishing.

Cassell, K. A. and Hiremath, U. (2006). *Reference and information services in the 21st century: an introduction.* New York: Neal-Schuman Publishing.

Chall, D. K. (1992). *Responses to reference questions: a study of reader services in selected university libraries in Malaysia.* Unpublished MLIS Dissertation, University of Malaya.

Chowdhury, G. G. (2002). 'Digital libraries and reference services: present and future.' *Journal of Documentation,* 58 (3): 258-283.

Chowdhury, G. G. and Chowdhury, S. (2001). *Information sources and searching on the World Wide Web*. London: Library Association Publishing.

Chowdhury, G. G. and Chowdhury, S. (2003). *Introduction to digital libraries.* London: Facet Publishing.

Chowdhury, G. and Margariti, S. (2004). `Digital reference services: a snapshot of the current practices in Scottish libraries.' *Library Review*, 53 (1): 50-60.

Coffman, S. and Arret, L. (2004). 'To chat or not to chat: taking another look at virtual reference, part 1.' *Searcher* 12.7 (July/August, 2004). Available at *http://www.infotoday.com/searcher/jul04/arret_coffman.shtml.* Accessed May 20th, 2005.

Connor, B. M. and Alford, T. E. (1982). 'Drafting the reference services policy statement.' In Katz, B. and Clifford, A. (eds.). *Reference and online services handbook: guidelines, policies, and procedures for libraries.* New York: Neal-Schuman: 21-31.

Connor, E. (ed.). (2006). *An introduction to reference services in academic libraries.* New York: The Haworth Information Press.

Cox, C. N. (2006). 'Virtual reference: answering patrons' questions electronically.' In Connor, E. (ed.). *An introduction to reference services in academic libraries.* New York: The Haworth Information Press: 49-59.

'Creating a development dynamic: final report of the digital opportunity initiative', Available *at http://www.opt-init.org/framework/pages/appendix3Case5.html.*

Accessed December 1, 2004.

Creswell, J. W. (1994). *Research design: qualitative and quantitative approaches.* Thousand Oaks: Sage.

Cullen, R. (2001). 'Only connect … a survey of reference services – past, present and future.' In Gorman, G. E. (ed.). (2001). *Information services in an electronic environment.* London: Library Association Publications.

Curry, E. L. (2001). Technological advances in reference: a paradigm shift? *Library Trends,* 50(2): 165-167.

Dabbs, J. M. (1982). 'Making things visible'. In VanMaanen, J. (ed.). *Varieties of qualitative research*. Beverly Hills, CA: Sage.

Davinson, D. (1980). *Reference service.* London: Clive Bingley.

Dee, C. and Allen, M. (2006). 'A survey of the usability of digital reference services on Academic Health Science Library Web.' *Journal of Academic Librarianship,* 32 (1): 69.

Deegan, M. (2002). 'The spectrum of digital objects in the library and beyond.' In Gorman, G. E. (ed.). (2002). *The digital factor in library and information services.* London: Facet Publishing: 3-23.

Deegan, M. and Tanner, S. (2002). *Digital futures: strategies for the information age.* London: Library Association Publishing.

Denzin, N. K. and Lincoln, Y. S. (eds.). (2000). *Handbook of qualitative research.* 2nd ed. Thousand Oaks: Sage Publications, Inc.

Diaz, K. R. (ed.). (1997). *Reference sources on the Internet: off the shelf and onto the Web.* New York: The Haworth Press, Inc.

'Digital reference services'. In *Wikipedia: the free encyclopedia.* Available at *http: en.wikipedia.org/wiki/Digital-reference-services.* Accessed June 29, 2006.

Dilevko, J. (2001). 'An ideological analysis of digital reference service models. *Library Trends*, 50(2): 218-244.

Ding, C. M. (1996). 'Assessing the impact of IT on university library services in the 21st century.' *Malaysian Journal of Library and Information Science*, 1 (2): 79-88.

Doherty, J. J. (2007). *Facilitating interaction: the role of the reference librarian in online learning environment*. EdD Dissertation. Northern Arizona University.

Drake, M. A. (ed.). (2003). *Encyclopedia of library and information science.* Vol.3, 2nd ed. New York: Marcel Dekker.

Education guide Malaysia: your one-stop resource guide to Malaysian education. (2004). 9th ed. Petaling Jaya: Challenger Concept.

Education guide Malaysia: your one-stop resource guide to Malaysian education. (2005). 10th ed. Petaling Jaya: Challenger Concept.

Edwards, J. D. (ed.). (2001). *Emerging solutions in reference services: implication for libraries in the new millennium.* New York: The Haworth Information Press.

Egghe, L. and Rousseau, R. (2001). *Elementary statistics for effective library and information service management.* London: Aslib-IMI.

Elbakhiet, A. B. (1998). *The impact of Internet on the library: usage patterns and perceptions of postgraduate students at the University of Malaya.* Unpublished MLIS Dissertation, University of Malaya.

Electronic Frontier Foundation (2002). 'Unintended consequences: four years under the DMCA.' Available *at http://www.eff.org/IP/DMCA/200030102-dmca-unintended-consequences.html*. Accessed August 27, 2005.

Eisenhardt, K. M. (1999). 'Building theories from case study research.' In Bryman, A. and Burgess, R. G. *Qualitative research.* Vol. 1. London: Sage: 135-159.

Feather, J. and Sturges, P. (eds.). (2003). *International encyclopedia of information and library science.* 2nd ed. London: Routledge.

Ferguson, C. D. and Bunge, C. A. (1997). 'The shape of services to come: values-based reference service for the largely digital library.' *College and Research Libraries*, 58(3): 252-265.

Foley, M. (2002). 'Instant messaging reference in academic library: a case study.' *College and Research Libraries.* 63: 36-45.

Fontana, A. and Frey, H. J. (2000). 'The interview: from structured questions to negotiated text.' In Denzin, K. N. and Lincoln, S. Y. (eds.). (2000). *Hand-book of qualitative research*. 2nd ed. Thousand Oak. CA: Sage Publication.

Ford, C. E. (2003). *An exploratory study of the difference between face-to-face and computer-mediated reference interactions.* Unpublished Ph.D Dissertation, Indiana University.

Fraenkel, J. R. and Wallen, N. E. (2006). *How to design and evaluate research in education.* 6th ed. Boston: McGraw Hill.

Francoeur, S. (2002). 'Digital Reference.' In *The Teaching Librarian.* Available at *http://www.teachinglibrarian.org/digref.htm.* Accessed July 27, 2004.

Gabriel, M. R. (1998). 'The Internet: a ready reference library.' *Catholic Library World*, 68(3): 13-18.

Gandhi, S. (2003). 'Academic librarians and distance education: challenges and opportunities'. *Reference and User Services Quarterly*, vol. 43(2): 138-154.

Gates, J. K. (1994). *Guide to the use of libraries and information sources.* 7th ed. New York: McGraw-Hill.

Gay, L. R. (1996). *Educational research: competencies for analysis and applications*. 5th ed. New Jersey: Prentice-Hall.

Glazier, J. D. and Powell, R. R. (1992). *Qualitative research in information management.* Englewood, Colorado: Libraries Unlimited, Inc.

Goetsch, L. Sowers, L. and Todd, C. (1999). 'SPEC kit 251: electronic reference service: executive summary.' Available at *http://www.arl.org/spec/251sum. html.* Accessed October 29, 2003.

Gopal, K. (2004). *Digital libraries in electronic information era.* Delhi: Author Press.

Gorman, G. E. (ed.). (2001). *Information services in an electronic environment.* London: Library Association Publications.

Gorman, G. E. (ed.). (2002). *The digital factor in library and information services.* London: Facet Publishing.

Gorman, G. E. and Clayton, P. (2005). *Qualitative research for the information professionals: a practical handbook.* 2nd ed. London: Facet Publishing.

Gosling, M. (1999). *Learn reference work.* Canberra: Book Promotion and Service Company.

Gray, S. M. (2000). 'Virtual reference services: directions and agendas'. *Reference and User Services Quarterly*, 39(4): 365-375.

Green, S. B., Salkind, N. J. and Akey, T. M. (2000). *Using SPSS for Windows: analyzing and understanding data.* 2nd ed. London: Prentice-Hall.

Greenstein, D. (2002). 'Digital Library Federation draft strategy and business plan.' Available at *www.diglib.org/about/strategic.htm.* Accessed 30 September, 2004.

Grohs, K., Reed, C. and Allen, N. (2003). 'Marketing the virtual library.' In Hanson, and Levin, B. L. (2003). *Building a virtual library.* London: Information Science Publishing: 133-147.

Gross, M., McClure, C. R. and Lankes, R. D. (2001). *Assessing quality in digital reference services*: *overview of key literature on digital reference*. Florida: Information Use Management and Policy Institute.

'Guidelines for implementing and maintaining virtual reference services.' (June 2004). Available *at http://www.ala.org/PrinterTemplate.cfm?Section=referenceguide& Template=/Conten…* Accessed August 13, 2005.

Guidelines for reference and information services in public libraries. London: Library Association, 1999.

Han, L. and Goulding, A. (2003). 'Information and reference services in the digital library.' *Information Services and Use*, 23: 251-262.

Hanson, A. and Levin, B. L. (2003). *Building a virtual library.* London: Information Science Publishing.

Hawamdeh, S. (1996). *Virtual library concept, implementation and enabling technologies*. 10th Congress of Southeast Asian Librarians (21- 25 May 1996 Kuala Lumpur).

Hayes, R. M. (2001). *Models for library management, decision making, and planning.* London: Academic Press.

Healy, M. (1995). 'Information – access or ownership?' *ThE-Journal*, November. Available at *http://infotrain.magill.unisa.edu.au/epub/Special_Editions/* Accessed July 26, 2005.

Higgens, G. L. (ed.). (1984). *Printed reference materials*. 2nd ed. London: LA.

Huling, N. (2002). 'Reference services and information access.' In Schement, J. R. (ed.). (2002). *Encyclopedia of communication and information.* New York: Gale Group: 867-874.

Ibrahim, A. E. (2004). 'Use and user perception of electronic resources in the United Arab Emirates University (UAEU)'. *Libri,* 54*:* 18-29.

'IFLA digital reference guidelines.' Available at *http:www.ifla.org/VII/s36/pubs/ drg03.htm*. Accessed June 15th, 2008.

'International students: private education in Malaysia.' Available at *http://www. studymalaysia.com/is/education12.shtml.* Accessed January 17, 2005.

Janes, J., Carter, D. and Memmott, P. (1999). 'Digital reference services in academic libraries.' *Reference and User Services Quarterly,* 39(2): 145-150.

Janes, J. (2002). 'What is reference for?'. Available at *http://www.ala.org/ala/rusa /rusaprotools/futureofref/whatreference.htm.* Accessed June 12, 2004.

Jesser-Skaggs, S., Duke, G., Ferguson, J., Fulbright, A. and Battle, J. (2002). *Richland College library handbook.* 8th ed. Richland College.

Johnson, C. M. (2004). 'Online chat reference: survey results from affiliates of two universities'. *Reference and User Services Quarterly*, 43(3): 237-247.

Johnson, I. M., Newton, R. and Reid, P. (2004). 'Management and development of e-reference services: some implications for education and training of library staff.' In *Proceedings of the Second Shanghai International Library Forum*, October 12 -15, 2004, Shanghai: 166-174.

Juhana Salim (1996). 'From tour to problem solving: evolution of library instruction programmes in Tun Seri Lanang Library, Universiti Kebangsaan Malaysia.' *Malaysian Journal of Library and Information Science*, 1 (2): 27-42.

Kantor, A. and Neubarth, M. (1996). 'Off the charts: the Internet of 1996'. *Internet World*, December: 45-51.

Kasowitz, A., Bennett, B. and Lankes, R. D. (2000). 'Quality standards for digital reference consortia'. *Reference and User Services Quarterly,* 39 (4):355-363.

Kasowitz, A. S. (2001). 'Trends and issues in digital reference services'. *ERIC Digest*, November.

Katz, B. and Bunge, C. A. (eds.). (1989). *Rothstein on reference…with some help from friends.* New York: Haworth Press.

Katz, B. and Clifford, A. (eds.). (1982). *Reference and online services handbook: guidelines, policies, and procedures for libraries*. New York: Neal-Schuman.

Katz, B. and Tarr, A. (eds.). (1978). *Reference and information services: a reader.* Metuchen, N.J: The Scarecrow Press, Inc.

Katz, W. A. (2002a). *Introduction to reference work volume I: basic information services*. 8th ed. New York: McGraw-Hill.

Katz, W. A. (2002b). *Introduction to reference work volume II: reference services and reference processes.* 8th ed. New York: McGraw-Hill.

Kawakami, A. K. (2003). 'Real-time digital reference.' In Drake, M. A. (ed.). *Encyclopedia of library and information science*. 2nd ed. New York: Marcel Dekker: 2463-2474.

Keenan, S. and Johnston, C. (2000). *Concise dictionary of library and information science.* 2nd ed. London: Bowker Saur.

Kerr, A. W., Hall, H. K. and Kozub, S. A. (2003). *Doing statistics with SPSS*. London: Sage Publications.

Khoo, S. M. (1981). 'University libraries in Malaysia.' In Jackson, M. M. (ed.). *International handbook of contemporary developments in librarianship.* Westport, Connecticut: Greenwood Press.

Kibbee, J. (2006). 'Librarians without borders? Virtual reference service to unaffiliated users.' *The Journal of Academic Librarianship*, 32 (5): 467-473.

Kloss, L. and Yin, Z. (2003). 'An evaluative case study of a real-time online service'. *The Electronic Library*, 21 (6): 565-575.

Kochtanek, T. R. and Matthews, J. R. (2002). *Library information systems: from library automation to distributed information access solution.* Westport, Connecticut: Libraries Unlimited.

Koenig, M. (2006). 'Leadership roles for information professionals.' *Proceedings of the Asia-Pacific Conference on Libraries and Information Education and Practice.* Organized by Nanyang Technological University, University of Malaya and Nanyang Technological University Library, Singapore 3-6 April, 2006: 11-17.

Krejcie, R. V. and Morgan, D. W. (1970). 'Determining sample size for research activities.*' Educational and Psychological Measurement*, 30 (Autumn): 607- 610.

Laili Hashim (2000). *A study on the perceptions of library services and usage in selected higher education institutions in Malaysia.* Unpublished Ph.D Dissertation, Loughborough University of Technology.

Lam, K. (2003). 'Exploring virtual reference: what it is and what it may be' In Lankes, R. D. et al. (eds). *Implementing digital reference services: setting standards and making it real*. London: Facet Publishing: 31-40.

Lamolinara, G. and Grunke, R. (2002). 'Reference service in a digital age'. *http:www.loc/lcib/9808/ref.html*. Accessed 20 October, 2002.

Lankes, R. D. (1998). *AskA starter kit: how to build and maintain digital reference services.* Syracuse: ERIC Clearinghouse on Information and Technology.

Lankes, R. D. (1999). *Building and maintaining Internet information services.* Unpublished Ph.D Dissertation, Syracuse University.

Lankes, R. D., Collins, J. W. and Kasowitz, A. S. (eds.). (2000). *Digital reference service in the new millennium: planning, management and evolution.* New York: Neal-Schuman.

Lankes, R. D. (2000a). 'The birth cries of digital reference: an introduction to this special issue'. *Reference and User Services Quarterly*, 39 (4): 352-354.

Lankes, R. D. (2000b). 'The foundations of digital reference.' In Lankes, R. D., Collins, J. W. and Kasowitz, A. S. (eds.). (2000). *Digital reference services in the new millennium: planning, management and evaluation.* New York: Neal-Schuman Publications: 1-10.

Lankes, R. D., McClure, C. R., Gross, M. and Pomerantz, J. (eds.). (2003). *Implementing digital reference services: setting standards and make it real*. London: Facet Publishing.

Lankes, R. D. (2005). `Digital reference research: fusing research and practice.' *Reference and User Services Quarterly*, vol. 44 (4): 320-327.

Lankes, R. D., Abels, E. G., White, M. D. And Hague, S. N. (2006). *The virtual reference desk: creating a reference future.* London: Facet Publications.

Lee, K. H. (2000). *Evaluation of academic library web sites in Malaysia.* Unpublished MLIS Dissertation, University of Malaya.

Lee, K. H. and Teh, K. H. (2000). 'Evaluation of academic library web sites in Malaysia.' *Malaysian Journal of Library and Information Science,* 5(2): 95-108.

Lee, S. H. (ed.) (1983). *Reference service: a perspective.* Ann Arbor, Michigan: The Pierian Press.

Lee, W. L. (1993). *A proposal for standards and guidelines for teacher training college resource research centres in Malaysia.* Unpublished M.Lib. Dissertation, University of Wales at Aberystwyth.

Lesk, M. E. (1999). 'The organization of digital libraries.' In Stern, D. (ed.). (1999). *Digital libraries: philosophies, technical design considerations and example scenarios*. New York: The Haworth Press.

Lessick, S. (2000). 'Transforming reference staffing for the digital library.' In Lankes, R. D., Collins, J. W. and Kasowitz, A. S. (eds.). (2000). *Digital reference service in the new millennium: planning, management and evaluation.* New York: Neal Schuman.

Lin, Zi-yu (2000).'Classification practice and implications for subject directories of the Chinese Language Web-based digital library.' *Journal of Internet Cataloging*, 3 (4) 2000: 29-50.

Lipow, A. G. (1998). 'Reference service in a digital age.' *Reference and User Services Quarterly*, 38: 47-81.

Lipow, A. G. (1999). 'Serving the remote user: reference service in the digital environment.' Available at *http://www.csu.edu.au/special/online99/ proceedings99/200.htm.* Accessed March 3, 2003.

Lipow, A. G. (2003). *The virtual reference librarian's handbook.* New York: Neal-Schuman Publishers, Inc.

Madhavji, N. (2006). 'Conducting research in computer science, software engineering and information technology: an overview for graduate students.' *Research Methodology Workshop*, Faculty of Computer Science and Information Technology, University of Malaya, 26th June, 2006.

Maharana, B. and Panda, K. C. (2005). 'Virtual Reference Service in academic libraries: a case study of the libraries of IIMs and IITs in India.' *E-prints in Library and Information Science*. Available at *eprint.rclis.org/archive*. Accessed 24.10.2007.

'Malaysia Internet Usage and Telecommunications Reports'. Available at *http://www. Internetworldstats.com/asia/my.htm.* Accessed May 28, 2008.

Malaysia. Ministry of Finance (2005). *Economic report 2005/2006*. Kuala Lumpur: Percetakan Nasional.

Malaysia. National Library (2003*). Sistem PERDANA/MYLIB FAQ.* Available at *http//:www.pnm.my/faq.htm.* Accessed 22.7.2005.

Malaysia. Prime Minister's Department (2006). *Ninth Malaysia Plan 2006-2010.* Kuala Lumpur: Economic Planning Unit.

Malaysia. Prime Minister's Department (2001). *The third outline perspective plan 2001-2010.* Kuala Lumpur: Percetakan Nasional Malaysia Berhad.

Manda, P. A. (2005). 'Electronic resources usage in academic and research institutions in Tanzania.' *Information Development,* 21 (4): 269-282.

Marchionini, G. and Maurer, H. (1995). 'The roles of digital libraries in teaching and learning.' *Communications of the ACM*, 38 (4), 67-75.

Margariti, A. and Chowdhury, G. G. (2003). 'Digital reference services: do we still need libraries?' In Sembok, T. M., Halimah Badioze Zaman, Chen, H. Urs, S. R. and Myaeng, S. H. (eds.). *Digital libraries: technology and management of indigenous knowledge for global access*. Proceeding of the 6th International Conference on Asian Digital Libraries, Kuala Lumpur, December 8-12: 158-167.

McClennen, M. (2002). 'Software, systems and standards in digital reference: a research agenda.' Available at *http://www.ipl.org/div/papers/symposium-2002/systems.html.* Accessed November 19, 2002.

McClennen, M. and Memmot, P. (2001). 'Roles in digital reference'. *Information Technology and Libraries*, 20 (3): 143-148.

McClure, C. R. (2005).'Digital reference: the future of reference services.' Available at *http://www.solinet.net/preservation/mcclure.pdf.* Accessed April 15, 2005.

McClure, C. R., Lankes, R. D., Gross, M. and Choltco-Devlin (2002). *Statistics, measures and quality standards for assessing digital reference library services: guidelines and procedures.* Draft version. New York: Syracuse University.

McClure, C. R. and Lankes, R. D. (2001). 'Assessing quality in digital reference services: A research prospectus.' Available at *http://quartz.syr.edu/quality/Overview.htm.* Accessed May 10, 2004.

Meola, M. and Stormont, S. (2002). *Starting and operating live virtual reference services: a how-to-do-it manual for librarians*. New York: Neal-Schuman.

Merriam, S. B. (1998). *Case study research in education: a qualitative approach.* San Francisco: Jossey Bass.

Mohd Sazili Shahibi, Zaharudin Ibrahim, Mohd Ridwan Seman and Mohd Jailani Paiman (2005). 'The Malaysian society perception on the prospect of electronic commerce.' *Journal of Knowledge Management*, 1 (1): 57-71.

Mohd Sharif Mohd Saad and A. N. Zainab (2002). 'Information literacy programmes In Malaysian public universities: an observation.' Paper presented at the *68th IFLA Council and General Conference*, 18-24 August, 2002, Glasgow.

Moore, N. (2000). *How to do research: the complete guide to designing and managing research projects.* 3rd ed. London: Library Association Pub.

Moyo, L. M. (2002). `Reference anytime anywhere: towards virtual reference services at Penn State.' *The Electronic Library*. 20 (1): 22-28.

Mugwisi, T. and Ocholla, D. N. (2003). 'Internet use among academic librarians in the universities of Zimbabwe and Zululand.*' Libri*, 53: 194-201.

'Muhammad Uthman tokoh Maal Hijrah 1426'. *Mingguan Malaysia*, 20th February, 2005: 36.

Multimedia Development Corporation (2005). 'The MSC flagship applications.' Available at *http://wwww.mdc.com.my/msc/flagships.asp.* Accessed June 20, 2005.

Mutala, S. M. (2002). 'Web-based reference services: design and implementation decisions.' In Gorman, G. E. (ed.). (2002). *The digital factor in library and information services.* London: Facet Publishing: 159-184.

National Information Standards Organization (2001). Report on the NISO Workshop on Networked Digital Reference Services. Available at *http: //www.niso.org/news/reports/netref-report.html.* Accessed 22 October, 2004.

Neuhold, E., Niederee, C. and Stewart, A. (2003). 'Personalization in digital libraries: an extended view.' In Sembok, T. M., Halimah Badioze Zaman, Chen, H. Urs, S. R. and Myaeng, S. H. (eds.). (2003). *Digital libraries: technology and management of indigenous knowledge for global access.* Proceedings of the 6th International Conference on Asian Digital Libraries. Kuala Lumpur, December 8-12: 1-16.

Neuman, W. L. (2003). *Social research methods: qualitative and quantitative approaches*. 5th ed. Boston: Allyn & Bacon.

Nitecki, D. A. (2005). 'SERVQUAL: Measuring service quality in academic Libraries'. Available *at http://www.arl.org/newsttr/191/servqual.html* Accessed January 20, 2005.

Noor Hidayat bin Adnan (2007). 'Strategic information system in the library (UiTM)'. *Paper presented at Seminar on Strategic Information System in Globalization Era.* Organized by Faculty of Information Management, UiTM 21 March, 2007.

Noran Fauziah Yaakub, Ahmad Mahdzan Ayob and Abdul Rahman Md. Aroff (1996). 'Evaluation of teaching in Malaysian universities: the state of art.' *Journal of Educational Research*, 17: 37-49.

Norhamimi Othman (2002). *Keberkesanan penggunaan laman web perpustakaan Universiti Malaya di kalangan kakitangan akademik.* Unpublished MLIS Dissertation, University of Malaya.

Norma Abu Seman (2002). 'Library education in Malaysia: current developments, challenges and prospects in the knowledge era.' In *Directory of information and library products and services*. Kuala Lumpur: Librarians Association of Malaysia: 50-54.

Norma Abu Seman and Che Normadiah Che Abbas (2002). 'Determining the authoritativeness of electronic and Web resources: the quality issues of Information.' Paper presented at the *National Seminar of Electronic Resource Centre*, 9-10 September, 2002 at Intekma Resort and Convention Centre, Shah Alam.

Novotny, E. (2001). 'Evaluating electronic reference services; issues, approaches and criteria.' In Su, D. (ed.). *Evolution in reference and information services: the impact of the Internet.* New York: The Haworth Press: 103-120.

Nunally, J. C., Jr. (1978). *Test and measurements*. New York: McGraw-Hill.

Oppenheim, C. and Smithson, D. (1999). 'What is the hybrid library?' *Journal of Information Science,* 25 (2): 97-112.

Palmer, R. C. (1983). *Online reference and information retrieval.* Colorado: Libraries Unlimited, Inc.

Palmer, S. S. (1999). 'Creating our role as reference librarians of the future: fate or choice.' In *Proceedings of the Association of College and Research Libraries (ACRL) Ninth National Conference*, Chicago.

Penka, J. T. (2003). 'The technological challenges of digital reference: an overview.' *D-Lib Magazine*, 9(2). Available at *http://www.dlib.org/dlib /february03/penka/02penka.html.* Accessed May 14, 2004.

PERPUN. Sub-Committee of Standards for Private University and College Libraries (1999). *Standard for Private University Libraries.* Kuala Lumpur: Library Association of Malaysia.

Perry, J. P. and Schneider, G. P. (1999). *New perspectives on the Internet comprehensive.* Cambridge, MA: International Thomson Publishing.

Pomerantz, J., Nicholson, S. and Lankes, R. D. (2003). 'Digital reference triage: factors influencing question routing and assignment'. *The Library Quarterly,* 73(2) April: 103-120.

Pomerantz, J., Nicholson, S., Belanger, Y. and Lankes, R. D. (2004). 'The current state of digital reference: validation of a general digital reference model through a survey of digital reference services'. *Information Processing and Management*, 40: 347-363.

Powell, R. R. (1993). *Basic research methods for librarian.* 2nd ed. New Jersey: Ablex Publication Corporation.

Profeta, P. C. (2006). *Effectiveness of asynchronous reference services for distance learning students within Florida's Community College System.* Ph.D. Dissertation, Nova Southeastern University.

Raghavan, A. (2000). 'Role of librarians: paradigm shifts – past to present.' *CONSAL XI,* April 26 – 28, Singapore: CONSAL.

Raja Abdullah Yaacob. (1990). *Attitudes concerning information technology of librarians employed in government supported special libraries in Malaysia.* Unpublished Ph.D. Dissertation, University of Michigan.

Raja Abdullah Yaacob (2002). 'ICT-based information professionals, admidst the knowledge era: challenges in training and education.' Paper presented at *International Conference on Linking Technology in the Information Services.* 25-26 June 2002 at JW Marriot Hotel, Kuala Lumpur.

Raja Abdullah Yaacob and Wan Ab. Kadir Wan Dollah (2000). 'Applying the concept of customer service in the context of e-learning: the Faculty of Information Studies, UiTM experience.' Paper presented at the *Training Programme*, Faculty

of Business Administration, UNITAR, Glory Beach Resort, Port Dickson, 26-27 October, 2000.

Ranganathan, S. R. (1931). *Five laws of library science.* Madras: Madras Library Association.

Ranganathan, S. R. (1940). *Reference service*. New York: Asia Publishing House.

Rehman, S. and Amoah, L. (1996). 'The effect of automation on job design: a case study of 4 Malaysian university libraries.' *LASIE: Library Automated Systems Information Exchange*. 27 (1): 16-25.

Reitz, J. M. (2004). *Dictionary for library and information science*. London: Libraries Unlimited.

Rennie, J. (1997). 'Civilizing the Internet.' *Scientific American.* 276 (3): 6.

Richardson, J., Fletcher, J., Hunter, A. and Westerman, P. (2000). 'Ask a librarian's electronic reference services: the importance of corporate culture, communication and service attitude', *Library Automated Systems Information Exchange (LASIE)*, 31 (4): 25-37.

Richardson, S., Guru, B. K., Cheng, M. Y., Khong, K. W. and Pointon, L. (2005). *How to research: a guide for undergraduate and graduate students*. Singapore: Thomson.

Robson, C. (1999). *Real world research: a resource for scientists and practitioner-researchers.* 2nd ed. Oxford: Blackwell.

Roesch, H. (2006). 'Digital reference services: state of the art in the focus on quality.' *World Library and Information Congress: 72nd IFLA General Conference and Council,* 20-24 August 2006, Seoul.

Roesnita Ismail (2005). *Survey on the perception and use of electronic books among IT students.* Unpublished MLIS Dissertation, University of Malaya.

Roesnita Ismail and Zainab A. N. (2005). The pattern of e-book use amongst under-graduates in Malaysia: a case of to know is to use. *Malaysian Journal of Library & Information Science*, 10 (2): 1-24.

Rosna Taib (2002). 'Performance indicators for academic libraries in Malaysia'. *Sekitar Perpustakaan*, 34: 1-8.

Ross, C. S., Nilsen, K. and Dewdney, P. (2002). *Conducting reference interview: a-how-to-do-it manual for librarians.* London: Facet Publications.

Rothstein, S. (1953). 'The development of the concept of reference service in American Libraries, 1850-1900.' *Library Quarterly*, 23:1(January, 1953):1-15.

Rothstein, S. (1961). 'Reference services: the new dimension in librarianship.' *College and Research Libraries*, 22:11-18.

Rothstein, S. (1964). 'Reference service: the new dimension in librarianship.' In Rowland, A. R. (1964). *Reference services.* Hamden, Connecticut: The Shoe String Press: 35-46.

Rowland, A. R. (1964). *Reference services.* Hamden, Connecticut: The Shoe String Press.

Rowland, F. (2002). The librarian's role in the electronic information environment. Paper presented to the ICSU Press Workshop, Keble College, Oxford, UK, 31 March - 2 April, 1998. Available at *http:www.bodley.ox.ac.uk/icsu/ rowlandppr.htm.* Accessed November 17, 2002.

'RUSA reference guidelines: guidelines for information services.' (July 2000). Available at *http://www.ala.sa/rusaprotocols/referenceguide/guidelinesinformation.htm.* Accessed October 11, 2004.

Ryan, S. (1996). 'Reference service for the Internet community: a case study of the Internet Public Library Reference Division.' *Library and Information Science Research*, 18 (3): 241-259.

Salant, P. and Dillman, D. (1994). *How to conduct your own survey.* New York: John Wiley & Sons.

Saracevic, T. and Kantor, P. B. (1997). 'Studying the value of Library and Information Services: Part 1 Establishing the theoretical framework.' *Journal of the American Society for Information Science*, June: 528-542.

Sauers, M. P. (2001). *Using the Internet as a reference tool: a how-to-do-it manual for librarians.* London: Library Association Publication.

Schement, J. R. (ed.). (2002). *Encyclopedia of communication and information.* New York: Gale Group.

Schneider, G. P. and Evans, J. (2004). *New perspectives on the Internet.* 5th ed. Massachusetts: Thomson.

Schwartz, C. (2000). `Digital libraries: an overview.' *Journal of Academic Librarianship.* 26 (6): 385-393.

Sekaran, U. (2000). *Research methods for business: a skill building approach.* 3rd ed. New York: John Wiley and Son.

Shachaf, P. (2008). 'Implementation of professional and ethical standards.' *Bulletin of The American Society for Information Science and Technology*, December/ January 2008, 34 (2): 20-24.

Shahar Banun Jaafar (1999). *The digital age: challenges to librarians in Malaysia* Kuala Lumpur: Perpustakaan Negara Malaysia.

Shahar Banun Jaafar (2003). 'Libraries in Malaysia.' In Drake, M. A. *Encyclopedia of library and information science.* 2nd ed. New York: Marcel Dekker: 1561-1577.

Shaifol Yazam Mat and Aishah Mohd Nasir (2005). 'Digitization and sustainability of local collection: an observation of digitization activities among Malaysian universities libraries.' *World Library and Information Congress: 71st IFLA General Conference and Council.* August 14-18th 2005 Oslo, Norway.

Singh, Diljit (1993). *An international comparative study of school libraries.* Unpublished Ph.D Dissertation, The Florida State University.

Singh, Diljit (2004). 'Reference services in the digital age.' Paper presented at the *Conference on Library Management in the 21st Century* at Ateneo de Manila University, Philippines, 29-30 March, 2004.

Sloan, B. (2004). 'Digital reference services bibliography.' Available at *http: //alexia.lis.uiuc.edu/~b-sloan/digiref.html*. Accessed August 5, 2005.

Sloan, B. (1997). Service perspectives for the digital library: remote reference services. Available at *http://www.lis.uiuc.edu/~b-sloan/e-ref.html*. Accessed May 3, 2003.

Smith, B. (2001). 'Enhancing reference services through technology.' In Edwards, J. D. (ed.). (2001). *Emerging solutions in reference services: implications for libraries in the new millennium.* New York: The Haworth Information Press.

Smith, C. N. (2002). 'A librarian without library: the role of the librarian in electronic age'. Available at *http:www.curtin.edu.au.* Accessed October 18, 2002.

Sreenivasulu, V. (2000). 'The role of digital librarian in the management of Digital Information System (DIS).' *The Electronic Library*, 18 (1): 12-20.

Stacy-Bates, K. (2003). 'E-mail reference responses from academic ARL libraries: an unobtrusive study.' *Reference and User Services Quarterly,* 43(1): 59-70.

Stake, R. E. (2000). 'Case studies.' In Denzin, N. K. and Lincoln, Y. S. (eds.). *Hand-book of qualitative research.* 2nd ed. Thousand Oaks: Sage Publications Inc.

Stern, D. (ed.). (1999). *Digital libraries: philosophies, technical design considerations, and example scenarios.* New York: The Haworth Press.

Stevenson, J. (1997). *Dictionary of library and information management.* Middlesex: Peter Collin Publishing.

Storey, T. and Lauer, C. (2004). 'The next generation of librarians.' In *OCLC Newsletter*, no. 264, April-June, 2004: 8-13.

Straw, J. E. (2001). 'From magicians to teachers: the development of electronic reference in libraries: 1930-2000.' In Su, D. (ed.). *Evolution in reference and information services: the impact of the Internet.* New York: Haworth Press: 1-12.

Su, D. (ed.) (2001). *Evolution in reference and information services: the impact of the Internet.* New York: The Haworth Press.

Su, S. S. (2002). 'Web-based reference services: the user intermediary interaction perspective.' In Gorman, G. E. (2002). *The digital factor in library and information services.* London: Facet Publishing: 185-207.

Sulaiman Shamsuri (2004). *Research methods for the social sciences: made simple.* Bangi: DSS Publishing Enterprise.

Sullivan, D. (2004). 'Characteristics of E-mail Reference Services in selected public libraries, Victoria, Australia.' *The Reference Librarian*, 85: 51-80.

'MDC to focus on three key strategies'. *SundayStar*, 30th January, 2005: 2.

Sutton, S. (1996). 'Future service models and the convergence of functions: the reference librarian as a technician, author, and consultant.' In Low, K. (ed.). *The role of reference librarians: today and tomorrow.* New York: Haworth Press: 131-138.

Swanpoel, M., DuToit, A. and VanBrakel, P. A. (2001). 'Management of information technology in academic information services.' *Aslib Proceedings*, 53(6): 224-237.

Tedd, L. A. (1993). *An introduction to computer-based library systems.* 3rd ed. Chichester: John Wiley and Sons.

Tedd, L. A. (2003). 'Challenges facing information professionals.' In *Global knowledge renaissance: selected papers from the World Library Summit 2002*. Singapore: Times Book International: 119-133.

Tellis, W. (1997). 'Introduction to case study.' *The Qualitative Report*, 3(2). Available *at http://www.nova.edu/sss/QR/QR3-2/tellis1.html.* Accessed January 10, 2005.

Tennant, R. (2004). *Managing the digital libraries*. New York: Reed Press.

Tenopir, C. (2001). 'Virtual reference services in a real world.' *Library Journal*, 126(11): 38-40.

Tenopir, C. and Ennis, L. (1998). 'The impact of digital reference on librarians and library users'. *Online*, November. Available at *http://www.onlinemag.net/OL1998/tenopir11.html.* Accessed December 1, 2004.

Tenopir, C. and Ennis, L. (2002). 'A decade of digital reference 1991-2001.' *Reference and User Service Quarterly*. 41(3), Spring: 264-273.

Thomsen, E. (1999). *Rethinking reference: the reference librarian's practical guide for surviving constant change*. New York: Neal Schuman Pub., Inc.

Tipton, C. J. (2002). *Academic libraries and distance learners: a study of graduate student perceptions of the effectiveness of library support for distance learning* Unpublished Ph.D Dissertation, Texas A & M University.

Tunender, H. (2002). 'Digital reference: trends, techniques, and changes.' *Library Hi Tech News*, 19(4): 5-6.

Tyckoson, D. A. (2001). 'What is the best model of reference service?' *Library Trends*. 50(2): 183-196.

Uimonen, P. (2001). 'Contested visions-the digital dilemma.' Available at *http: //www.i-connect.ch/uimonen/visions.htm.* Accessed January 10, 2005.

VandeCreek, L. M. (2006). 'E-mail reference evaluation: using the results of a satisfaction survey'. *The Reference Librarian*, number 93: 99-108.

Vasudevan, V. (2007). 'Move to attract 100,000 foreign students by 2010'. In *New Straits Times*, 24.1.2007: 21.

Virtual Research Facilitator (VRF): user manual. (n.d.) Tun Abdul Razak Library, Mara University of Technology.

Wainwright, E. (1996). 'Digital libraries: some implications for government and education from Australian development experience.' Available at http://:*www. nla.gov.au/nla/staffpaper/ew6.html.* Accessed May 15, 2004.

Wan Ab. Kadir Wan Dollah (1994). *Potential contribution of CD-ROM resources in teacher training institution libraries in Malaysia with special reference to Faculty of Education Library, University of Malaya*. Unpublished M.Lib. Dissertation, University of Wales at Aberystwyth.

Wan Norizan Wan Mansor (2001). *Digital libraries: its challenges and roles of the librarians in the information age.* Unpublished M.Sc. Info. Mgmt. Dissertation, MARA University of Technology.

Wasik, J. M. (2003a). 'Building and maintaining digital reference services.' Available at *http://www.michaellorenzen.com/eric/ref-serv.html.* Accessed January 20th, 2004.

Wasik, J. M. (2003b).`Digital reference evaluation.' Available at *http://www.vrd. org/AskA/digref-assess.shtml.* Accessed December 3, 2004.

'The way forward: the research universities partnership with industries.' In *StudyGuardian*, July 2006. Available at *http://www.studyguardian.com/2006/jul 2006_1htm.* Accessed August 5th, 2006.

Wells, A. T. and Hanson, A. (2002). `E-reference.' In Hanson, A. and Levin, B. L. *Building a virtual library*. London: Information Science Pub.: 95-120.

White, M. D. (2001). 'Diffusion of an innovation: digital reference services in Carnegie Foundation Master's (Comprehensive) Academic Institution Libraries.' *Journal of Academic Librarianship*, 27: 173-187.

White, M. D. (2001). 'Digital reference services: framework for analysis and evaluation.' *Library and Information Science Research,* 23: 211-231.

Whitlatch, J. B. (2001). `Evaluating reference services in the electronic age.' *Library Trends,* 50 (2) Fall: 207-217.

Whitlatch, J. B. (1990a). 'Reference service effectiveness'. *RQ*, 30 (Winter): 205-214.

Whitlatch, J. B. (1990b). *The role of the academic reference librarian.* New York: Greenwood Press.

Willis, B. (1993). *Distance education: a practical guide.* Englewood Cliffs, NJ: Educational Technology Publications.

'World Internet Usage Statistics News and World Population Statistics' Available at *http:// www.internetworldstats.com/stats.htm.* Accessed May 28, 2008.

Wright, K. B. (2004). 'Online relational maintenance strategies and perceptions of partners within exclusively Internet-based and primary Internet-based relationships.' *Communication Studies*, 52 (2): 418-432.

Wyer, James I. (1930). *Reference work: a textbook for students of library work and librarians.* Chicago: American Library Association.

Yin, R. K. (1989). *Case study: research design and methods.* Newbury Park: Sage.

Yin, R. K. (1994). *Case study research: design and methods.* 2nd ed. Thousand Oaks: Sage Publications.

Yong, T. K. (2001). 'Is distance learning varsity necessary?' Available at *http:// www.cikgu.net.my/english/classtech.php3?page=techclass2001/021a.* Accessed January 18, 2005.

Zach, L. (2006). 'Using multiple-case studies design to investigate the information seeking behavior of arts administrators.' *Library Trends*, 55 (1): 4-21.

Zahidi Zainol Rashid (2003). *Keberkesanan pengimplementasian sistem perpustakaan berkomputer ke atas perpustakaan dan pusat maklumat di Malaysia.* Unpublished Ph.D Dissertation, National University of Malaysia.

Zaiton bte. Osman (1993). *The school library as a learning resource: a survey of library use by Standard Six pupils and teachers in selected primary schools in Peninsular Malaysia.* Unpublished Ph.D Dissertation, Loughborough University of Technology.

Zaiton Osman, Kaur, Kiran and Zanaria Saupi Udin (2003). 'A survey of student satisfaction at the University of Malaya Library.' *Kekal Abadi,* 22 (1): 1-17.

Zanin-Yost, A. (2004). 'Digital reference: what the past has taught us and what the future will hold.' Available *at http:/www.webpages.uidaho.udul~mbolin/zanin-yost.htm*. Accessed October 19, 2004.

Zawiyah Baba (2002). 'Networking the nation's libraries: the role of the National Library of Malaysia.' Paper presented at the *International Conference on Linking Technology in the Information Services: Issues and Challenges*: 25-26 June 2002 at JW Marriot Hotel, Kuala Lumpur.

Zumalt, J. R. and Pasicznyuk, R. W. (1998). 'The Internet and reference services: a real-world test of Internet utility.' *Reference and User Services Quarterly,* 38 (2): 165-172.