Users' Information Seeking Behaviours, their Interactions and Experience with the Academic Library Web Interface

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Declaration:

‘This is a declaration that the work in this Thesis is my own work and was carried out in accordance with the regulations of the University of Salford. The work is original, except where indicated by special references in the text, and no part of the Thesis has been submitted for any other degree. The Thesis has not been presented to any other University for examination either in the United Kingdom or elsewhere’.

Signed: Date: 5th June 2015

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Abstract

The websites provided by academic libraries are challenged by the rapid developments in information and communication technology (ICT). These developments have created diverse options and channels for information sources that can be accessed easily by users through the Internet. Because of these alternate sources, many users no longer physically visit the library. Instead, they depend on the library's website to obtain information online, or they use Internet searches to obtain the information they require.

This research addresses the following question: How do the users of academic libraries search for information and interact with the libraries' web interfaces? The research draws on models from the disciplines of information-seeking behaviour (ISB) and human-computer interaction (HCI). A unified model based on the models in ISB and HCI is created and investigated. In addition, a qualitative study has been conducted to investigate users' information needs, information-seeking behaviours, and difficulties and experiences with the websites of academic libraries. Interpretive case studies were conducted at two universities, one in the UK and one in Kuwait. Qualitative data were collected in interviews, focus groups, and observations of diverse groups of library users. Furthermore, a content analysis approach was applied to analyse the data.

The findings revealed seven steps taken in searching for information and interacting with academic libraries' web interfaces, but exposed variance in the order in which users executed these steps. The findings also revealed several issues regarding the use of library websites to search for information. In particular, these concerned the complexity of finding information, the content organisation of the library websites and the use of incomprehensible terms on the library websites. As a result, the library users relied heavily on Google to find information. The thesis concludes with suggested guidelines for how academic library interfaces can best support the way users search for information, as well as their interactions, experiences and needs.

Keywords: information-seeking behaviour, human-computer interaction, users' needs, user experience, academic library website, usability, content analysis, postgraduate students, academics, library staff, Kuwait, UK.

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Dedication

To my late father, Raja Alazemi, who died in the middle of my research journey, but whose worthy words and lovely memories have remained alive in my memory over and over as my research journey has progressed. God bless his soul.

To my mother, for her love, prayers, support and encouragement.

To my brothers and sisters, for care and support all the time.

To my wife, for her love, and patience with me.

And to my lovely daughters, Amnah and Rawan with hope for a bright future.

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List of Abbreviations

ACM	Association for Computing Machinery
DEFF	Denmark's Electronic Research Library
GCC	Gulf Cooperation Council
HCI	Human-Computer Interaction
HEP	High-Energy Physics
IB	Information Behaviours
ICT	Information and Communication Technology
IICTs	Information and Communication Technologies/resources
ILS	Integrated Library System
INSYDER	INternet SYstem DE Recherche
IR	Information Retrieval
IS	Information System
IS	Information Science
ISB	Information-Seeking Behaviour
ISB	Information-Searching Behaviour
ISO	International Standards Organisation
ISP	Information-Search Process
ISSs	Information-Search Strategies
IT	Information Technology
LAC	Library Assessment Committee
LIS	Library and Information Science
MIS	Management Information System
NHS	National Health Services
OCLC	Online Computer Library Centre
OD	Oxford Dictionary

OED	Oxford English Dictionary
OPACs	Online Public Access Catalogues
PDF	Portable Document Format
RIN	Research Information Network
RSS	Rich Site Summary
SCONUL	Society of College, National and University Libraries
SOLAR	Search Our Library's Academic Resources
TA	Task Analysis
UX	User Experience
UCD	User-Centred Design

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Chapter 1: Introduction

1.1 Background

Remarkable advances in information and communication technology (ICT), as well as the expansion of electronic resources, have changed many aspects of information resources, services and library environments. Moreover, libraries have undergone many changes and encountered numerous challenges related to their procedures, objectives and services because of the rapid development of ICT. The diverse needs of users, in terms of access to information resources and services in the digital age, require new methods for keeping pace with these developments. Muqueem and Ambedkar (2007) pointed out that in order to keep pace with technological advances, libraries have begun converting data into digital formats and presenting them via library interfaces. Libraries and their users are now confronted with new forms of delivering electronic information, such as electronic documents, electronic journals and e-books, which are available only via networks and databases. Thus, many libraries have recognised the need to adapt their resources, services and techniques to the current requirements of users. By providing wider access to information services and resources, libraries can offer optimal services to information seekers.

In the near future, libraries will likely provide all their resources and services through websites or other electronic systems. Such platforms should therefore include effective interfaces that are easy to use. Indeed, library interfaces have become significant points of access to library resources and services. Most Internet users have found that the web is in desperate need of sites that have been designed with users in mind. Despite the abundance of well-designed pages, users continue to experience difficulties in searching for sites that are well organised and functional, that is, websites that facilitate efficient access to all the information they are seeking. In particular, library users need functional and efficient web interfaces that are simple to use (Garlock and Piontek, 1999). In order to fulfil their essential role in facilitating research, academic libraries need to identify the ways in which their users access information (Ismail, 2010). Users are more sophisticated and skilful than they were previously (Little, 2012). Because most users have used search engines, such as Google, they commonly assume that all information can be found on the Internet, which has compelled academic libraries to provide similar ICT services. In fact, the library's website is a virtual

public face because it is the user's first contact with the collections, the services and to some extent, the library staff.

1.2 Motivation

The websites provided by academic libraries are challenged by rapid developments in information and communication technology (ICT). These developments have created diverse options for information sources and channels that can be accessed easily by users of the Internet. Because of these alternate sources, many users no longer physically visit the library. Brown and Swan (2007) noted that the number of researchers visiting libraries has declined since 2001, a trend that is expected to not only continue, but also accelerate. Instead, they depend on the library's website to obtain information, or they use search engines on the Internet to obtain the information they require. However, the number of users who take advantage of library websites is also decreasing because of the availability of other diverse options for information sources and channels on the Internet. According to Haglund and Olsson (2008, p. 57), 'libraries spend huge amounts of time and money to work on the structure and content of the library web page, while few researchers use it as a starting point for information searching'. Therefore, in order to encourage users to use the library web site, academic libraries need to increase the efficiency, usability and effectiveness of their web interface. Swanson and Green (2011) pointed out that library web interfaces are important in adding value to the library's resources and services because they increase the accessibility of information.

Users have a variety of needs. They also differ in terms of their experience in seeking information. They require various kinds of information resources and services and prefer the fastest ways to access information, especially those that require little effort or expertise. However, the websites of academic libraries that are available today do not focus on the ways that users seek information and interact with their web interfaces. They do not take into account alternative sources, such as Google, or their influence on users' behaviours, experiences and needs. Furthermore, no previous studies have investigated the users' seeking behaviours and interactions with academic library websites. Although Al-Moumen (2009) investigated the information seeking behaviours of postgraduate students at Kuwait University, her study focused mainly on the factors that influenced these behaviours.

For these reasons, this research aims to address the steps that users of an academic library take when they search for information and interact with the web interface. The academic library websites of two universities (Kuwait University and the University of Salford) will be examined. Furthermore, the research will investigate the information needs and information seeking behaviours of different groups of users of the websites of these academic libraries, as well as the difficulties and obstacles they experience and encounter by using the library website. This is done by investigating two main areas; Information science (in particular, studies on user needs and models of information-seeking behaviours [ISB]) and human-computer interaction (HCI) (especially interaction design models, usability studies and user experience) in order to achieve the research aim and objectives.

1.3 Aim and Objectives

This research aims to address the following question:

"How do the users of academic libraries search for information and interact with the libraries' web interfaces?"

In seeking to address this research question, this study adopts the following objectives:

1. To develop a unified model combining the ISB and HCI models in order to investigate whether these could facilitate the understanding of how users search for information and interact with the web interface when they use the academic library website.
2. To investigate the information needs of different groups of users of the two academic libraries.
3. To understand the information-seeking behaviours of different groups of users in using the web interfaces of the academic libraries.
4. To investigate the difficulties and experiences of different groups of users of the academic libraries' websites.
5. To develop guidelines for how academic library interfaces can best support the way users seek information, as well as their interactions, experiences and needs.

1.4 Significance of ISB and HCI for Academic Library Web Interfaces

ISB is concerned with the methods that users follow to obtain the information they require, while HCI is the study of human interaction with computer systems. These fields are significant for design of user interfaces and in making the information system easy to use. Hearst (2009) asserts that it is necessary to understand the human information-seeking process in order to design successful user interfaces for searches, including the strategies people employ when engaged in an information search.

Human information-seeking behaviour involves both information processing and their interactions with information resources and, nowadays this includes technological systems. Studies of such behaviours contribute to the design of new systems and tools for organisation of knowledge and utilisation of information in academic and scientific contexts, as well as in organisations (Steinerova and Susol, 2005). Furthermore, information systems are intended to help users retrieve specific items that they require from the volume of information available. Consequently, understanding information-seeking behaviour is necessary to identify user search techniques and preferences for information resources (Rowley and Hartley, 2008). This can help design and implement a convenient user-centred information system or services (Rafiq and Ameen, 2009). In addition, Connaway and Dickey (2010) argue that information systems need to be supported by the entire process for information-seeking needs. On the other hand, Miller (2002) indicates that any improvements in HCI require a deep understanding of human behaviours and needs, which is the most helpful information with regard to evaluating any new technology. Ahmed et al. (2009) suggest that more user-centred studies with web-based systems are needed for significant improvements in the design of user interfaces for such systems.

Hearst (2009, p. 1) states that 'the job of the search user interface is to aid users in the expression of their information needs, in the formulation of their queries, in the understanding of their search results, and in keeping track of the progress of their information-seeking efforts'. Undoubtedly, the user interface should be designed to recognise the users' requirements, including their goals, tasks and environments (Karpasov, 2010). Furthermore, Sommerville (2007) suggests that user interfaces should be designed to match the skills, experiences and expectations of the anticipated users, and that interfaces should be designed to match their information-seeking behaviours. Therefore, these fields are significant for the context of this research, which aims to identify how the users of academic libraries search for information and interact with the libraries' web interfaces.

1.5 The Academic Library and Its Users

Hoare (2003, p. 3) defined the academic or university library as 'attached to academic institutions above the secondary or high school level, serving the teaching and research needs of students and staff'. The academic library is the most important of all types of libraries because it serves a wide range of users, unlike most other libraries. According to Brophy (2005), the many different types of users of the academic library include the following:

- Undergraduate students.
- Postgraduate taught students.
- Postgraduate research students.
- Teaching staff.
- Research staff.
- University management, including heads of academic departments and senior management.
- Former students (alumni).
- Members of the local business community.
- Members of the public, including organised community groups.
- Higher education funding councils (which provide much of the library funding and require the library to be accountable).
- Distance learners.
- Members of government.
- Local or regional library communities, including specialised and public libraries and other academic libraries that rely on cooperative agreements.
- Users with special needs.
- National and international research communities, especially in relation to special collections and services.
- National and international communities, especially in relation to interlibrary loans and other cooperative arrangements.
- Library and information professions.
- Posterity (future generations of users).

Indeed, this list of academic library users could be extended. Oakleaf (2010) argued that people who could potentially be affected by academic libraries include parents or even future employers. However, in this study the respondents are postgraduate students, academics and library staff. Postgraduate students were chosen because they have the most diverse needs

related to their scholarly activities (e.g. assignments, dissertations and theses). Academics were chosen because of their frequent usage of the library website in order to research or prepare lectures for their students (e.g. articles, books and proceedings). The library staff was chosen based on the expectation that they would provide invaluable data due to their use of the library system (website) to guide users in finding and accessing information. Library staff are keenly aware of the resources and services that users have at their disposal. Fox (2014) argues that librarians intimately know the users of their libraries.

1.6 Scope and Focus of the Thesis

The scope of the thesis is summarised in the main research question: How do the users of academic libraries search for information and interact with the libraries' web interfaces? Thus, the scope of the thesis comprises two main fields: information science (IS) and human-computer interaction (HCI). The research combines two main areas in these fields: models of information-seeking behaviour (the IS field) and models of interaction (the HCI field). In addition, the existing literature is used as the foundation of the research. Previous studies are reviewed in order to establish the context of this study and to develop a unified model based on the existing ISB and HCI models.

The introduction provides background information about ISB and HCI. The analyses of the ISB and HCI models will emphasise their applicability to the research question. Accordingly, a unified model is created and investigated to determine whether it could aid in understanding how users search for information and interact with the web interface when using the academic library website. Also, the thesis will provide a review of the extant literature on various topics including, the purpose for seeking information and the reasons for using or not using the library, the predominant requirements for academic library resources and services, the methods (strategies) used to search for information, the locations of searches, and the difficulties and obstacles experienced and encountered in using the academic library website, which reflect usability issues.

1.7 Contributions to Knowledge

The findings of this thesis provide a number of contributions to the body of information-science knowledge, particularly regarding the websites of academic libraries:

- This study is the first to provide a unified model based on the ISB and HCI models.
- This study is the first to identify the steps that academic library users take when they search for information and interact with the web interfaces at two universities in two different countries (i.e. Kuwait University and the University of Salford).
- The study provides valuable data on diverse areas, because no previous study has investigated different users from two diverse case study universities to determine their needs for information (including the purpose for seeking information and the reasons for using or not using the library), their information-seeking behaviours (including the location from which the searches are conducted and the methods [strategies] employed to seek information) and the difficulties and obstacles they experienced and encountered in using the academic library website, all of which relate to usability.
- The research presents guidelines for how academic library websites can best support users in their search for information, as well as facilitate their interactions, improve their experiences and meet their needs. Thus, the proposed guidelines could be useful for the websites of other academic libraries around the world, especially because they have been developed based on the findings of investigations conducted at two universities in two different countries (i.e. Kuwait and the United Kingdom).

1.8 Structure of the Thesis

Chapter 2: Literature Review. This chapter reviews and discusses the relevant literature, which provides the context of the research. It is divided into three sections:

- Section 2.2 reviews ISB studies. It provides a brief history of these studies, gives terms and definitions in the ISB field (i.e. information use, information needs, information behaviours, information-seeking behaviours, information-searching behaviours and information retrieval), and explains the importance of information-seeking studies and information-seeking models.
- Section 2.3 reviews HCI studies and provides a brief history of HCI. It also gives a definition of HCI, its related fields, its goals and importance, interaction design, terms used in HCI models and in models of interaction.
- Section 2.4 reviews and investigates the literature relating to user studies that highlight postgraduate students and academics, particularly those that pertain to the purpose of seeking information and the reasons for using or not using the library, the predominant

requirements for library resources and services, the methods (strategies) used to search for information, the locations of searches, user experiences, and users' difficulties encountered and experienced in using the library website.

Chapter 3: ISB and HCI. This chapter discusses the significance of the ISB and HCI fields, as well as the rationale for selecting the models used in this study. Moreover, this chapter combines the selected models to identify their similarities and differences regarding the ways that users search for information and interact with the web interface. This leads to a unified model based on ISB and HCI models.

Chapter 4: Research Methods. This chapter describes the research methods and their implementation. It reviews and identifies the research philosophy, methodological approach, strategy, data collection procedures and techniques, as well as the data sources.

Chapter 5: Data Analysis of Interviews. This chapter describes the approach used to analyse the data and the method of analysis. It then presents the analysis of the data collected in interviews conducted with the academics and librarians.

Chapter 6: Data Analysis of Focus Groups. This chapter presents the analysis of the focus groups conducted with the postgraduate students.

Chapter 7: Data Analysis of Observations. This chapter describes the method and the process of analysis of the observations, and then presents the analysis of the data gathered from the postgraduate students.

Chapter 8: Findings and Discussion. This chapter summarises the research aim and objectives. It presents and discusses the findings that emerged from the analysis of the interviews, the focus groups, and the observations. Moreover, it explains how these findings relate to previous studies and the unified model derived from combining the ISB and HCI models.

Chapter 9: Guidelines. This chapter provides guidelines for how academic library interfaces can best support the way users seek information, as well as their interactions, experiences and needs.

Chapter 10: Conclusions. This chapter summarises the research, presents the main findings of the research, highlights its contributions to knowledge in the field, explains the limitations of the research, and provides suggestions for future research.

1.9 Conceptual Model of the Thesis

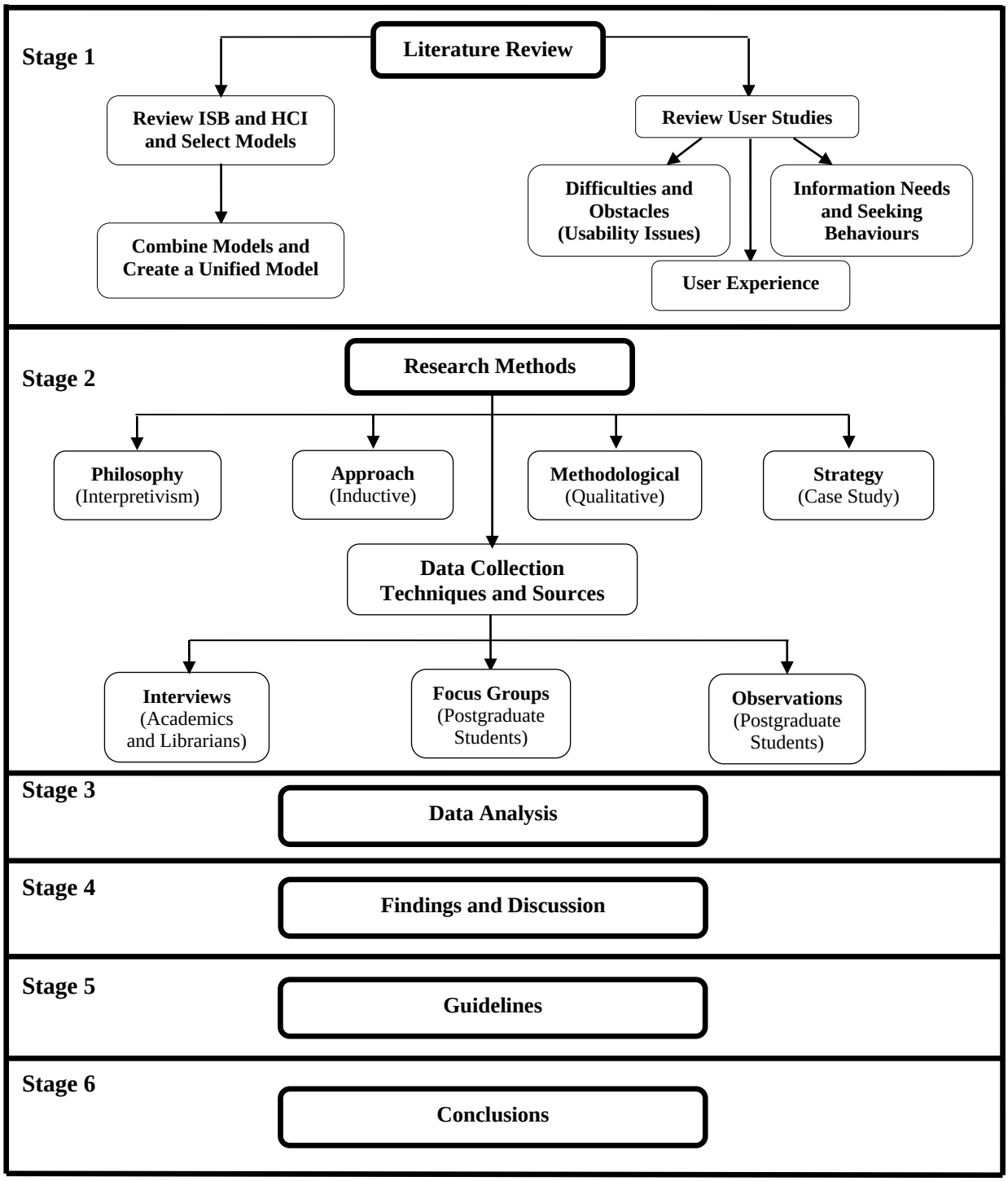


Figure 1.1: Overall Conceptual Model of the Thesis

Chapter 2: Literature Review

2.1 Introduction

This chapter presents the relevant literature to provide a context for the current research. This chapter is divided into three sections:

- Section 2.2 provides in-depth information regarding information-seeking behaviours on the following points:
  - Brief history of information-seeking studies.
  - Information-seeking terms and definitions (information use, information needs, information behaviours, information-seeking behaviours, information-searching behaviours, information retrieval, related concepts).
  - Importance of information-seeking studies.
  - Information-seeking models.
- Section 2.3 provides in-depth information regarding human–computer interactions on the following points:
  - Historical background.
  - Definition.
  - Related fields.
  - Goals and importance.
  - Interaction design.
  - Terms in the interaction models.
  - Models of interaction.
- Section 2.4 reviews and investigates the literature relating to user studies that highlight postgraduate students and academics, particularly those that pertain the purpose for seeking information and the reasons for use or not use the library, the predominant requirements for library resources and services, the search strategies used to search for information, the locations of searches, user experiences, and users' difficulties encountered and experienced in using the library website.

2.2 Information-Seeking Behaviours

2.2.1 Brief History of User Studies

In library and information science, user studies are considered to be the most researched areas and have shaped a considerable amount of literature in the discipline (Siatri, 1999). User studies developed in the late 1940s, when the Royal Society Scientific Information Conference triggered the interest of researchers in this field (Siatri, 1999; Wilson, 2000). Subsequent to this, many studies were carried out to identify which approaches researchers were using to obtain the information they needed. One such study was Bernal's (1948) study; it aimed to discover from active scientists what they read as well as how and why they obtained their information. Wilson (1994) described how, as a result of the Royal Society conference, the field expanded from a study of library systems to a study of the behaviours and attitudes of information users in general. According to Siatri (1999, p. 133), 'earlier user studies were mainly related to scientists involved with biochemistry, medicine, engineering, physics etc. The high concentration of user studies in these sciences can be partially attributed to the fact that the publication of professional and scientific information in these disciplines was much more developed at the time in comparison with the humanities. This resulted in the earlier development of information handling tools, like abstracts and indexes'.

Starting in the early 1960s, the number of user studies escalated quickly (Siatri, 1999). Writing in 1998, Eskola mentioned that the importance of such studies had increased in the previous decades, partly as a result of the increasing number of students enrolling in institutions of higher education and partly due to the fact that libraries were committed to meeting the requirements of their users and satisfying their needs in the most appropriate way possible. According to Eskola, many studies regarding students' trends in the use of university libraries were being conducted across several countries.

In the 1980s, user studies started to focus not only on people's needs for information, but also on their information-seeking behaviours. Since that time, a number of studies have been conducted, leading to many models that described and investigated diverse groups of users' seeking behaviours (e.g. Wilson, 1981; Ellis, 1989).

In 2003, Ingwersen discussed developments in the field of information-seeking behaviours in general and described how these developments had occurred. Ingwersen divided the history of information-seeking behaviour into three periods:

1. **Sixties to the mid-eighties:** During this period, attention was paid to the provision and quality of information services.
2. **Mid-eighties to the mid-nineties:** Several empirical studies were conducted during this period, and the first activity models of information-seeking processes were created.
3. **Mid-nineties until the present period (2003):** This period was represented by endeavours to design comprehensive models that integrate information seeking with information retrieval.

Since 2003, research in information-seeking behaviours, such as that carried out by George et al. (2006), Vezzosi (2009), Haines et al. (2010), Thani and Hashim (2011), Al-Moumen (2012), and Sapa et al. (2014), covered particular or different groups of users in various specific disciplines.

With the development of technology, academic libraries have started to provide users with advanced web-based systems that help them integrate the task of looking for resources with the services they require. As a result, Al-Muomen (2009) argued that users have options for new information delivery systems, with a broad array of information sources and channels, and are able to obtain information anytime and anywhere. However, providing information resources and services for users as well as making them available online does not mean that this is sufficient or that users will be satisfied. It must be considered that users' experiences and requirements are constantly changing and they look for information according to developments in the technological fields.

Butler and Gratch (1982) pointed out that user studies are a serious attempt by researchers to discover the methods of use and the levels of user awareness of the quality and nature of information services, as well as the effectiveness of these services, which might require modifications or changes in strategies for providing information services. Information user studies started from the principle that the effectiveness and quality of library services depend primarily on the ability of all kinds of libraries to establish the real requirements of information users (Ocheibi and Buba, 2003). Therefore, many studies have focused on the field of user studies, making it one of the most researched areas in the field of library and information science (Siatri, 1999).

2.2.2 Information Seeking: Terms and Definitions

2.2.2.1 Different Terms and Definitions

The evolution of user studies has presented some terms, such as information use, information needs, information behaviour, information-seeking behaviours, information-searching behaviours and information retrieval. Hughes (2006) argued that these terms overlap and their interpretations vary. In addition, a number of related words and concepts exist, such as browsing, scanning, and encountering. In order to clarify the terminology, definitions and an explanation of key terms used in this thesis are provided.

2.2.2.2 Information Use

According to Wilson (2000, p. 50), 'information use behaviour consists of the physical and mental acts involved in incorporating the information found into the person's existing knowledge base. It may involve, therefore, physical acts, such as marking sections in a text to note their importance or significance, as well as mental acts that involve, for example, comparison of new information with existing knowledge'. However, Sadeh (2010) pointed out that, although Wilson's definition might be useful, it fails to relate to an information need that might have been triggered by the search process (a person can find information useful even if they previously had not perceived a need for it).

Recently, and in a deeper explanation, Kari (2010) analysed literature from the field of information studies in order to conceptualise the use of information and its meaning. Kari argued that there are seven main concepts relating to information use:

- **Information practices:** this involves human interaction with information.
- **Information search:** the procedures for information seeking and information retrieval.
- **Information processing:** information is explained, analysed, and modified.
- **Knowledge construction:** mental constructs are formed or designed as a basis for thought.
- **Information production:** creating an expression of knowledge which can be viewed by other people.
- **Applying information:** information works as a resource in some process.
- **Effects of information:** changes brought about by information or changes brought about by information as a mirror of information use.

2.2.2.3 Information Needs

A considerable amount of literature has been published on information needs. Information needs are often understood in information science as evolving from a vague awareness of something missing and culminating in locating information that contributes to understanding and meaning (Kuhlthau, 1993). Belkin (2005) explained an information need as an anomalous state of knowledge, meaning that the user's state of knowledge is in some way insufficient with respect to enabling the person to attain an objective, while Drevin and Nilan (1986) argued that an information need is a gap in an individual's knowledge in a sense-making situation. Wilson (1997) highlighted that, when a person experiences an information need, a motive must be present before behaviour will ensue. Case (2012) pointed out that information need is the recognition that your knowledge is inadequate to satisfy a goal that you have. Finally, Weigts et al. (1993) provided three categories with regard to the information need concept: the need for new information, the need to clarify the information already held, and the need to corroborate information held.

2.2.2.4 Information Behaviours

Wilson (2000, p. 49) explained that 'information behaviour is the totality of human behaviour in relation to sources and channels of information, including both active and passive information seeking, and information use. Thus, it includes face-to-face communication with others, as well as the passive reception of information as in, for example, watching TV advertisements, without any intention to act on the information given'.

A similar definition was provided by Case (2012, p. 5), who proposed that information behaviour 'encompasses information seeking, as well as the totality of other unintentional or passive behaviours (such as glimpsing or encountering information), as well as purposive behaviours that do not involve seeking, such as actively avoiding information'.

According to Bates (2010), the term information behaviours has come to be used to refer to the numerous methods that human beings use to interact with information, particularly the ways in which individuals seek and utilise information. In library and information science, information behaviour refers to a sub-discipline that engages in a broad domain involving research conducted in order to understand the relationship between the human and information.

2.2.2.5 Information-Seeking Behaviour

According to Wilson (2000, p. 49), 'information seeking behaviour is the purposive seeking for information as a consequence of a need to satisfy some goal. In the course of seeking, the individual may interact with manual information systems (such as a newspaper or a library), or with computer-based systems (such as the World Wide Web)'. Case (2012, p. 5) agreed with Wilson when he provided another definition for information seeking, defining it as 'a conscious effort to acquire information in response to a need or a gap in knowledge'. According to Ingwersen and Järvelin (2005, p. 21), information-seeking behaviour is 'human information behaviour dealing with searching for or seeking information by means of information sources and (interactive) information retrieval systems'.

2.2.2.6 Information-Searching Behaviours

Wilson (2000, p. 49) has a different approach, as he distinguished between seeking and searching behaviours. According to him, 'information searching behaviour is the "micro-level" of behaviour employed by the searcher in interacting with information systems of all kinds. It consists of all the interactions with the system, whether at the level of human–computer interaction (for example, use of the mouse and clicks on links) or at the intellectual level (for example, adopting a Boolean[1] search strategy, or determining the criteria for deciding which of two books selected from adjacent places on a library shelf is most useful), which will also involve mental acts, such as judging the relevance of data or information retrieved'.

Sadeh (2010) mentioned that searching and seeking are regarded as synonymous in some studies, beings based on the definition provided by Ingwersen and Järvelin (2005), who do not differentiate between information seeking and searching. However, Sadeh (2010, p. 20) pursued Wilson's point of view regarding the difference between seeking and searching, mentioning that 'information searching behaviour is, then, the aspect of information-seeking behaviour that deals especially with active, directed searching in information systems for data that can be specified to some degree'.

[1] A Boolean search or logic is a technique of searching using words such as 'and', 'not', and 'or'.

2.2.2.7 Information Retrieval

According to De Campos et al. (1998, p. 53), 'information retrieval (IR) is concerned with the identification of documents in a collection that are relevant to a given information need, usually represented as a query containing terms or keywords, which are supposed to be a good description of what the user is looking for'. Similarly, Manning et al. (2008) described IR as a broad term; however, they declared that in the academic field it can be defined as finding materials (usually documents) in an unstructured nature (usually text) thereby accomplishing the need to glean information from big collections (usually stored on computers). Based on this definition, only a few people can engage in IR—namely, reference librarians, paralegals, and similar professional searchers. However, as global technological changes have led many people to engage in information retrieval in their everyday lives using web search engines or searches in their emails, IR has become the dominant form of information access. In fact, IR supports users when they browse or filter document collections or further processing of a set of retrieved documents.

On the other side, Wilson (1999b) provided a nested model to explain the differences among the terms information behaviour, information-seeking behaviour, and information-searching behaviour. Wilson's model defined information behaviour as a broad field which includes information-seeking behaviour as a sub-set of the field and is concerned with the diversity of methods people employ to identify and obtain access to information resources. According to this model, information-searching behaviour is a more specific area interested in the interactions between the information user (with or without an intermediary) and computer-based information systems, of which information retrieval systems for textual data might be seen as one type. The following figure shows a nested model of the information-seeking and information-searching research based on Wilson's model and modified for the context of this study.

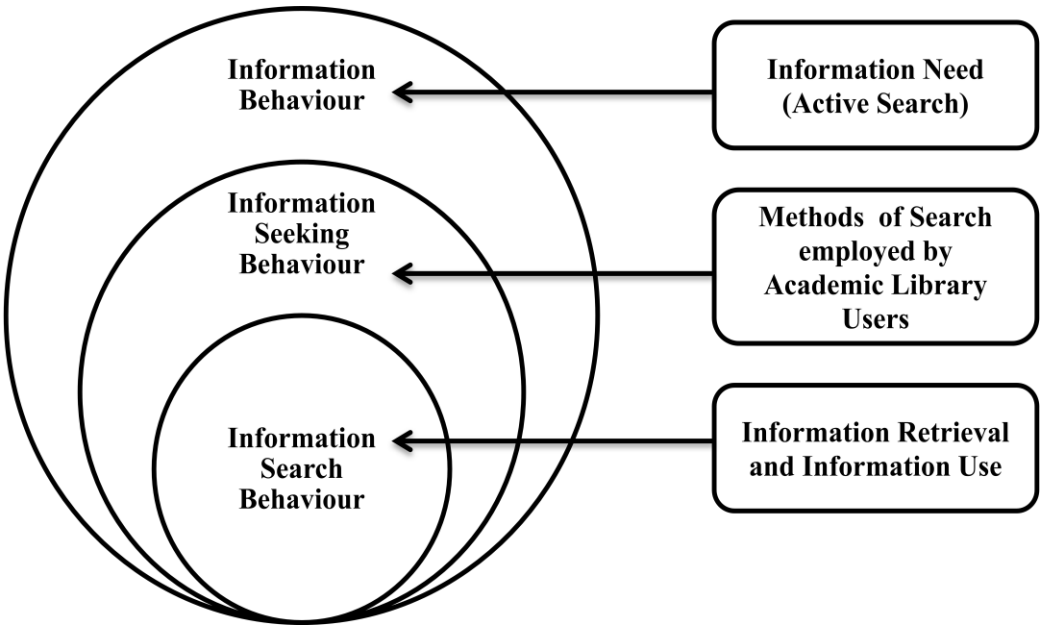


Figure 2.1: Wilson's nested model adapted to academic library users' practices (Wilson, 1999b)

2.2.2.8 Related Concepts

Case (2012) stated that the most general terms used to describe the phenomena of seeking and searching for information are "browsing" and "scanning".

Browsing is definitely the central, and now considered older, concept, superseded by a diversity of terms used to indicate informal or unplanned search behaviours. The meaning of browsing has been broadened to include terms like scanning and encountering. Several authors deem browsing to be a type of information seeking, although the browser might be seeking nothing in particular.

Bates (2007) analysed empirical research results as reported by earlier researchers. Based on the issues obtained from this research, the components of browsing were closely analysed and developed. According to Bates, browsing is composed of four steps:

- Glimpsing a field of vision.
- Selecting or sampling a physical or informational object within the field of vision.
- Examining the object.
- Acquiring the object (conceptually and/or physically) or abandoning it.

Not all of these elements need be present in every browsing episode, although multiple glimpses are seen to be the minimum to constitute the act. Bates (2007) proposed the

following definition for browsing: ‘browsing is the activity of engaging in a series of glimpses, each of which may or may not lead to closer examination of a (physical or represented) object, which examination may or may not lead to (physical and/or conceptual) acquisition of the object’.

Case (2012) presented a table of browsing goals, depending on domain of interest, goal type, and terminology adapted, taken from a study by Chang and Rice (1993), who investigated problems and issues in browsing behaviour. The table consisted of four domain examples: library or bookstore, electronic information resources, TV/radio, and shopping.

Table 2.1: Examples of browsing goals by domain interests, goal type, and terminology (Case, 2012, p. 103)

	Distinction made, with associated terms			
Example domain	**Well-defined (formal search and retrieval)**	**Semi-defined (browse, forage, scan)**	**Poorly defined (browse, graze, navigate, scan)**	**Undefined (encounter, serendipity)**
Library or bookstore	Find material by a particular author or on a specific subject	Find books, tapes, or articles on a general subject	Find any material of potential interest	Discovery previously unknown interests
Electronic information resources	Find specific pages or records using controlled terms or attributes	Find records or pages matching general, natural language terms	Follow links to pages that pique interest	Accidently encounter pages of interest
TV/Radio	Locate a specific program (e.g. *Cheers*) on a specific channel (e.g. WTBS)	Choose a specific TV channel (4) or radio frequency (FM 88.4)	Watch or listen to whatever catches attention purposefully	Serendipitous viewing or listening, unintentionally
Shopping	Find an item of a particular brand in a category (e.g. Kellogg’s Cornflakes)	Find items in a category (e.g. breakfast cereals)	Find something to eat (e.g. packaged foods)	Pass by/see item for sale without intending to buy

2.2.2.9 Importance of Information-Seeking Studies

The study of information-seeking behaviours plays a crucial role in user studies and is indispensable for libraries that seek to raise their level of performance and improve the level of services provided to their users. Turnbull (2001) identified the following nature and features of information-seeking behaviours:

- Having a user focus.
- Coming to understand the heuristic and dynamic nature of browsing through information resources.

- Suggesting that information is searched for to enhance knowledge.
- Pursuing a more opportunistic, non-premeditated search strategy.
- Including identifying relevant information.
- Anchoring on an interactive approach, thereby making browsing easy.

This kind of study helps provide information for the categorisation of users, and Fine (1984) outlined the following points:

- Determine the categories of users that have benefited from available resources of information in the library and then identify and select the resources they have been using to guide the library in providing for them.
- Identify categories of users who have widely used the information resources available in the library to assist the library in providing suitable collections for them.
- Identify categories of users who do not make use much of the information resources available in the library, as this will help in designing programmes that will make these users interested in the library resources.
- Identify the level of user satisfaction regarding resources and services provided by the library and the reasons for this satisfaction.

Wilson (2008, p. 463) further highlighted the importance of research in information seeking: 'It seems likely that the need to understand how people search for and use information services will continue to develop, as the understanding gained may become more and more important for the effective design of systems and services'.

The variety of information-seeking behaviours has led many authors to present models to explain the process behind such behaviours.

2.2.3 Information-Seeking Models

An increasing number of studies have focused on information-seeking behaviours, putting forth a number of information-seeking behaviour models to explore the information-seeking process. These are outlined below, focusing on those which have received the greatest attention in the literature (Chapter 3 provides a more detailed explanation of the rationale for choosing these models, how they relate to this research, and their applicability to academic library practices).

2.2.3.1 Ellis's Model of Information-Seeking Behaviour

This model was originally designed to investigate information retrieval from the social science perspective. Its chief aim was to suggest a behavioural approach rather than a cognitive one. This model was based on interviews with different groups of researchers from various academic disciplines, including social sciences (Ellis, 1989), engineers and research scientists in industrial environments (Ellis and Haugan, 1997), and physicists and chemists (Ellis et al., 1993) as well as non-academic disciplines, such as English literature researchers using interview data (Smith, 1988) which Ellis analysed to validate the model.

Ellis et al. (1993, p. 359) argued that 'the models do not attempt to define the interactions and interrelationships between the categories or the order in which they are carried out. The nature of the relationship between the features of the models can only be described in relation to specific information seeking patterns. Therefore, although it is possible to describe relationships between the features at a general level, the exact relationship of the features of the models depends upon the circumstances associated with the information-seeking behaviour of a particular individual at a particular time'. However, Ellis (2005) stated that he found similarities in general and in detail between the groups of researchers, even though they were from different disciplines. Ellis identified the following characteristics:

- **Starting/Surveying:** refers to activities which embrace preliminary searches for information, forming the initial point for the search.
- **Chaining:** the next step, whereby an initial resource is used as a reference point to carry out follow-up efforts. This is backward chaining, while forward chaining involves using other resources as reference points (e.g. follow references cited in the document or references citing the document).
- **Browsing:** the third stage, in which the individual uses pointers, such as contents, lists of titles, subject headings, and summaries, to narrow the search.
- **Filtering:** 'characterised by use of certain criteria or mechanisms when searching for information to make the information as relevant and as precise as possible' (Ellis, 2005, p. 140).
- **Differentiating/Distinguishing:** at this point, the individual distinguishes between the topic areas and the quality of the information available. This process can be determined

by the searcher's previous knowledge of the sources and by hearsay information gleaned from others.

- **Monitoring:** keeping up to date with the details of changes in a specific area, with particular attention given to a core set of sources.
- **Extracting:** the process of working through the resources and selecting materials of interest; this can take place through direct investigation of the resource or less directly through bibliographies, indexes, and online databases.
- **Verifying:** determining that information is accurate.
- **Ending:** ending the process at the end of a project.

This model was tested in several studies, and subsequent modifications were made. Meho and Tibbo (2003) applied Ellis's model to the evaluation of a social science faculty conducting research into stateless nations. The study outcomes agreed with Ellis's model, but contributed additional features—namely, accessing, networking, verifying, and managing information. Using these findings, a new model was developed with four interrelated stages: searching, accessing, processing, and ending. These studies adopted a triangulation research method involving interviews, data collection, and surveys. The new behaviours identified (accessing, networking, verifying, and managing information) should inform future improvements to current information systems and services.

Meho and Tibbo's (2003) findings are comparable to those of Ge (2010), who assessed and evaluated Ellis's model in relation to modern reliance on electronic resources. The author concluded with a confirmation of the model's pertinence in both the traditional environment and the modern electronic information environment. A number of participants noted that the model's stages might occur out of sequence or simultaneously with the adoption of other characteristics, depending on the individual's circumstances. Ge's study added two new characteristics, "preparation and planning" and "information management", to Ellis's permanent characteristics (starting, chaining, browsing, monitoring, differentiating, and extracting). These two characteristics cover the research methods that the social sciences and humanities utilise in finding information. These factors indicate an interest in acquiring additional research tools and in ensuring greater flexibility and ease-of-use in information systems.

Bronstein (2007) applied Ellis's behavioural model to the information-seeking behaviour of Jewish studies scholars, finding a strong relationship between the information activities utilised and the stage of the research or the purpose of the search. Consequently, Bronstein

proposed a revision to Meho and Tibbo's (2003) version of Ellis's model. Bronstein's proposed revision provides an inclusive view of the dynamic stages of the information-seeking process through the information-seeking activities used in every phase of the research:

- Initial phase: starter references, browsing, extracting.
- Current awareness phase: monitoring activities, monitoring electronic materials, monitoring printed materials, networking, citation tracking.
- Final Phase: ending.

Ingwersen and Järvelin (2005) mentioned that Ellis's characteristics might make different types of activities available that the user needs to use, although they were confident that those characteristics did not contribute any design specifications to an interactive system.

Ellis considered that the sequences of behavioural characteristics might be diverse which occur in different sequences with dissimilar users (Wilson, 1999b). In addition, it does not specify the exact order and relationships within the set of eight characteristics of information-seeking behaviour (Sadeh, 2010).

2.2.3.2 Kuhlthau's Information-Search Process

Kuhlthau's information-search process (ISP) focuses on intellectual access to information and ideas as well as the process of seeking meaning. ISP describes the process of information seeking as one of construction, focusing on users' experience through the interaction of thoughts, feelings, and actions, which Kuhlthau (2005) represented in six stages:

- **Initiation:** a person starts searching; he/she becomes aware of inadequate knowledge or understanding of the topic.
- **Selection:** a general idea is identified, and the person is able to start his/her search.
- **Exploration:** doubt and confusion increase as inconsistent information is encountered.
- **Formulation:** uncertainty decreases, and confidence increases as a perspective is formed.
- **Collection:** the gathering of relevant information diminishes the uncertainty, resulting in greater interest, while participation in the project deepens.
- **Presentation:** the search is completed, the topic understood, and the person is able to use his or her learning to explain it to others.

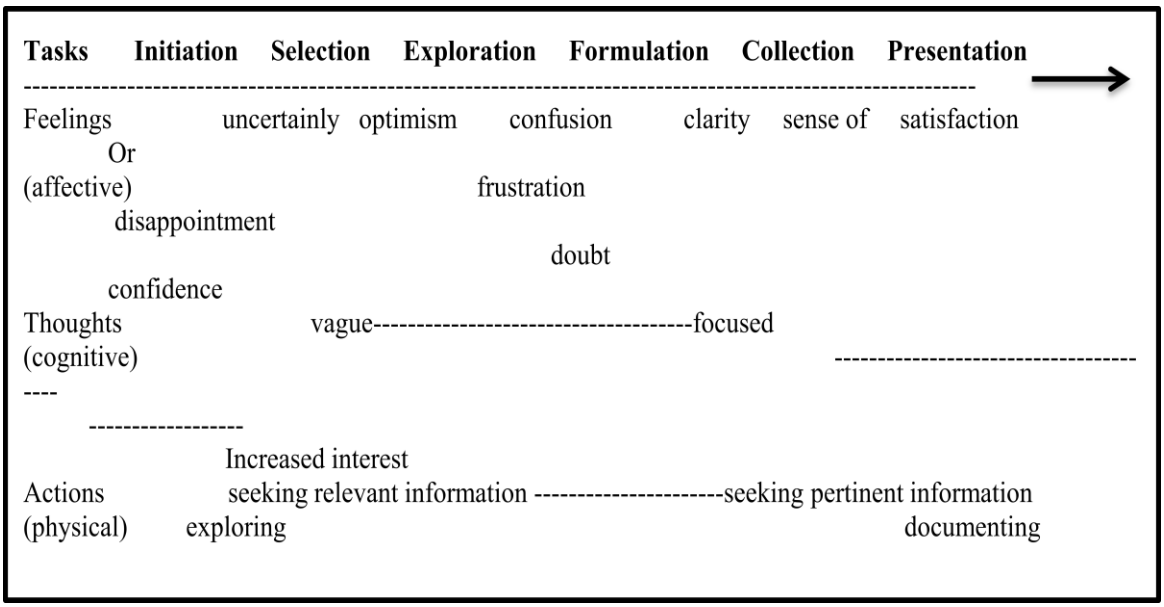


Figure 2.2: Kuhlthau's information-search process. Reproduced from Kuhlthau et al. (2008)

Hyldegard (2006) used a qualitative longitudinal case study in order to explore Kuhlthau's information-search process in a group-oriented, educational setting. His intention was to examine differences in the behaviour of individuals relative to that of the group, including how they experienced the process emotionally. In a seven-week project, questionnaires were filled out by two groups of information science students who also kept diaries of their information-associated activities. Each student was interviewed three times during the study. Contextual and social factors were determined in relation to the group members' physical activities as well as their emotional experience in the course of the project, as it related to their information behaviours. Some correlation was shown between group members and the ISP model in terms of the cognitive experience of individuals. However, this resulted from the work task activities and intragroup interactions and did not result from the information-seeking activities alone. No emotional changes suggesting a move to relief and certainty were observed towards the end of the information-seeking process. In fact, the students frequently expressed that they felt frustrated, disappointed, and unsure. This arose from the uneven matching of motivation, project focus, and ambition in terms of the intragroup behaviours, and group members' behaviours did not correlate. It was concluded that the group's behaviour cannot be used as a model for the behaviour of an individual. Groups are made up of individuals who are collectively engaged in a problem-solving process involving information-seeking behaviours. In recognition of this research, additions need to be made to

Kuhlthau's ISP model. Individual behaviour is impacted by social and contextual factors which will in turn affect the group process.

The validity of Kuhlthau's model was supported through the undertaking of a thorough investigation, where the model was validated in numerous settings. A study by Kuhlthau et al. (2008) led to the claim that the ISP model is still valid, based on their research applied with school students and utilising both qualitative and quantitative methods. The researchers concluded that the model is useful for clarifying students' information-seeking behaviours when the tasks require knowledge construction. In addition, the model is useful as a research tool when used to design, frame, and analyse information-seeking behaviour in complex tasks and also for designing user-centred information services and systems, especially for students in research projects.

Furthermore, a study conducted by Thani and Hashim (2011) aimed to identify the information needs and information-seeking behaviours of social science postgraduate students of four local Malaysian universities. Using closed-ended questionnaires, the researchers found that the majority of students, when searching for information, followed Kuhlthau's six stages of the information-search process.

Regardless of the users, Kuhlthau's model determines the information seeking in order of its stages (Wilson, 1999b). This model is also important as it focuses on users' experience through the interaction of thoughts.

2.2.3.3 Belkin et al.'s Information-Seeking Strategies

Belkin et al. (1993) outlined the following information-seeking strategies:

- **Browsing:** defined as scanning a resource.
- **Learning:** defined as expanding knowledge of one's goal and the problem, the system and the resources, and the topic.
- **Recognition:** defined as identifying relevant items through stimulated association (e.g. display).
- **Meta information tasks:** defined as interaction with the source that describes the structure and contents of the information objects and resources.

Belkin et al. claimed that a variety of behaviours can be identified when people engage in searching for information in a knowledge resource. Examples include locating identifiable, known items; searching for items already identified; browsing for interesting items; perusing their contents; locating useful items through inspection; and looking over item descriptors and item organisation schemes. These information-search strategies (ISSs) are some, but not all, of the possibilities and may be interchangeable, but are also exclusive of each other. In one ISS, the interaction between the user and the elements of the information-retrieval (IR) system can be observed, and Belkin proposed an IR interface design, based on the above interaction and the behaviours of information-seeking individuals as well as the reciprocal movement between them.

Belkin et al. (1995) discussed how their concept can be used to design effective interaction and provided a theory of interactions, built on information-seeking strategies. Specifically, they presented a model of information-retrieval system designs based on the following concepts:

- A multi-dimensional space of information-seeking strategies
- Dialogue structures for information seeking
- Cases of specific information-seeking dialogues
- Scripts as distinguished in prototypical cases

Belkin et al. (1995) suggested that any single information-seeking interaction is a complex activity which can be described according to its relationship to the four identified dimensions and can also be characterised based on its values on a comparatively small number of factors or dimensions. The researchers proposed four dimensions of ISS according to the observations they made and the findings from other empirical studies.

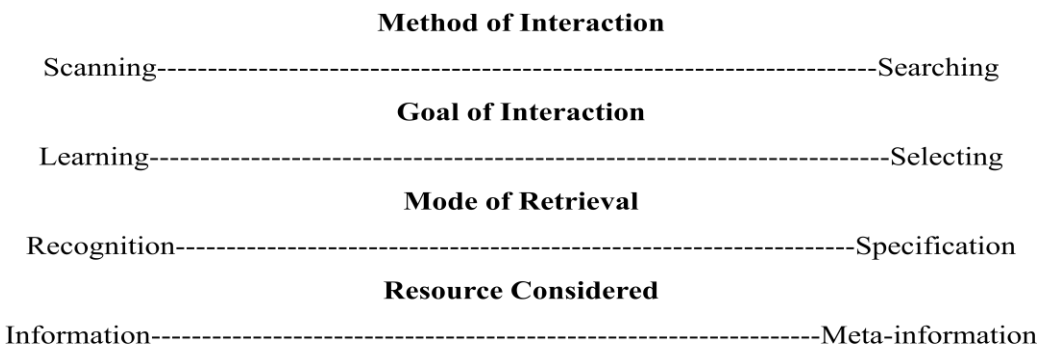


Figure 2.3: Belkin et al.'s four dimensions of interaction. Reproduced from Belkin et al. (1995)

Belkin et al.'s (1995) dimensions can be explained as follows:

- **Method of interaction:** This includes a range of variations, from searching for an identified item to scanning for an interesting item.
- **The goal of the interaction:** This involves either learning something about an item or resource or selecting useful ones for retrieval.
- **Mode of retrieval:** This can be divided into two modes: specification, which is seeking for identified items, and recognition, which is identifying relevant items through stimulated associations.
- **Resource considered:** The interaction with the items of information themselves might differ from the interaction with meta-information, which describes the structure and contents of the objects of information.

Belkin et al. pointed out that information-seeking behaviour is considered an action that moves from one strategy to another in the course of a single information-seeking episode and as the problematical situation of the person changes. 'Having ISSs described by, and located in, the kind of space we suggest gives us a means to describe movement from ISS to ISS, as well as to describe the individual ISSs, and potentially the means to understand such movement well enough to devise methods for supporting it in a principled fashion. From this point of view, we can consider ISSs as types of user interactions within the IR system, rather than as queries or demands put to that system' (p. 7). This model is important for the context of this study as all information-seeking episodes can consist of different types of interactions.

2.2.3.4 Marchionini's Information-Seeking Model

Marchionini (1995) stated that humans purposefully engage in an information-seeking process to change their state of knowledge. This process has been described by Marchionini as both systematic and opportunistic. Marchionini argued that this process increasingly depends on the development of electronic technology. The information-seeking process consists of a series of sub-processes, as shown in the following figure.

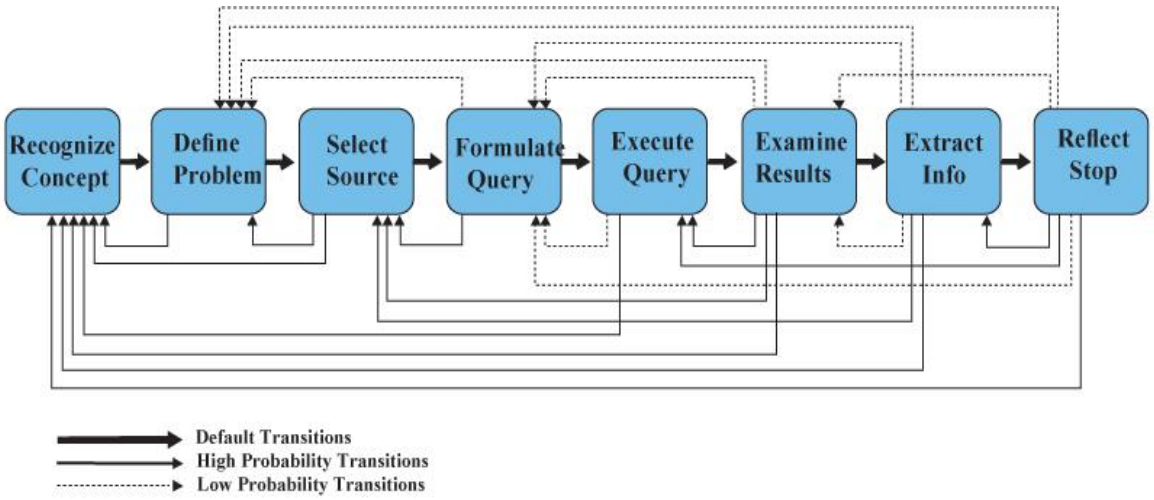


Figure 2.4: Marchionini's information-seeking model. Reproduced from Marchionini (1995)

Information seeking starts with the recognition and acceptance of the problem and continues until the problem is solved or abandoned.

The sub-processes of Marchionini's model can be explained as follows:

1. **Recognise and accept an information problem:** users should be aware of the problem with which they will engage in the information-seeking process. The problem might be suppressed or accepted, and the system design plays an important role in affecting the user's decision.
2. **Define and understand the problem:** this process depends on the information seeker having an understanding or knowledge of the task field, and this will remain as part of the process for the duration of information seeking. Furthermore, it can be affected by the setting.
3. **Choose a search system:** information seekers at this point look to their previous experiences with the task field. Their range of information infrastructures and expectations regarding the answer are shaped as they define the problem and the task. As all users (information seekers) are different, their information retrieval techniques will also be different; their previous experiences will be reflected in this process. At this point, information seekers will attempt to map the search task in relation to one or more search systems and in accordance with their constraints relating to domain knowledge, their general cognitive conditions, and their previous search experiences.
4. **Formulate a query:** this process comprises two types of mapping:

a) Semantic mapping: vocabulary that the information seeker uses in order to describe the task according to the system's vocabulary as this will be used to achieve access to the content.
b) Action mapping: takes account of the information seeker's strategies and tactics and assumes that it will be best to advance the task according to the rules and features allowed by the system interface.

5. **Execute search (query):** this depends on the semantic and action mappings built up through the query formulation. How the searches are executed has been greatly influenced by communication and computing technology. For example, e-mail or phone calls have made it far simpler to execute the search than the previous human search system.
6. **Examine results:** information seekers examine the outcomes to determine if they are relevant to their goal. This will depend on the quantity, type, and format of the information displayed in the answer. The information seeker will then decide whether to continue or not.
7. **Extract information:** Marchionini points out that the information seeker is using some skills, such as reading, scanning, listening, classifying, copying, and storing information. When information is extracted, it is manipulated and integrated into the information seeker's knowledge of the domain.
8. **Reflect/iterate/stop:** information seekers infrequently terminate their search after only a single query. They repeat the search until they have found information that meets their needs.

George (2010) applied Marchionini's model to examine it with regard to a public emergency, specifically a large-scale food recall in the United States in 2009 involving products containing peanuts that were contaminated with Salmonella. She applied the action method to discover the public's reaction during emergencies and to find out more regarding their information seeking in stressful situations, ultimately concluding that people do not act in their normal manner under stressful circumstances. 'It cannot be assumed that they will always seek information during that time in their normal manner either' (p. 6). In addition, Marchionini's model is more human–computer oriented, not human-centred; it is for users who seek information via a computer. Hence, it is mainly linked to human–computer interaction and the capability to create and develop interactive computer programmes.

Similarly, Cignoli (2011) evaluated the performance of Marchionini's model in relation to information seekers' responses after the Democratic People's Republic of Korea's (North Korea) bombing of the Republic of Korea's (South Korea) Yeonpyeong Island in November 2010. She concluded that Marchionini's model does not account for modifications to the hierarchy of information sources and the rearrangement of information-seeking variables' priority and value in uncontrolled environments, such as crisis situations. Moreover, she claimed three variables were lacking in Marchionini's model:

- the effects of stress and collectivism on the information-seeking process
- the effectiveness of formal search systems
- the unprompted creation of new search systems (p. 2)

However, Sadeh (2010, p. 127) pointed out that 'the model falls short in covering the non-directed processes and does not present a clear picture that characterises a specific community'.

2.2.3.5 Wilson's Model

Since 1981, Wilson has provided a number of models to explain the development of theory in the field of information seeking. Figure 2.5 illustrates the latest model of information-seeking behaviour—a combination of his previous models which grew out of Wilson's 1981 model. This earliest model was used as a framework for the integration of studies from diverse fields, excluding information science, but including decision making, psychology, innovation, health communication, and consumer research (Wilson, 1999b; 2005).

In his model, Wilson pointed out that the person in the context continues to be the focus of information needs and that intervening variables, such as psychological, demographic, role-related, interpersonal, environmental, and source characteristics, may play a crucial role in facilitating or obstructing the information-seeking process (Wilson, 1999b).

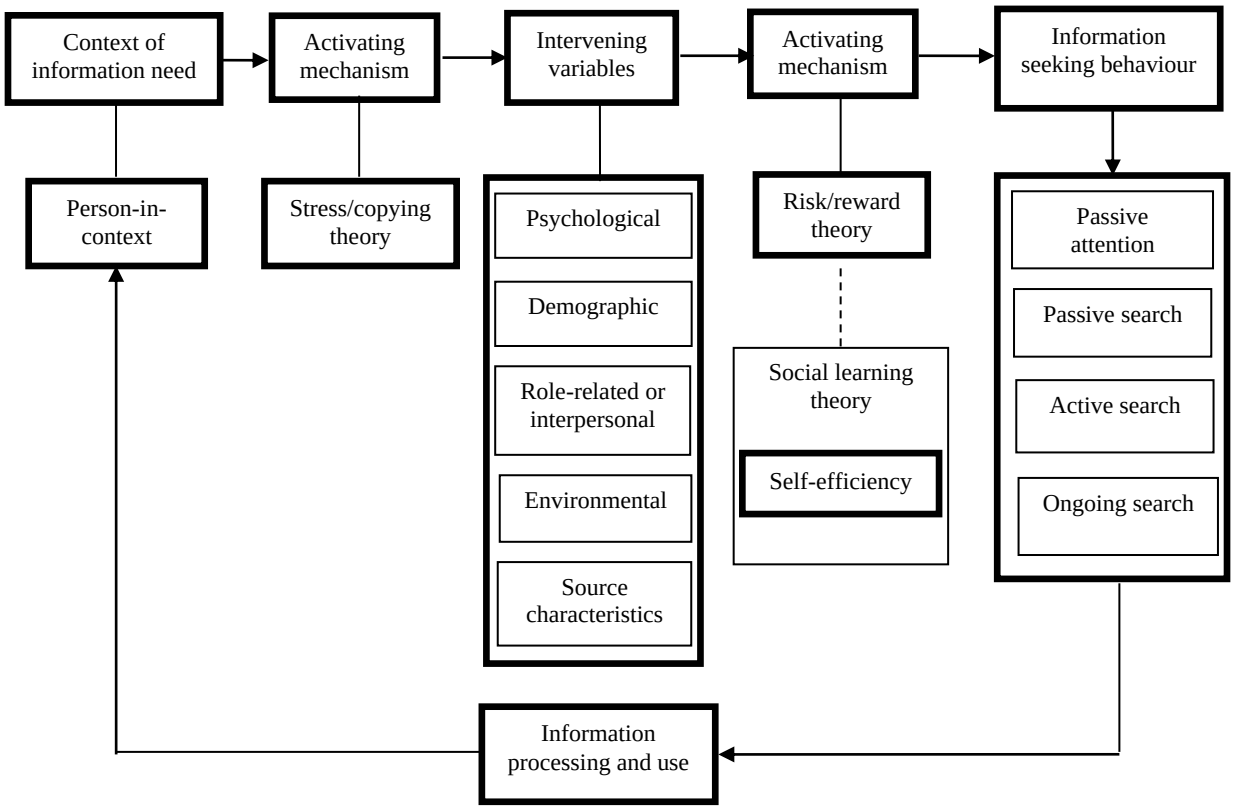


Figure 2.5: A revised model of information-seeking behaviour. Reproduced from Wilson (2005)

Case (2012) commented that Wilson's model is a complex one. It invokes explicit theories at certain points, modified from other areas of study, to explain the following aspects of information seeking:

- **The theory of stress and coping, from psychology:** can explain why some needs prompt information seeking more than others.
- **The theory of risk and reward, from consumer research:** may help clarify why individuals have a preference for using some sources of information rather than others.
- **The theory of social learning, from psychology:** derived from the concept of self-efficacy, helps explain why people can (or cannot) track a goal successfully, as this ability is based on their perceptions of their own efficacy (Case, 2012).
- **Information processing and use:** activities that happen when a person satisfies his or her information needs and begins to use the results. Wilson (1999b, p. 256) argued that 'information processing and use is shown to be a necessary part of the feedback loop, if information needs are to be satisfied'.

Case (2012) assumed that Wilson's activating mechanisms can be motivators that help and encourage an individual to search for information, but questioned how and to what extent. In addition, these motivators can be influenced by a number of intervening variables: psychological predispositions (e.g. the tendency to be curious); demographic background (e.g. education or age); role-related or interpersonal factors (e.g. acting as a manager or a mother); environmental (e.g. availability of resources); and characteristics of the sources (e.g. accessibility and credibility).

Wilson's model provides an essential perspective, recognising diverse types of search behaviour: passive attention, passive search, active search, and ongoing search (Case, 2012).

- **Passive attention:** information can be acquired without planning or seeking, such as by listening to the radio or watching television programmes.
- **Passive search:** indicates those occasions when one type of search (or other behaviour), such as browsing, results in the acquisition of information that happens to be related to the individual requirement.
- **Active search:** an individual seeks out information actively from diverse sources, such as databases, e-journals, and conferences.
- **Ongoing search:** the basic framework of knowledge in a particular context has been already been established by an active search, but an infrequent progressive search is carried out to update or broaden knowledge. In consumer research, Bloch et al., as cited by Wilson (1997, p. 562), defined the ongoing search 'as that which is independent of specific purchase needs or decisions and that the motives are to build knowledge for future purchase decisions and simply to engage in a pleasurable activity'.

Wilson's model can help one understand information-seeking behaviours in general, from the time when the needs of the individuals begin until the individuals find what they need. According to Wilson (2005, p. 34), 'Wilson's model is a very general model and is not only hospitable to theory that might help to explain the more fundamental aspects of human behaviour, but also to various approaches to information-seeking behaviour and information searching'. The importance of this model is that it makes researchers conscious of the breadth of information-seeking behaviour and enables them to see how a specific piece of research might be viewed as well as how it might contribute to an understanding of the whole (Wilson, 2005).

Wilson's model has received wide recognition and has been cited by a number of key authors in the field, such as Belkin, Ellis, and Kuhlthau. Wilson (2005, p. 36) commented that 'it seems likely that the model will continue to evolve as more and more researchers use it as a basis for thinking about the problems of human information behaviour'. Wilson's model has been used and applied in a number of information-seeking behaviour studies, such as Odhiambo (2000, PhD Thesis), Niedźwiedzka (2003), Al-Daihani (2003, PhD Thesis), Al-Moumen (2009, PhD Thesis), and Sadeh (2010, PhD Thesis).

2.2.3.6 Sadeh's Models of Information-Seeking and -Searching Behaviours

Sadeh (2010) pointed out that the information systems available today do not address the information-seeking behaviours of users, especially scholars in scientific communities; consequently, their searches are often clumsy and inefficient. Therefore, Sadeh sought to design an information-seeking system that addresses the scholarly materials required by members of a scientific community (INSPIRE High-Energy Physics) and which would increase the effectiveness of scholars' searches and assist them in finding relevant materials. To this end, Sadeh conducted a number of interviews and observations and distributed a survey that received more than 2,100 responses.

Sadeh provided a new model that leveraged some existing models in terms of information behaviour, information seeking, and information searching and designed a new user interface—namely, the High-Energy Physics (HEP) INSPIRE information system—based on the model proposed. In addition, the user interface was evaluated using a set of six personas.

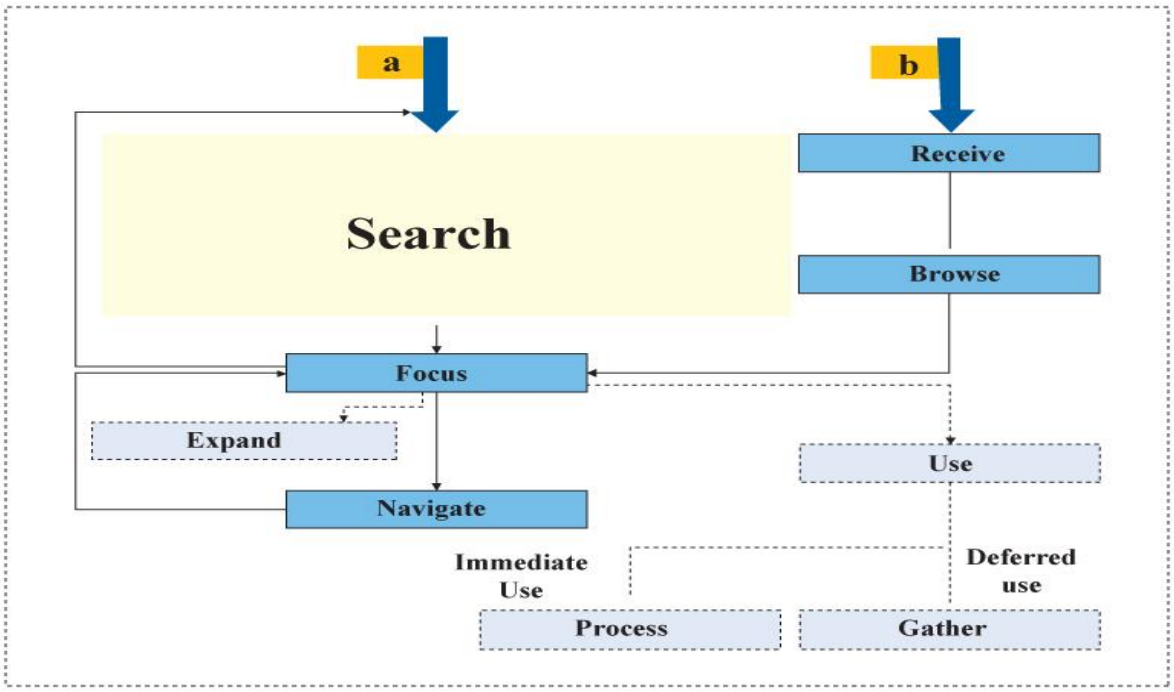


Figure 2.6: Sadeh's model of information-seeking behaviours. Reproduced from Sadeh (2010)

The model describes two processes of active information seeking: directed and undirected. Directed is searching for information that can be recognised, while undirected is the scanning of information with no exact information need in mind. Sadeh claimed that the nodes represent the interactions in this model as it relates to searching in automated information systems, but it can also be applied to querying a human being.

The undirected process begins with a receive action, and the user gains a list, whether by automated update, such as a rich site summary (RSS) feed, an e-mail, or access via a dedicated web page. The list can also be obtained from a person (a supervisor or an instructor). The references at the end of the received article can be also considered as relevant to the process. Users do not usually depend on the list of references as a solitary source of information, separated from its context. They can use the list as a route to other documents that might be interesting and exit the list of the document they are reading.

The next action is browse, in which users examine the items on the list. In most cases they are interested in the metadata, including the abstract; however, in some cases they would like to check a document closely, and they then focus on it. The focus action is at the crossroads of directed and undirected information seeking. When researchers focus on a document, they might desire to examine it for more information that might be provided in textual elements

and figures in the text. Conceptually, such behaviour aims to expand the document to include, for instance, an explanation, a map of a place, or a translation of a word. Different ways of expanding a document can present previous versions of the article.

At this point, the user can make a decision either to use the document immediately or to keep it for deferred use. The user might navigate other documents of diverse types by following links. In the case of navigation, the user focuses on one document at a time. The process is repeated, and the user can decide at any point to keep on navigating or to invoke a new search, probably re-using metadata elements of the material found in the focus as the search term.

A user may decide to invoke a search for other articles on an interesting topic mentioned in the primary article. When doing this, the researcher will, in all probability, use another information system—normally the library system, but possibly Google or Google Scholar—to begin a new search about their topic.

Figure 2.7: Sadeh's model of information-searching behaviours. Reproduced from Sadeh (2010)

In Figure 2.7, Sadeh (2010) illustrated that information searching is a directed process which is a part of the more general activity of information seeking. When the researcher has perceived an information need, searching begins as a direct process. The researcher has a concept regarding the materials required. With the purpose of querying the information

system, the researcher should switch and articulate the information need. The query could be related to the researcher's assumptions about particular keywords displayed in the information or attached to it as metadata.

Success in bringing a perceived information need to an articulated information need does not require the researcher to use the correct terms in the query, but it does require experience in querying the information system, such as knowing the options (pre-filter) that the system provides from a more general point of view. Failure to find what the researcher needs does not mean that he/she has failed; it might be because the user has not described what he/she needs in an appropriate way or because of other factors.

The query can be divided into three modes—explore, search, and ask for—depending on the method used in the query for the information requirement.

- **Explore:** when the researcher searches for information outside his/her field of expertise.
- **Search:** an exploratory search.
- **Ask For:** asking for a document well defined by the user.

All three modes (explore, search, and ask for) rely on system options.

Prior to taking an action, researchers usually scan the first items in a results list. When they analyse the first screen, their choice will be based on one of the following options:

- **Reformulate:** if a researcher does not find relevant items, he/she reformulates the query.
- **Focus:** if the results appear acceptable and relevant, the researcher will possibly focus on a particular item.
- **Narrow down:** if there are several results, the researcher might decide to narrow down the list to find more relevant items.

Sadeh (2010) models are important as they were created in order to design user interface; they are also the newest models of those selected for this study.

Table 2.2: A comparison summary of each model of information seeking selected in this study

Model	Year proposed	Participants	Place	Some studies apply the model	No. of citations*	Data collection Method	What distinguishes it from other models	Key benefits	Disadvantages
Ellis	1989	Physical and social sciences, engineers, researchers and research scientists	United Kingdom	Meho and Tibbo (2003) Bronstein (2007) Makri et al. (2008) Ge (2010)	474	Semi-structured interviews	Information seeking occurs in activities	Focus on behavioural approach (activities) rather than process	It depends on the circumstances of the individual's activities when seeking information linked to that particular point in time
Kuhlthau	1991	Students in universities, colleges, secondary schools, and public libraries	United States	Hyldegard (2006)	1708	Mixed methods via five studies	Information seeking occurs in stages	Focus on users' experience through the interaction of thoughts, feelings, and actions	Information seeking indicates stages, not users
Belkin et al.	1993	Based on a multidimensional space of information-seeking strategies	-	Kim (2009)	319	Observations the authors made and the findings of other empirical studies	Interaction within the system by the user	Designed to support the user's interaction with the system interface	It was not created based on studies the author applied and depends on other studies' findings
Marchionini	1995	-	-	George (2010), Cignoli (2011)	1972	Based on a number of personal and environmental factors and processes	Information-seeking process consists of a series of sub-processes	Provides flexibility for moving from one sub-process to another when the process is in progress	It does not take in consideration the user abilities
Wilson	1981	Based on studies from diverse fields	-	Niedźwiedzka (2003), Odhiambo (2000, PhD Thesis), Al-Daihani (2003, PhD Thesis), Al-Moumen (2009, PhD Thesis)	1444	Based on studies from diverse fields	Combination of his previous models and integration of studies from diverse fields	Classifying the types of search behaviours and investigation of difficulties when seeking information	Very broad as consists of theories, behaviours, and variables
Sadeh	2010	Researchers in a scientific community	High-Energy Physics (INSPIRE)	Based on the email received from author, no previous studies applied this model	-	Survey, interviews, observations, and personas	Has been created in order to design user interface	Divides the seeking information into two processes: direct and indirect	It applies for professionals in a specific community

*Based on Google Scholar (January 2015).

2.2.4 Summary of the Models

Table 2.2 summarises the information for each model in terms of year proposed, participants to which the model applies, place where the model was created, studies that apply to the model, number of citations, data collection method, what distinguishes it from other models, key benefits, and disadvantages.

All of these models investigated the different stages of information seeking, yet differences emerged. Ellis did not determine the relationships within the set of eight characteristics of information-seeking behaviour whereas Kuhlthau linked the stages of the seeking process to the users' feelings. Belkin et al.'s model was not created based on studies, but rather on other studies' findings and authors' observations. Similarly, Wilson's model was created based on studies that excluded information science; it was not based on users, and it was very broad as it consists of theories, behaviours, and variables. Marchionini's work was also not based on users, but rather on a number of personal and environmental factors and processes; it also did not take into account the user's abilities. Sadeh's model to some extent is similar to the context of this study as it was created to design a user interface and improve its effectiveness; however, it was for scholars in a scientific community, who are more professional than users of academic libraries. In fact, none of these models was specifically developed for academic library users or the academic library interface or even links users seeking behaviour to their interactions with interfaces.

The current study focuses on a particular group of users who are academic library users. Moreover, this study collected data using direct observation alongside the think-aloud technique in order to see what users search for, what they do, how they think, and how they interact with the interface. Therefore, the context of this study is different than the aforementioned models.

2.3 Human–Computer Interaction

2.3.1 Historical Background

Human–computer interaction (HCI) emerged from different and overlapping areas of study, including computer graphics, operating systems, human factors, ergonomics, industrial

engineering, and cognitive psychology (Hewett et al., 1992). HCI, although not yet called such, began coming into prominence at the beginning of the last century, when factory owners were concerned with human performance, specifically in manual tasks (Dix et al., 2004). The Second World War then witnessed the rise of research on the interaction between humans and machines for the purposes of creating more effective weapons systems and avoiding the problems presented by human-designed weapons. This development increased scholarly interest in the field and prompted the establishment of the Ergonomic Research Society in 1949. Ergonomics (the preferred term in the United Kingdom) or human factors engineering (the preferred term in North America) revolves around the physical characteristics of equipment and systems, as well as their effects on user performance. Ergonomics also centres on user performance in any system, including manual, mechanical, and computer systems (Sanders and McCormick, 1987; Dix et al., 2004). Until the late 1970s, information technology (IT) professionals were the only users interacting with computers, and even then, this task was primarily a hobby (Carroll, 2013). However, as computer use increased, researchers began to study the interaction between users and computers, paying attention to the physical, psychological, and theoretical aspects of this interaction. In the early to mid-1980s (Preece et al., 1994; Dix et al., 2004), the term *human–computer interaction* became widely recognised (prior to this development, the expression used was *man–machine interaction*). The evolution into HCI reflects a particular focus on computers and users' composition (Dix et al., 2004).

2.3.2 Definition of Human–Computer Interaction

Preece et al. (1994) pointed out that HCI has not been clearly defined, although Baecker and Buxton (1987, p. 40) provided a description that encompasses the direction of the early literature: a 'set of processes, dialogues, and actions through which a human user employs and interacts with a computer'. Numerous other scholars have attempted to explain HCI as well; they are more or less in agreement with one another. Bodi and Zeleznikow (1988) stated that HCI involves the manner in which users interact with computers to exchange information. Hewett et al. (1992, p. 5) created curricula for the Association for Computing Machinery (ACM), in which HCI is defined as 'a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the

study of major phenomena surrounding them'. From a computer science perspective, HCI is based 'on interaction and specifically on interaction between one or more humans and one or more computational machines (Hewett et al., 1992, p. 5). Johnson (1992) reiterated this definition, indicating that HCI is an area of study that focuses on the interaction that occurs between humans (users) and computers (machines). By contrast, Carey et al. (2004, p. 359) argued that 'the definition of Human–Computer Interaction depends on the situational context and the referent discipline being considered'.

2.3.3 Human–Computer Interaction and Related Fields

As indicated by Carey et al.'s (2004) definition, HCI is related to many other fields. The relationship or interaction between HCI and these fields is illustrated in Figure 2.8.

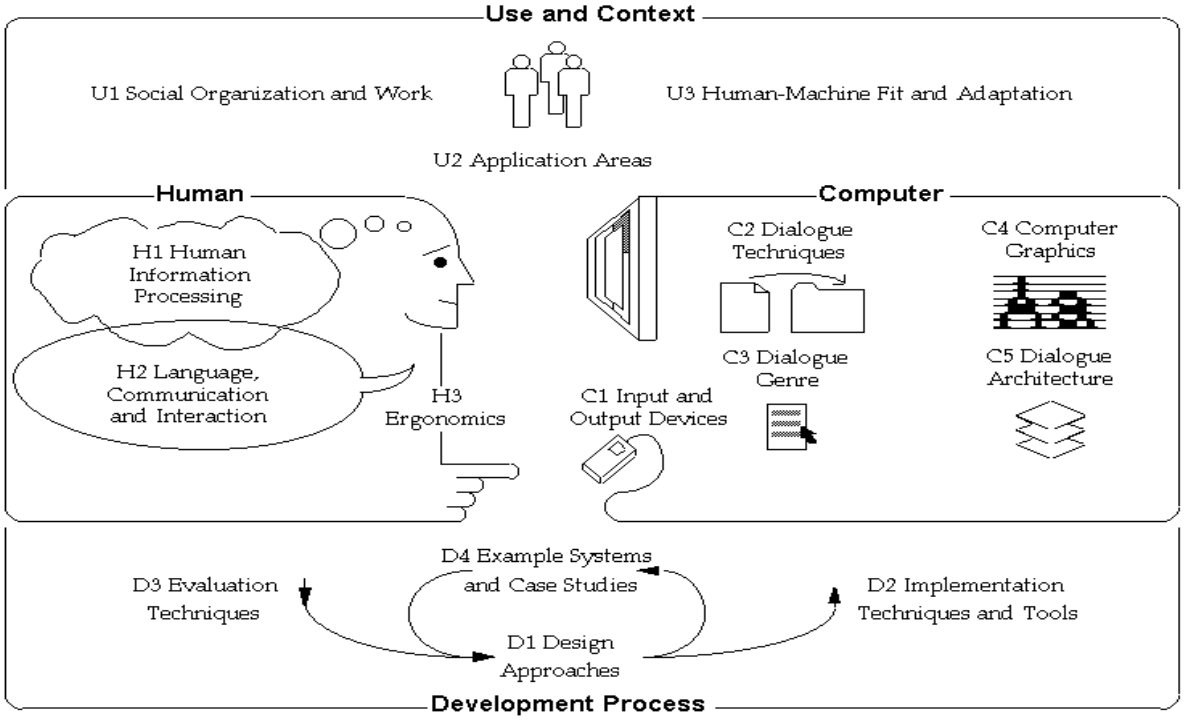


Figure 2.8: Human–computer interaction (taken from Hewett et al., 1992, p. 16)

Several published studies and books (Preece et al., 1994; Carey et al., 2004; Dix et al., 2004; Wania et al., 2006; Te'eni et al., 2007; Ziefle and Jakobs, 2010) also describe HCI as an

interdisciplinary area that incorporates various topics and sciences. These disciplines are briefly described as follows:

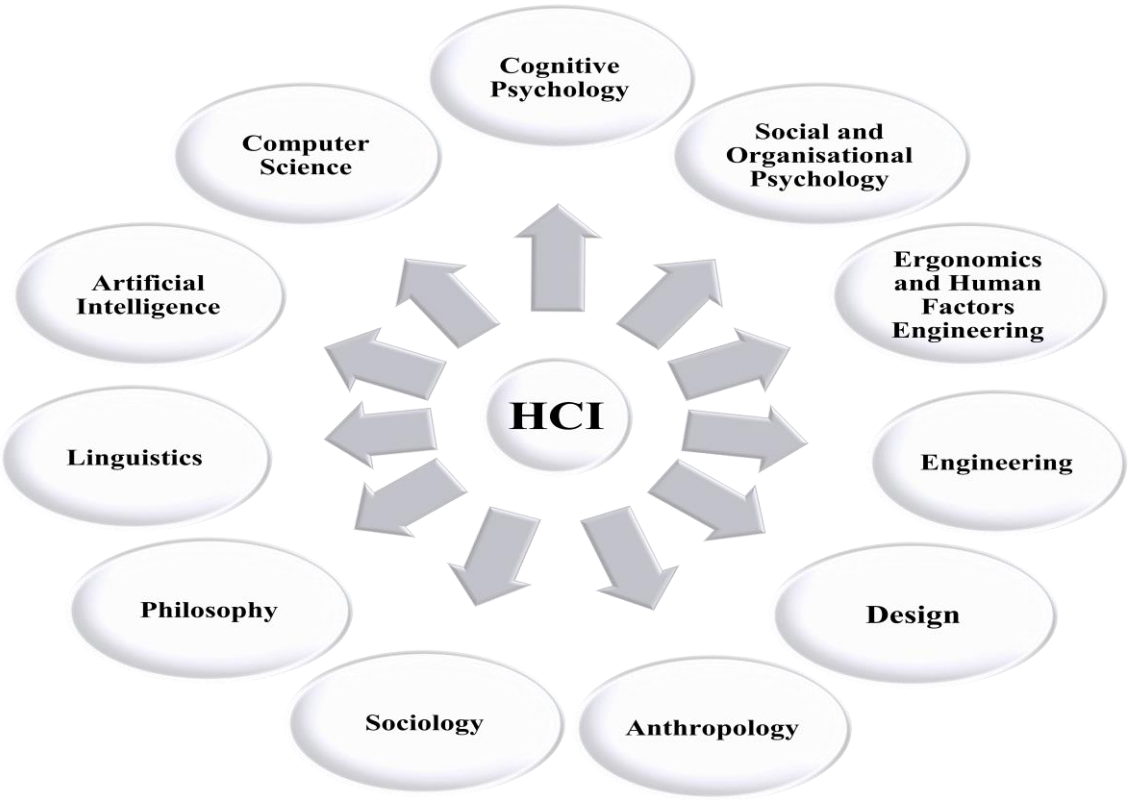


Figure 2.9: Disciplines that involve human–computer interaction (Preece et al., 1994)

- **Computer science** provides ideas and knowledge about the capability of technology, the ways in which technology may be exploited, and the application design needed to build the technology necessary for human–computer interfaces.
- **Cognitive psychology** applies theories of cognitive processes and empirically analyses user behaviour and mental model to gain insights into a user's perceptual, cognitive, and problem-solving skills. Norman (2002, p. 10) said 'the objective of cognitive psychology is to characterise these [cognitive] processes in terms of their capabilities and limitations'.
- **Social and organisational psychology** informs designers about social and organisational structures as well as the influence that introducing computers has on work practices.
- **Ergonomics or human factors engineering** maximises an operator's performance safety, efficiency, and reliability to make a task easier to accomplish as well as to increase feelings of comfort and satisfaction with the user's physical capabilities.

- **Linguistics** enables an understanding of structure (syntax) and meaning (semantics) in the development of natural language interfaces.
- **Artificial intelligence** is concerned with the design of intelligent computer programmes which simulate diverse aspects of intelligent human behaviour.
- **Philosophy, sociology, and anthropology** consider the implication of the introduction to IT to society. They also help explain the structure and functions of organisations through the use of techniques like ethnomethodology.[2]
- **Engineering and design** allow for the production of pleasing visual interfaces.
- **Graphic design** facilitates the production of effective interface presentations.
- **Information systems** ensure system functionality and usability, providing effective user-interaction support and enhancing user experience.

Zhang and Li (2005) reviewed the literature from HCI studies in seven prime management information system (MIS) journals published within a 13-year period (1990–2002). Based on their review, the authors formulated a topic classification scheme for HCI issues (Table 2.3).

Table 2.3: Topic classification scheme (Zhang and Li, 2005, p. 240)

ID	Category		Description and Examples
A	IT development		Concerned with issues that occur at stages of IT development and/or implementation that are relevant to the relationship between humans and technology Focuses on the process in which IT is developed or implemented; artefact is improved before actual use
	A1	Development methods and tools	Involves structured approaches, object-oriented approaches, CASE tools, and socio-cognitive approaches for developing IT that considers the roles of users/IT personnel
	A2	User–analyst involvement	Concerns user involvement, user participation, user–analyst differences, and user–analyst interactions
	A3	Software/hardware development	Focuses on programmer/analyst cognition studies as well as the design and development of specific or general applications or devices that consider human factors
	A4	Software/hardware evaluation	Considers system effectiveness, efficiency, quality, reliability, flexibility, and information quality evaluations that consider people as part of the factors
	A5	User-interface design and development	Involves interface metaphors, information presentations, and multimedia
	A6	User-interface evaluation	Pertains to instrument usability (e.g., ease of use, error rate, ease of learning, retention rate, satisfaction), accessibility, and information presentation evaluation

[2] Ethnomethodology: a method of sociological analysis that examines how individuals use everyday conversations to construct a common-sense view of the world (OD Online).

	A7	User training	Addresses users' training issues during IT development (prior to product release or use)
B	IT use and effect		Concerned with issues that occur when humans use and/or evaluate IT; issues related to the reciprocal influences between IT and humans; artefact is released and used in actual contexts
	B1	Cognitive belief and behaviour	Involves self-efficacy, perception, belief, incentives, expectation, intention, behaviour, acceptance, adoption, resistance, and use
	B2	Attitude	Measures attitude, satisfaction, and preference
	B3	Learning	Revolves around learning models, learning processes, and training in general (different from user training as part of system development)
	B4	Emotion	Concerns emotion, affect, hedonic quality, flow, enjoyment, humour, and intrinsic motivation
	B5	Performance	Concerned with performance, productivity, effectiveness, and efficiency
	B6	Trust	Involves trust, risk, loyalty, security, and privacy
	B7	Ethics	Addresses ethical beliefs, ethical behaviours, and ethics in general
	B8	Interpersonal relationship	Encompasses conflict, interdependence, agreement/disagreement, interference, tension, leadership, and influence
	B9	User support	Addresses issues related to information centres, end-user computing support, and general user support
C	Generic research topics		Concerned with general research issues and topics

Given that HCI is a multi-disciplinary field of study, an ideal designer of interactive systems should hold expertise in diverse fields because designing an effective interactive system based on a single discipline is an illogical approach (Dix et al., 2004). Computer science engineers and system designers must consider the various disciplines related to HCI because their aim is to design, implement, and evaluate interactive computer systems in the context of user tasks and work (Dix et al., 2004). Regarding the information science field, HCI can play a crucial role in increasing the academic libraries' interface usability, identifying the way users interact with the interface, and defining how these interfaces should be designed to be more effective and easy to use for the users.

2.3.4 Goals and Importance of Human–Computer Interaction

In addition to attempting to establish its precise definition, the goals and importance of HCI have also been discussed by many researchers. Fischer (2001) claimed that the primary aims

of HCI research are to design easy-to-use and functional systems and to provide users with experiences that correspond to their specific background knowledge and objectives. Diaper (1989, p. 3) indicated that the goals of HCI are 'to develop or improve the safety, utility, effectiveness, efficiency, and usability of systems that include computers'. HCI has also been recognised as crucial to the success of a system; that is, if HCI fails, the system fails (Te'eni et al., 2007).

HCI is intended to make computers usable by linking two components: the machine side, which revolves around techniques such as programming languages and operating systems; and the human side, which addresses factors such as cognitive psychology and linguistics. In addition, the human side addresses the approaches people use to look for information through the systems, including how they interact with the systems' interfaces, their skills, experiences, and expectations of the systems. Thus, the main goal of HCI is to design systems that create simple and flexible relationships between users and computers based on a thorough understanding of human goals (Hewett et al., 1992).

Moreover, HCI aims to bring the power of computers and communications systems to people in ways and forms that are both accessible and useful for work, learning, communication, and recreation (Foley et al., 1996). This technology is necessary for the production of efficient, effective, and safe products and systems. HCI can also do the following:

- Facilitate the creation of products and systems that are easily and naturally used and encourage people to use such products and systems,
- Increase participation by ensuring the accessibility of interfaces and systems,
- Increase productivity (introducing technology that does not support work diminishes productivity),
- Improve safety (Preece et al., 1994).

Carey et al. (2004) discussed the importance of HCI, clarified its goals for the information system (IS) field, and used experiential evidence to explain why HCI research works towards understanding the relationships that affect human–technology interaction within an organisational setting. This knowledge is used to:

- Help IS professionals develop usable, and therefore successful, systems.
- Increase the productivity of IS users (managers, employees, and customers) and user satisfaction.

- Enhance organisational effectiveness as an outcome of productive users and IS professionals.
- Provide researchers with cohesive and cumulative knowledge, thereby extending the boundaries of scholarly theory.

HCI focuses on improving user effectiveness and computer experiences in organisational systems by enhancing the user interface through an understanding of the tasks and organisational contexts in which HCI occurs.

2.3.5 Interaction Design

Winograd (1997, p. 160) defined interaction design in general terms, referring to it as ‘designing spaces for human communication and interaction’. Meanwhile, Rogers et al. (2011, p. 9) described interaction design specifically as ‘designing interactive products to support the way people communicate and interact in their everyday and working lives’. Furthermore, Saffer (2009, p. 4) portrayed it as an artistic aspect—namely, ‘the art of facilitating interactions between humans through products and services’.

Norman (2002) pointed out two principles of interaction design: providing a good conceptual model and making things visible. A conceptual model is used to predict the effect of actions performed. The conceptual model is based on:

- Affordances, or the basic properties of a device/system that help users determine how to use such a device/system;
- Constraints, or possible actions that can be performed;
- Mapping, or the relationship between controls and outcomes; and
- Experience, or acquired knowledge related to a domain.

Visibility is related to mapping and feedback:

- It provides control for each function (direct mapping).
- It makes actions and reactions visible (feedback).

2.3.6 Terms in the Interaction Models

Szalwinski (2010) mentioned that a number of terms have been used in interaction models between the user and the computer. These are briefly defined as follows:

- **Goals:** the objectives that the user has determined.
- **Domain:** the field of expertise and knowledge pertinent to some activity work; consists of concepts.
- **Tasks:** actions on the concepts of the domain.
- **Intentions:** particular actions needed to reach or accomplish the goal.
- **Task analysis:** identification of the problem space in terms of goals, domain, intentions, and tasks.
- **Core language:** the computational characteristics of the domain pertinent to the system condition.
- **Task language:** the psychological characteristics of the domain pertinent to the user condition.

In addition, the following terms have been used by Shneiderman (1997):

- **Formulation:** decisions that arise before the user starts searching.
- **Refinements:** removal of unwanted results to extract the required results.

2.3.7 Models of Interaction in HCI

Interaction models identify events or interactions between the user and the system. Some of these models will be discussed in this research and are introduced in the sections that follow (Chapter 3 provides a more detailed explanation of the rationale for choosing these models, how they relate to this research, and their applicability to academic library practices).

2.3.7.1 Donald Norman's Execution–Evaluation Cycle Model

Norman originally introduced his cycle model of the execution–evaluation gulfs in his book *The Psychology of Everyday Things* (1988); the model was subsequently popularised in his book *The Design of Everyday Things* (2002). Victor (2006) described this model as the way

to conceptualise the philosophy of computer interfaces. The model explains the methods users encounter when they intend to achieve a goal. When using (interacting with) something (system), they encounter two gulfs (phases): the Gulf of Execution, when they endeavour to understand how it operates, and the Gulf of Evaluation, when they endeavour to understand what happened. The Gulf of Execution is divided into three stages: plan, specify, and perform. The Gulf of Evaluation is also divided into three stages: perceive, interpret, and compare (Norman, 2013). Thus, interaction in this model is divided into three major phases: the goal to be achieved from the something (system) that is intended to be used; the execution of the action (the Gulf of Execution); and the evaluation of the results of what has occurred (the Gulf of Evaluation). This is then sub-divided into seven stages, as shown in Figure 2.10 and explained below.

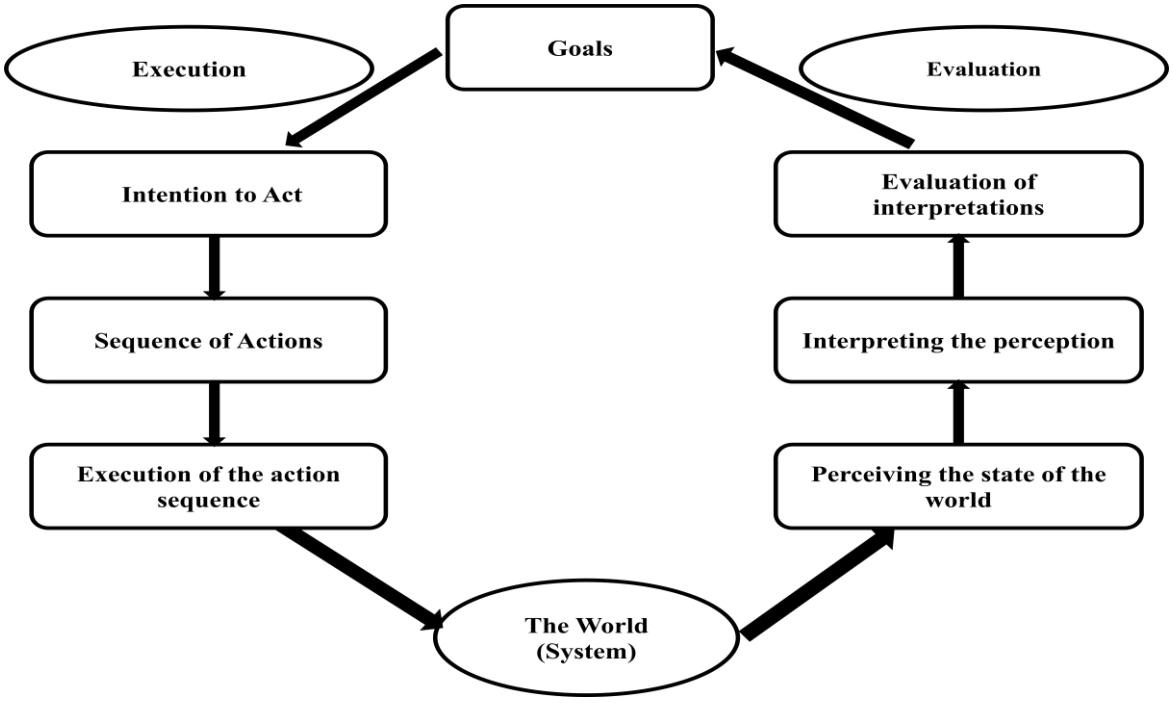


Figure 2.10: Norman's cycle model phases and sub-stages (Norman, 2002, pp. 47–48)

- **The Gulf of Execution:** the intentions of users and the actions that the system allows them to take. (Does the system provide actions that correspond to the intentions of the user?)
- **The Gulf of Evaluation:** the physical representation provided by the system which can be perceived by the expectations and intentions of the user. (Does the system provide a

physical representation that can be directly perceived and that is directly interpretable in terms of the intentions and expectations of the user?)

Stages of action:

1. **Forming a goal:** What does a user want? (Goal)
2. **Forming an intention:** What will satisfy this goal? (Execution)
3. **Specifying an action:** What should the user do to act out the intention? (Execution)
4. **Executing the action:** Are the steps precise? (Execution)
5. **Perceiving the state of the world:** Are the senses effectively used to collect information about the world or system with which the user is working? (Evaluation)
6. **Interpreting the state of the world:** Has the user identified whether anything has changed? (Evaluation)
7. **Evaluating the outcome:** Was the goal attained? (Evaluation)

Hearst (2009) argued that users in Norman's model use their mental model of a situation to decide which course of action will accomplish their goals in the real world (system). She claimed that the mental model is a concept which is often invoked in the field of HCI as a mechanism to explain a user's understanding of a system or interface. Lim et al. (1996) developed a number of hypotheses about the operations of Norman's model and tested them in a laboratory experiment based on action identification theory.[3] They found no difference in the total amount of time taken to perform a task by users of a direct-manipulation interface and users of a menu-based interface because utilising a direct-manipulation interface sees more time dedicated to performing motor actions, but this is offset by shorter non-motor time. Moreover, interactions among task familiarity, instructions, and the type of interface are significant, which means that Norman's model may not hold under all conditions.

On the other hand, Lee and Smeaton (2002), in their study which aimed to design a user interface for a digital video library system at the Centre for Digital Video Processing in Dublin City University, pointed out that, in order to think clearly about user interfaces for digital video library systems, it is useful to break the interface down into a number of elements designed to support different user actions. They thought it was worthwhile to consider the diverse stages of information-seeking behaviours, such as:

[3] Vallacher and Wegner (1987) stated that, in action identification theory, people can think about a particular activity at different levels of identity or abstraction. Lower levels of identity specify the mechanics of an action, or how something is done, while higher levels indicate what is to be done and why (as cited in Lim et al., 1996, p. 8).

- Starting with the decision of which information source to use;
- Searching for a document in the selected collection;
- Searching for a part of a document and reading that point in the document; and
- Returning to search and so on.

Therefore, Lee and Smeaton (2002) applied Norman's model alongside a number of models also discussed in this chapter, such as the Marchionini model (see Section 2.2.3.4), the four-phase search process by Shneiderman et al. (see Section 2.3.7.3), and the eight sequences of interaction cycle by Hearst (see Section 2.3.7.4). Lee and Smeaton claimed that, in terms of the user stages, the use of these models is beneficial in considering the user interface clearly, even though they are in different stages. However, they emphasised the unpredictable and non-purposeful change of directions between their respective stages. Thus, they developed a practical interface design framework (Figure 2.11) consisting of five rough groupings of interface features responsible for diverse stages of the four models that support the following activities:

- Browsing and then selecting video programmes (as a collection)
- Querying within a video programme (content querying)
- Browsing the content of a video programme
- Watching (part of) a video programme
- Re-querying the video digital library and/or within a video programme

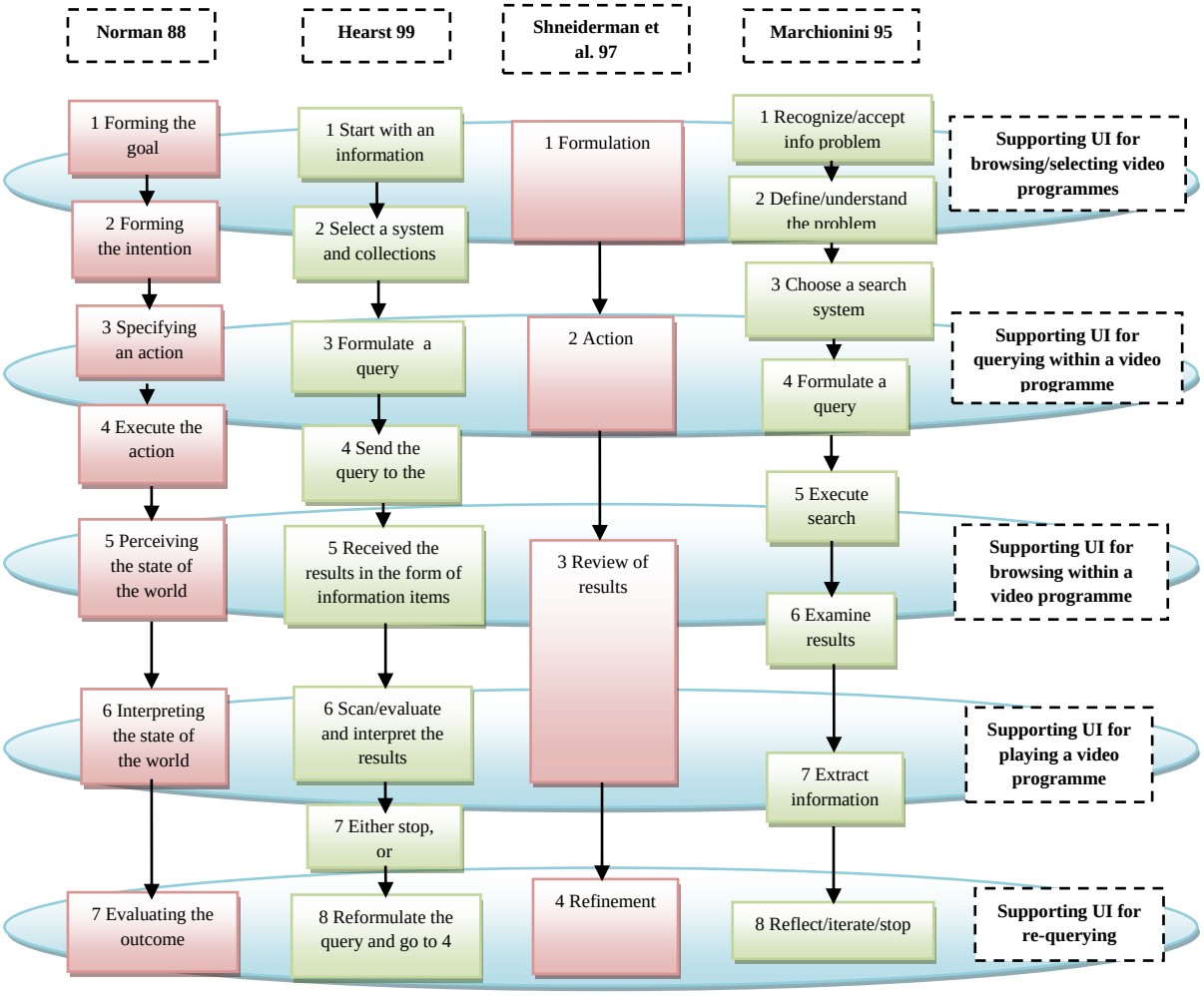


Figure 2.11: Interface elements that correspond to and are supported by information-seeking stages from the selected models. Reproduced from Lee and Smeaton (2002)

Norman's model is a good representation of the process by which user–system interaction is clearly and intuitively understood. This model has been used to elucidate why some interfaces cause problems in terms of expectation and evaluation. However, it only focuses on a user's view of interaction without attempting to resolve system communication through the interface (Dix et al., 2004). Kim (2002) argued that models of human–computer interaction, such as Norman's model, have been employed by several researchers as a classification frame of usability problems. Because models of the information-seeking process fail to incorporate the digital library-reflected query-based information-seeking behaviours using stand-alone database systems, there is a need for a more comprehensive model to serve as a framework to classify usability problems in the digital library context.

Norman's model identified the way users interact with the interface as well as determined interactions in stages; thus, it supported the context of this study which aims to identify the way that users interact with the academic library web interface.

2.3.7.2 Dix et al.'s General Interaction Framework

Dix et al. (2004) developed a general framework that describes system and user interaction in reality. The interaction framework was originally proposed by Abowd and Beale (1991) via Norman's model which helped them develop their framework. It consists of four main components: system, user, input, and output.

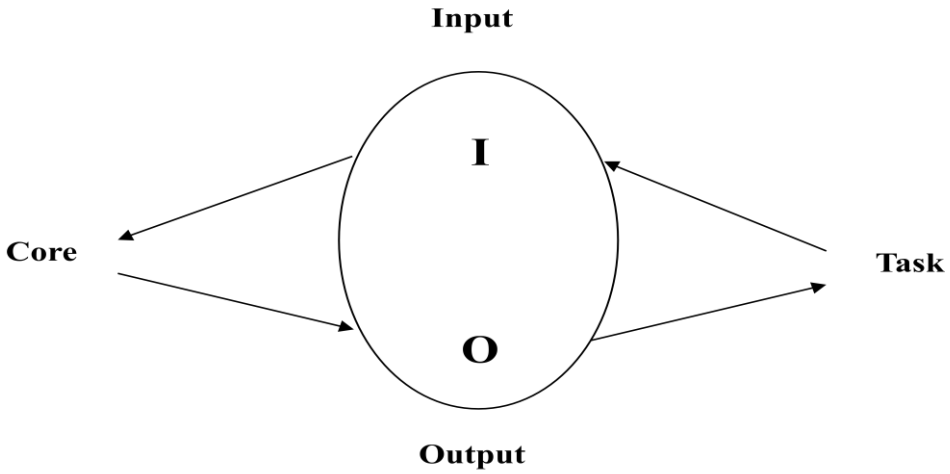


Figure 2.12: General interaction framework. Reproduced from Dix et al. (2004)

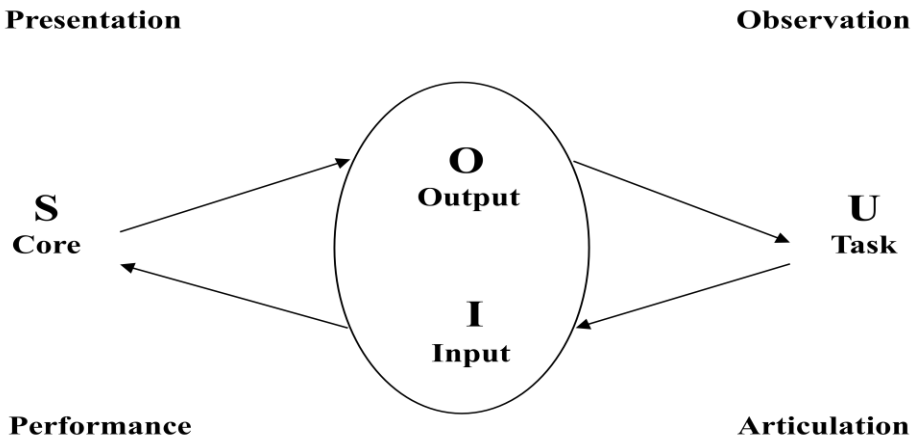


Figure 2.13: Translations between components. Reproduced from Dix et al. (2004)

Fields (2001, p. 30) declared that this model highlights some of what is important in HCI modelling: ‘A human user interacts with a computer device through its user interface. The user’s actions (and possibly autonomous processes within the computer and the real world to which it is connected) effect some changes to the computer’s internal state, which are presented back to the user, again through the user interface’. The interactive cycle occurs in four steps, each corresponding to translation from one step to another.

1. A user initiates interaction by forming a goal and a task for accomplishing the goal.
2. The task can be controlled only via an input; thus, the task must be articulated.
3. The input language is translated into a core language, suggesting that operations be performed by the system.
4. The system then adjusts to the new situation, which must be communicated to the user, who can observe the presented results and check whether they are related to the goal.

Four main translations are incorporated into the interaction phases: articulation and performance from the execution phase, and presentation and observation from the evaluation phase (Dix et al., 2004).

Mitchell et al. (1996) proposed a framework for user interfaces to databases. The framework drew from user, interaction, visualisation, and data models, where appropriate, but was mainly influenced by Abowd and Beale’s general interaction framework. Mitchell et al. revised the framework of Abowd and Beale as shown in Figure 2.14.

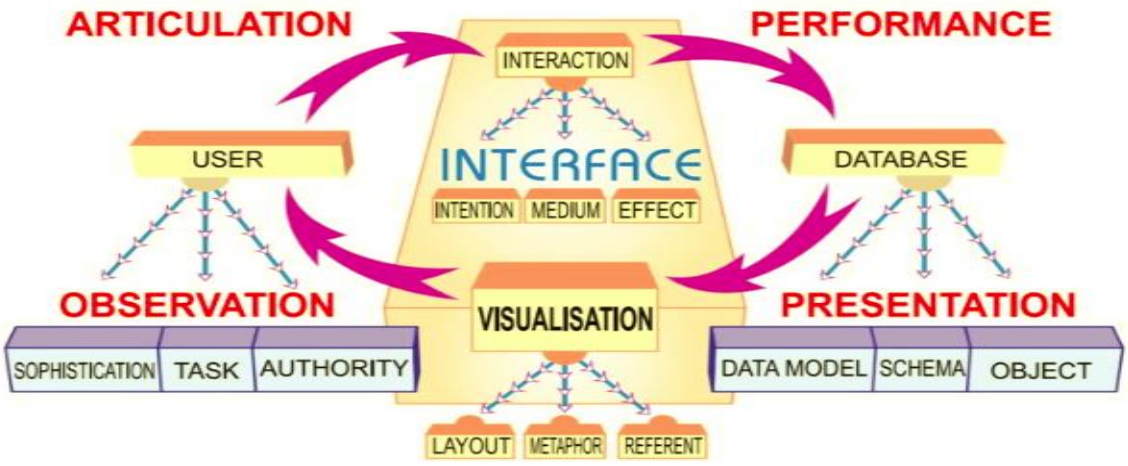


Figure 2.14: The revised framework. Reproduced from Mitchell et al. (1996)

The revised framework is derived from Abowd and Beale's system, input, output, and user components. They replaced input with interaction, as they assumed that—in several modern direct manipulation interfaces—the user's articulation of a task is involved with the simultaneous input and output of a system. They replaced system with database, as they assumed that this would enable the framework to deal specifically with the interaction between the user and the elements of the database. They replaced output with visualisation, under the assumption that it would focus the framework on presenting elements of the database which will help divide the concerns of data visualisation from the interaction component. They found that the components of the framework provided a means of mapping it to a brief conceptual language, as they identified the main features and components of an interface with specific relation to database issues. Therefore, it generally can be applied to database interfaces supporting any data model.

2.3.7.3 Shneiderman et al.'s Four-Phase Framework

Shneiderman et al. (1997) identified the search process through which users interact with a system; it involves four phases that provide designers of specific systems with a good degree of independence, thereby enabling the presentation of different features in a systematic and consistent framework. The phases are described thus:

1. **Formulation:** Decisions that occur prior to the user's search. These decisions can be classified into four categories:
   a) Source decisions entail deciding which libraries and/or collections to search and the scope of the search within these databases.
   b) Field decisions pertain to identifying the documents in a collection that may be related to various fields. Users make a decision as to which text fields require searching, a decision which may be restricted by structured fields.
   c) In deciding on what to search for, users choose or type text that comprises one or more phrases. Users may control stop lists, such as common words and single letters.
   d) In variant decisions, searches can provide users with permission to control variant capitalisation, partial matches, word stemming, phonetic variants, stop words,

synonyms, abbreviations, and broader or narrower terms from a thesaurus. A user interface generally clarifies which variants, if any, are allowed.

2. **Action:** This phase refers to the manner by which a search begins, whether it is initiated explicitly (e.g. with a button) or implicitly (e.g. when some aspect of a query is modified).
3. **Review of results:** The usual options are, for instance, determining dataset size, layout, sequencing (alphabetical, chronological, relevance ranked, etc.), and contents (which parts and fields are displayed). Less conventional interfaces might employ diverse techniques, including several based on information–visualisation research.
4. **Refinement:** Search results can be obtained by supplying feedback through instructive messages and clustering of results. For example, an advanced query is possible especially by way of relevant feedback, recording of history, and extraction of results to files, perhaps for use in email.

Reiterer et al. (2000) designed INSYDER[4] to find business information on the World Wide Web; they chose the four-phase framework of Shneiderman et al. and employed it to support the user during the information-seeking process. They claimed that, from the user's perspective, the phases of this framework cover all phases of the information-seeking process in a clearly understandable way. They conducted user tests on INSYDER which resulted in a number of enhancements and showed that the project team was on the right track with this assistance system. Mußler (2002) argued that, in a search for business information on the World Wide Web, the application of Shneiderman et al.'s model was more useful than other proposed models (e.g. Saracevic [1996], Ingerwersen [1996], or Wilson [1997]), as they are unquestionably useful for explaining general information-seeking behaviour.

Another study by Reiterer et al. (2005) regarding the development of INSYDER mainly focused on its usability. The authors ascertained that Shneiderman et al.'s framework provides a task model for the different phases of information seeking, which are utilitarian, yet sophisticated enough. Reiterer et al. conducted broad evaluations of the retrieval performance and usability of the visualisation. These evaluations provided several helpful

[4] INSYDER, an abbreviation of INternet SYstem DE Recherche, assists the user in finding relevant business information on the World Wide Web. The system is also designed to help users overcome certain problems when searching for information on the World Wide Web.

insights into developing a new visual-information-seeking system for VisMeB,[5] which was originally developed by Klein et al. (2003).

2.3.7.4 Hearst Model of Interaction

Hearst (1999) explained the information access process, clarifying the interaction between users and systems when the latter are in use. Hearst's standard process is elucidated in the following sequence of steps:

1. Begin with an information need.
2. Choose a system and collection for searching.
3. Formulate a query.
4. Send the query to the system.
5. Obtain the results in the form of information items.
6. Scan, evaluate, and interpret the results.
7. Stop the search.
8. The query can also be reformulated and step 4 re-initiated.

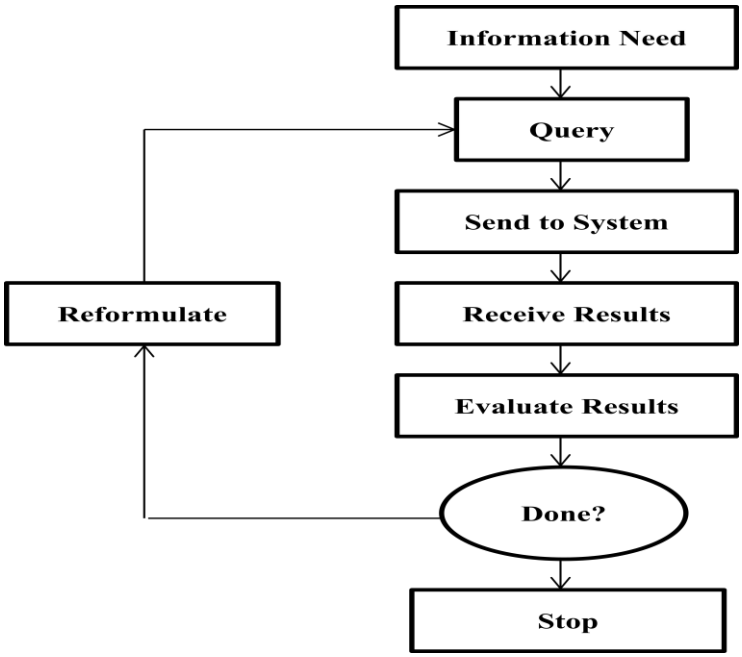


Figure 2.15: Model of interaction in information access. Reproduced from Hearst (1999)

[5] VisMeB is an abbreviation of Visual Metadata Browser, which is a framework for Metadata Visualisation Systems and is based upon redesign ideas from INSYDER.

Hearst (1999) claimed that the interaction model in Figure 2.15 is simple and the only model that web search engines use. It is based on the fundamental assumption that a user's need for information is stable and that the process of information seeking is one of sequentially purifying a query until the user retrieves only the documents that are required and related to the original information need.

However, users can also learn throughout the search process. They read the titles in result collections, scan information, view lists of topics related to their query terms, read the retrieved documents, and navigate to hyperlinked websites. Nevertheless, the model decreases the interaction that occurs when the user scans terms suggested as a result of relevant feedback, browses thesaurus structures, or views thematic overviews of document collections. It does not ascertain the role of source selection, which is gradually more important now that—for the first time—tens of thousands of information sets are instantaneously accessible to a large number of people. Furthermore, it disregards the fact that some users dislike a long list of disorganised results that do not directly reflect their information needs.

Zhu et al.'s (2011) study sought to propose a new model to describe autonomic information-seeking processes. To do so, they surveyed Hearst's model as well as Shneiderman's and Marchionini's models, concluding that Hearst's model intimately overlapped with the latter two models. The new model they proposed, called the net-casting information-seeking model, reflects automated information-seeking processes. They validated its usefulness through case studies and intend to conduct more empirical studies in the future.

2.4 User Studies

This section is divided into four subsections: information needs, information-seeking behaviours, user experiences, and users' difficulties with academic library websites. A number of authors have examined the user studies over a number of years. There have been different methodologies employed with a particular participants or diverse participants in different countries, as shown in Table 2.4.

Table 2.4: Studies investigated in this section

Author	Year	Research Methods	Type of Participants	Location
Al-Moumen	2009	Questionnaire, Interviews, and Focus Groups	Postgraduate Students, Academics and Library Staff	Kuwait
Al-Moumen et al.	2012	Questionnaire, Interviews, and Focus Groups	Postgraduate Students, Academics and Library Staff	Kuwait
Awana	2008	Based on previous Studies	-	-
Bhatia and Rao	2011	Questionnaire	Undergraduate Students	India
LAC Report (Boston University)	2012	Questionnaire	Postgraduate Students	US
Brown and Swan	2007	Focus Group and Interviews	Researchers and Librarians	UK
Catalano	2013	Based on Previous Studies	-	-
Chaurasia and Chaurasia	2012	Questionnaire	Research Scholars and Postgraduate Students	India
Choy	2011	Based on Experience and Understanding of the Topic	-	-
Connaway and Dickey	2010	Based on Previous Studies	-	US
Constable	2008	Focus Groups	Research Supervisors and Research Students	UK
Denton and Coysh	2011	Usability Testing and Online Survey	Undergraduate and Postgraduate Students	Canada
Drachen et al.	2011	Survey and Interviews	Postgraduate Students	Austria, Denmark, and Norway
Ganaie and Rather	2014	Questionnaire	Postgraduate Students	India
Ge	2010	Interviews	Faculty Researchers and PhD Students	US
George et al.	2006	Interviews	Postgraduate Students	US
Haglund and Olsson	2008	Observation	Academics	Sweden
Haines et al.	2010	Interviews	Academics	US
Hamade and Al-Yousef	2010	Based on Previous Studies	-	Kuwait
Jamali and Asadi	2010	Questionnaire and Interviews	Academics	UK
Jarrett	2012	Usability Testing and Online Survey	Undergraduate Students	Australia
Johnson et al.	2015	Questionnaire	Undergraduate and Postgraduate Students	UK
Kaur and Singh	2011	Previous Studies and Focus Groups	Postgraduate Students	Malaysia
Khan and Shafique	2011	Questionnaire	Teachers, Principals, and Vice Principals in Different Colleges	Pakistan
Khan et al.	2014	Questionnaire	Undergraduate and Postgraduate Students	Pakistan
Kim	2011	Questionnaire	Undergraduate, Postgraduate Students, and Faculty Members	US
Kress et al.	2011	Usability Testing	Diverse Participants	US
Kupersmith	2012	Based on Previous Studies	-	-
Liyana and Noorhidawati	2010	Questionnaire	Postgraduate Students	Malaysia
Majid et al	2012	Questionnaire	Postgraduate Students	Singapore
Majors	2012	Usability Testing	Undergraduate Students	US
Marouf and Anwar	2010	Questionnaire	Academics	Kuwait
Naqvi	2012	Questionnaire	Postgraduate Students and Research Scholars	India
Onifade et al.	2013	Questionnaire	Postgraduate Students	Nigeria
Padma et al.	2013	Questionnaire	Postgraduate Students	India

Prabha et al.	2007	Online Surveys and Telephone, Focus Group and Interviews	Academics	US
RIN	2006	Telephone Survey and Interviews	Researchers and Librarians	UK
Sadeh	2007a	Based on Workshop	-	Europe
Singley	2014	Based on Previous Studies	-	-
Tam et al.	2009	Interviews	Diverse Participants	UK
Tatarka et al.	2010	Survey	Professional and Postgraduate Students	US
Thani and Hashim	2011	Questionnaire	Postgraduate Students	Malaysia
Tracy and Searing	2014	Questionnaire	Postgraduate Students	US
Tucci	2011	Focus Groups	Academics	US
Urquhart and Rowley	2007	Questionnaire and Interviews	Staff, Students, Academics, and Library Staff	UK
Vassilakaki and Johnson	2015	Questionnaire, Observations and Interviews	Undergraduate and Postgraduate Students	UK
Vezzosi	2009	Interviews	Postgraduate Students	Italy
Walton and Leahy	2013	Questionnaire	Academic Staff, Postgraduate Students, Research Postgraduate Students, and Undergraduates	UK
Wu and Chen	2014	Interviews	Postgraduate Students	Taiwan
Yousef	2010	Questionnaire	Academics	Jordan

2.4.1 Information Needs

2.4.1.1 Use of the Library Website and Purpose

The expanded access to various information resources available through the Internet has become a challenge for academic libraries. This advancement has led many users of the library, such as postgraduate students and academics, to use alternative sources of information in addition to the library's website. Sadeh (2007a) argued that some challenges threaten libraries:

- The open direct channels provided by the Internet eliminate the need to go to the library or search through the library because users can obtain online information and physical items through various Internet services.
- The search process provided by Internet search engines is easier and intuitive. Hence, users do not learn library research skills.
- Online search engines lead to new means of human interaction. Instead of consulting a reference librarian when looking for specific information, users check the citation number of the article they need.

Several studies have investigated the reasons for the use or non-use of academic library websites by postgraduate students and academics. In terms of postgraduate students, several studies have indicated the low use of the library as users instead turn to the Internet—namely, Google and Google Scholar. Vezzosi (2009) found that the use of the library was limited by the doctoral students to a few services. Although they expressed that they were familiar with databases, catalogues, and online journals, they named Google as a crucial information tool in seeking information. Similarly, Drachen et al. (2011) found that Google and Google Scholar were the main tools used to conduct searches. They preferred Google to the other databases offered by the library, which did not function well. The PhD students in Wu and Chen's (2014) study indicated that Google was user friendly and that they could search efficiently, whereas the library's site required the knowledge of databases and sophisticated search methods. Postgraduate students also preferred Google Scholar to find highly crucial information sources of academic-related learning and research information. They used it mainly to retrieve full-text documents. Some of them used it to validate the quality and authority of certain documents according to the citation information found on Google Scholar.

The postgraduate students did not regularly use the library website due to the ability to take courses online, which reduced their use of the library, or the availability of the facilities provided by the Internet which more than any other library resources (Onifade et al., 2013). Furthermore, they encountered a number of difficulties with the library website, such as finding appropriate information resources and using databases or Boolean logic in the library as well as the use of passwords to retrieve off-campus information and the lack of some databases in a particular language (e.g. Arabic); these were considered factors that influenced the use of the library. Consequently, they preferred relying on resources that did not require effort, such as search engines (Al-Moumen et al., 2012). A recent study by Ganaie and Rather (2014) stated that postgraduate students access the e-resources of the library through search engines because they encountered problems through the university library website, such as networking, the time-consuming need for a username and password to access resources, and the limited e-resources held by the library. These findings support Awana's (2008) argument and Khan et al.'s (2014) findings that the lack of informational materials (e.g. e-resources, inadequate collections) and insufficient physical facilities were major issues and factors in the effective use of the library. However, the use of the library can be increased by faculty members, due to the crucial role they can play in encouraging postgraduate students to use

the library to study, conduct research, or do their assignments (Al-Moumen et al., 2012). Correspondingly, Yousef's (2010) study found that many faculty members usually advised their students to go to the library and told them how to use its resources.

In term of academics, their use of the library was lower. Haglund and Olsson (2008) found that most researchers used Google to search for all kinds of information and rarely used the library as they had very little contact with the library. According to these authors, 'the majority of the researchers seldom use the library web page as a starting point for information searching and instead use bookmarks/shortcuts added by themselves on previous visits to the information sources' (p. 55). Moreover, they indicated that they were confident that they could manage on their own, and they relied heavily on instant access to electronic information.

Marouf and Anwar (2010) found that the faculty's use of the library was extremely low. They attributed this finding to the low quality of resources, especially in a particular collection (e.g. Arabic), limited access to international resources, and limited library staff. Khan and Shafique (2011) reported similar findings and showed that, although the faculty used their institutional libraries to find resources, they were hindered by the disorganised sources and the lack of required materials. Consequently, they used the Google search engine.

Although Haines et al. (2010) found that none of the researchers in their study used the library and instead preferred to use different sites such as Google or websites specialising in their subject area rather than the library website as one researcher described the website as painful to use. A report by RIN (2006) found that, although academic researchers use Google Scholar primarily to follow up on references instead of searching for unknown publications, they do not depend on it for deep research; thus, ultimately, they use it for convenience.

Although these findings are slightly recent, they supported Anderson's (2005, p. 32) argument, who stated that 'Google has succeeded wildly at finding its users the information they want in return for a minimum investment of time and energy'. Anderson added, 'Google allows the user to pick his own terms and phrases and use them to interrogate the full text of documents on the open web' (p. 35).

In contrast, a number of studies have found that postgraduate students and academics still frequently use the library to search for and find information. A report by the Library Assessment Committee (LAC) at Boston University (2012) showed that 66% of the

postgraduate students who participated in the survey used the library and accessed its online resources at least once a week. In addition, a survey conducted by Walton and Leahy (2013) found that 90% of academic staff, 46% of postgraduate students, and 44% of postgraduate researchers used the library online at least once a week.

Based on the findings of the previously mentioned studies, the use of library websites by both postgraduate students and academics remains low because they prefer other tools, such as the Internet and search engines, especially Google. Sadeh (2007c) described users' expectations when looking for information, explaining why users preferred web search engines and other Internet services. The study pointed out that these online sources are attractive and provide many benefits, such as the following:

- Simple searches can often provide sufficient results without needing sophisticated research skills. Moreover, they provide alternatives to search queries and spelling corrections.
- Users do not need to use precise search terms.
- Internet search engines use simple interfaces, so expertise is not required to perform a keyword search.
- Internet search engines provide organised faceted browsers that help users minimise their searches and gain accurate results.
- They provide vast and heterogeneous content. For example, Google Scholar and Windows Live Search have more resources than are available in libraries. Although the library resources are of higher quality, users like to search in a variety of places, which can be a challenging process (e.g. catalogues, remote databases, and digital repositories). They prefer to search for all resources in a single location, which search engines such as Google Scholar provide.
- Internet search engines are easy to access because they are always available and do not present barriers to searches, such as a proxy server.
- Users generally prefer online materials that can be accessed from everywhere. Online access facilitates searching within documents, zooming images in and out, watching videos, listening to audio items, and extracting quotations.

In addition, a recent study by Johnson et al. (2015) aimed to discover the factors that influence the evaluation of information and the judgments made in the process of finding useful information in web search contexts, particularly in Google and Google Scholar. They

found that the user's involvement in the information interaction and the influences of the perceived system related to ease of use and information design.

On the other side, several studies have examined the reasons that postgraduate students and academics sought information, whether by using the library or other sources. A number of studies found that postgraduate students use the library and seek information for several purposes in order to:

- Enhance the current stage of knowledge, such as resolve the current problem, increase and validate the information presently obtained and known, obtain new information, recognise the meaning of information, and explain the acquired information (Thani and Hashim, 2011; Chaurasia and Chaurasia, 2012; Naqvi, 2012);
- Do assignments such as term papers and complete coursework (Majid et al., 2012; Chaurasia and Chaurasia, 2012);
- Find previous exam papers to prepare for comprehensive exams, student presentations, and class discussions (Al-Moumen, 2009; Majid et al., 2012);
- Do and accomplish research work such as dissertations and theses (Thani and Hashim, 2011; Majid et al., 2012; Chaurasia and Chaurasia, 2012; Naqvi, 2012); and
- Pursue career development and growth (Chaurasia and Chaurasia, 2012).

In terms of academics, a number of studies found that academics seek information to do research or prepare for teaching their classes (Marouf and Anwar, 2010; Haines et al. 2010). Khan and Shafique's (2011) found that they do so to improve personal competencies, converse with co-workers and other experts at institutions, and read articles/books.

Meanwhile, Choy (2011) suggested four factors that affect the use of the library:

- Convenience: This refers to saving time or reducing effort in gaining a service. Users will elect to use library services to satisfy their need for information if they find them convenient relative to other choices. However, if there are any obstacles or inconveniences in using them (library services), it is less likely that users will choose them, given the availability of other more convenient sources.
- Attention: It is not enough to make users use library services in the first place by depending on the convenience. Library services have to compete for attention amongst other services and options.

- Awareness: Users might not know what libraries can provide just by being in a library or even visiting a library website. Hence, it is necessary to follow a comprehensive strategy for promoting and marketing the resources and services of each academic library.
- Perception: If users do not consider much value in using library services, they might not use them even though the services are free and convenient and their attention has been captured. The idea of a library as a collection of information resources (notably books) sticks strongly in the minds of numerous users. This is reflected in the use of the word "library" as a synonym for "storage" in fields such as computer science.

2.4.1.2 Frequent Needs from Library Resources and Services

Postgraduate students and academics have diverse needs and preferences with regard to library resources and services. In terms of resources, researchers depend on journal articles for their research as the most important resource, but more than 90% said they use diverse resources, as displayed in Table 2.5 (RIN, 2006).

Table 2.5: Resources identified as most important by researchers (RIN, 2006)

No.	Resources	Ranking
1	Journal articles	71.1%
2	Monographs	32.0%
3	Chapters in books with many authors	21.8%
4	Expertise of individuals	19.4%
5	Organisations' websites	15.3%
6	Original text sources (e.g. newspapers, historical records)	12.5%
7	Conference proceedings	11.6%
8	Datasets published or unpublished	8.1%
9	Other sources (specified by interviewee)	6.8%
10	Preprints	5.1%
11	Non-text sources (e.g. images, audio, artefacts)	2.9%

Marouf and Anwar (2010) found that academics highly depend on books and journals for teaching purposes, while they use a variety of information sources for their research needs, with an emphasis on journals, books, and unpublished research and papers delivered at conferences. Meanwhile, Khan and Shafique (2011) found that teachers, principals, and vice principals frequently use books or monographs and sometimes use reference sources such as bibliographies and handbooks.

Postgraduate students, on the other hand, also mainly used journal articles; however, web pages and books/chapters in books are also as important as journal articles. In addition, they used other resources, such as conference proceedings, magazines/newsletters, encyclopaedias/dictionaries, reports, and dissertations/theses (Hamade and Al-Yousef, 2010).

Similarly, Drachen et al.'s (2011) survey found that journal articles obtained top rank as the most important resource for PhD students, followed by book articles and handbooks. Onifade et al. (2013) found that the resources postgraduate students use most frequently, in order of importance, include textbook/monographs, e-journals/e-books, reference materials, theses/dissertations, government publications, conferences/seminar papers, oral information/reference queries, and periodicals.

On the other hand, resources in the electronic format ranked high in value for academics and postgraduate students (Brown and Swan, 2007; Ge, 2010; Majid et al., 2012). Online databases were the top resources, closely followed by electronic journals and company annual reports in an electronic format, based on Majid et al.'s (2012) findings. Ge (2010) found that the faculty researchers and PhD students preferred to use the web first, followed by databases, e-journals, online catalogues, and e-mail. Ge provided the following reasons to explain why electronic resources are preferred:

- Availability in electronic format: The number of electronic resources is increasing rapidly, and users prefer the options provided by such increased availability.
- Accessibility: Resources can be accessed anytime and anywhere.
- Usability of electronic formats: They are easy to use and access.
- Source quality: Users can cite reliable electronic resources, such as government sites and e-journals.
- Discipline and research topic specificity: Some researchers use electronic resources more than others, depending on the nature of the study.
- Belief in efficacy: Electronic resources are convenient, effective, and timesaving.

Majid et al. (2012) also found that postgraduate students use printed resources; newspapers ranked first, followed by books, company annual reports, and journals. Thus, it is obvious that academics and postgraduate students use diverse resources, but journal articles are the most frequently used resource.

In terms of services, Onifade et al. (2013) found that postgraduate students frequently use the following types of services: bibliography and document delivery service and reference services. Vezzosi's (2009) study found that document delivery (interlibrary loans) appears to be a crucial library service for all doctoral students.

In their study, Drachen et al. (2011) found that PhD students requested guidance and courses run by the library, but needed efficient, effective, and tailored assistance. Furthermore, if the PhD students did not find what they needed in their local library, they used national and international interlibrary loans. However, they might also use booksellers or buy books on the Internet if several people before them have reserved the book they need or the international interlibrary loans are much delayed. The study also found that, although the services students need are available, they are not communicated effectively enough to the target audience. Similarly, Tracy and Searing (2014) found that only 19.4% of the postgraduate students do not use all sources of reference assistance available to them: Some only occasionally used reference services, although most used at least one of the options (e.g. the Ask-a-Librarian online chat service or consultations with librarians).

Kaur and Singh (2011) found that the postgraduate students' concerns as library customers in the web environment are similar to those in the traditional library environment. They are concerned about receiving help to search and use information as well as receiving online help for technical problems. They still require reference services, with an emphasis on the characteristics of the online librarian. They also found that there is a need to be able to provide feedback and then receive a fast response from the library.

Tatarka et al. (2010) asked professionals and postgraduate graduate students about a number of services and how important they are for their research and studies. They found that the majority chose "not important" or only "somewhat important" for every service listed; in addition, the majority rated help from circulation (68%), help at the reference desk (72%), and help from subject specialists (51%) as "important" or "very important".

Haines et al. (2010) found that researchers use the library services; some use the interlibrary loan service, some ask librarians for help with EndNote, and some contact the library reference desk to get help with accessing online articles. However, most of them said that they would continue to perform literature searches without assistance from a librarian.

Although interlibrary loan and reference services are the most frequently used services, library services are somewhat not important for academics and postgraduate students as they do not use them frequently.

2.4.2 Information-Seeking Behaviours

2.4.2.1 Locations for Seeking Information

The development of information technology (IT) and the availability of resources on the Internet have influenced the information-seeking behaviours of many academic library users, and many of them do not visit the library physically as they can access what they want anywhere and anytime either through the library website or through the diverse tools available on the Internet. Brown and Swan (2007) noted that the number of researchers visiting libraries has declined since 2001, a trend which is expected to continue and accelerate.

Constable (2008) found that researchers prefer searching for information from their offices rather than working in the library as they can access digital information from their personal desktops, including email, library resources, Google, and personal datasets. They stated that they might use the library more if it provided them with a specifically designed working environment (e.g. interactive technologies, network connectivity, and café-style seating). Nonetheless, they visited the library in order to contact library staff (e.g. a subject librarian) or review print resources. They also visited the library if they could not access a resource, especially an archive or a special collection, in their specific subject area. Tucci's (2011) study found that several faculty members did not usually go to the library and consequently had no opportunity to look at the hard copies of journals. Online access from the desktop was their primary focus.

Al-Moumen (2009) asked postgraduate students and academics where they carry out their research, making the following options available: library, college workstation/computer lab, office, and home. Her findings are summarised in Table 2.6.

Table 2.6: Locations to search for information (Al-Moumen, 2009)

Locations	Postgraduate students	Academics
Library	53.0%	22.0%
College workstation/computer lab	27.0%	19.0%
Office	32.0%	76.0%
Home	67.0%	38.0%

However, she argued that postgraduate students search from the library more often because they have more time than faculty members to go to the library. Faculty members, on the other hand, have limited time due to their teaching and research schedules. In addition, the postgraduate students are more engaged with lab work as a result of the need to attend graduate classes in college.

Postgraduate students might search from different places based on their positions. Drachen et al.'s (2011) study found that 70%–80% of PhD students in Vienna conducted most of their searches from home. In Copenhagen, 90% of them researched from their place of work. Whereas in Oslo, they search mostly from four places: place of work, home, place of work outside the university, and the university library. More recently, Ganaie and Rather (2014) revealed that postgraduate students access information sources through three access points. The majority of them access sources through a remote login facility, followed by the use of departmental facilities; only a few of them prefer to use the university's central library.

2.4.2.2 Methods and Search Strategies for Seeking Information

Numerous studies have investigated postgraduate students' and academics' methods and search strategies used to look for information and how they employ them when they seek information.

The Internet is the most popular method used by postgraduate students and academics, and they use it as their primary tool, particularly Google and Google Scholar search engines, as an important point of access to conduct searches of any kind of information in both everyday life and research (Haglund and Olsson, 2008; Al-Moumen, 2009; Vezzosi, 2009; Liyana and Noorhidawati, 2010; Drachen et al. 2011; LAC, 2012; Catalano, 2013). According to George et al. (2006), although the Internet is postgraduate students' main method of gathering information, their first step is often a meeting with advisers or key professors in order to get

direction and guidance, answer their questions, offer recommendations, and provide resources regarding the research process. However, a serious weakness with George et al.'s finding is that interfaces change quite regularly and, for example, the usefulness and availability of Google and Google Scholar with the way they link into resources from diverse sources is different now than it was nine years ago, when the study was published.

Searching the Internet using either Google or Google Scholar is usually an initial search, not a deep search, to obtain and find general information (Haglund and Olsson, 2008; Liyana and Noorhidawati, 2010). According to RIN (2006), Google is used for a variety of general search tasks, but not as much for tasks that are critical to the research. Moreover, Wu and Chen (2014) found that postgraduate students use Google Scholar in the early stages of their information seeking only if they have vague concepts of what they are looking for; most of them use it mainly to retrieve full-text documents.

However, they do not depend exclusively on the search engines when seeking information as they use diverse methods which are as significant as the Internet, such as personal networks and other people (Al-Moumen, 2009; Connaway and Dickey, 2010; LAC, 2012). Academics are more likely to turn to co-workers, colleagues, a network of contacts outside of the university, and other professionals to receive help, asking them about search engines and databases, areas that are new to them, or information that might not be recorded in formal resource discovery services, such as datasets. They also seek to gain recommendations about relevant databases, journals, and journal articles (RIN, 2006; Haglund and Olsson, 2008; Connaway and Dickey, 2010; Haines et al., 2010; Connaway and Dickey, 2010).

Similarly, postgraduate students turn to faculty advisors, other students, classmates, family, friends, professionals in the field, university library staff, and their own network of contacts beyond the local university (George et al., 2006; Vezzosi, 2009; Liyana and Noorhidawati, 2010; Connaway and Dickey, 2010; Drachen et al., 2011; Catalano, 2013) in order to share ideas and get feedback. Research groups' casual discussions also offer opportunities that help define and shape their research (George et al., 2006). In addition, Vezzosi's (2009) study revealed that PhD students primarily contact their personal networks in terms of suggesting relevant documents. They declared that personal communication is important in each stage of the research process, from the first list of references provided to them by their tutors—the starting point for the literature review—to their colleagues' comments and suggestions in the final stage of the dissertation.

Other methods for seeking information are also used. LAC (2012) found that databases and catalogues provided by libraries are as important as web search engines for postgraduate graduate students. Similarly, Catalano (2013) found that online resources are still preferred by postgraduate students, who use libraries in diverse ways depending on the discipline studied. Moreover, Al-Moumen (2009) revealed that e-journals, a library's online databases, and a university library's website are used by postgraduate students and mostly by academics after the search engines to seek information (see Table 2.7).

Table 2.7: Approaches to finding information (Al-Moumen, 2009)

Approaches to finding information		Postgraduate students (%)	Academics (%)
1	E-journals	48	68
2	Library's online databases	45	66
3	University library website	38	24

Nevertheless, Liyana and Noorhidawati (2010) found that search systems, such as a library catalogue and digital library, were only used occasionally. On the other hand, Drachen et al. (2011) found that postgraduate students can also seek information through conferences, news blogs, and alert services to keep up to date. However, LAC (2012) revealed that social media such as Twitter and blogs have relatively little importance. Haglund and Olsson (2008) found that Wikipedia as well as other encyclopaedias and the national phone directory (with maps, etc.) was also a popular source for academics.

In terms of search strategies, postgraduate students usually start with a general search in Google, Google Scholar, library website, databases, etc., without planning their searches for the topic with which they are not familiar (George et al., 2006; Drachen et al., 2011; Wu and Chen, 2014). They enter keywords, an author's name, or title information to retrieve what they require (Wu and Chen, 2014). Similarly, Padma et al.'s (2013) study found that, when postgraduate students begin their search, they employ the following search strategies:

- 40% search by keyword.
- 28% search by author.
- 22% search by title.
- 10% search by subject.

Al-Moumen (2009) revealed that they identify information from resources they need in six ways: previous search experience (71.9%); suggestions from a friend or colleague (38.6%); a

course which made them aware of the information resources available (33.8%); a departmental website (10.3%); and other options, including websites where they found information on electronic resources (7.3%).

Liyana and Noorhidawati (2010) indicated that, when postgraduate students did not find what they needed on the first attempt, 85.3% of them consulted another search engine system and 82.2% of them attempted another combination of keywords. In fact, they perform general searches in order to acquire a feel for what has to be done and how much is available or to develop a search strategy. This is often helpful, particularly when they do not know much about their topic (George et al., 2006). They also do this to locate information and gain an impression of content or to consult specific text passages for citing (Drachen et al., 2011).

When looking for a known subject, they often start with citation chaining, a method of following references. They use these techniques on the open web or on the university library Intranet (George et al., 2006). Drachen et al. (2011) found that PhD students follow the following strategies:

- They look for/browse journals or track references from the publication history of key authors.
- If they want to be aware of the relevant literature, they check the references in literature they have already read. They also use lists of references as a starting point and then further search for the references in Google or Google Scholar to obtain the documents. They occasionally use conferences to acquire tips on names of authors and search terms.
- If they find many results, they search for the most important authors in their field of study; this is done through colleagues, through their supervisors, or by following up on names and leads gained at conferences.
- They encounter difficulty, as they spend a lot of time developing an overview of their topic. They describe the process of beginning PhD research as chaotic, but as they become familiar with the research skills and obtain greater knowledge of their topic, they are able to find what they need more intuitively.

Recently, Wu and Chen (2014) found that postgraduate students—if they possessed bibliographic information about the documents in which they might be interested or had databases with which they were familiar—would begin their searches using library resources. In addition, they used the university to access journal articles or e-books to which the university subscribes if they could not access them in Google Scholar.

Postgraduate students also use a number of approaches in order to examine information obtained. According to Liyana and Noorhidawati (2010), six different approaches are used, as shown in Table 2.8.

Table 2.8: How postgraduate students examine information (Liyana and Noorhidawati, 2010)

Approaches	Percentage (%)
From the journal itself	86.0
Read the abstract	72.1
Read the introduction and conclusion	53.5
From the date of publication	51.2
Read the title	45.0
From the author bibliography	38.8

If they are not able to obtain what they need, whether in the library, Google, Google Scholar, etc., postgraduate students follow a number of methods to satisfy their needs. George et al.'s (2006) study found that if the needed resources not available in the library, 58% of postgraduate students mentioned using the interlibrary loan service to obtain their resource from other libraries. 52% found resources at a nearby university, while only a few (16%) mentioned using local public libraries. Similarly, Drachen et al. (2011) found that they use national and international interlibrary loans. However, they might use booksellers or buy books on the Internet if several people ahead of them have reserved the book they need or if international interlibrary loans are significantly delayed.

Academics similarly start with a general search for topics with which they are not familiar. RIN (2006) revealed that approximately 50% of researchers begin with a general search; they then refine their search from a large set of results. Only 17% begin with an exact search, and 34% change their search based on the enquiry. In comparison, 62% of postdoctoral students reported that they decide on the search strategy according to the type of inquiry, which might be a refining process from a large set of results or a precise search in order to avoid the irrelevant results returned from a broad search. Moreover, most of them use other tools for tasks such as finding a reference or researching a new area. Finding datasets and non-text sources are significant uses of general search engines, as they are not well identified in other places. Although they use Google Scholar primarily for following references rather than searching for unknown publications or articles, they appear to be using it for convenience rather than depending on it for deep research.

Haglund and Olsson's (2008) study found that searches are characterised by trial and error. Researchers start randomly, without a plan or a search strategy, by experimenting with both the actual search words and which sources to use. Although they might not know what went wrong when their searches are unsuccessful, they never consult manuals (e.g. for instructions) or even contact the library for help. They found that searches for a specific subject were rarely performed, and when they were attempted, researchers encountered difficulties in recognising the correct search terms, which often led to unsuccessful searches.

In the same vein, Haines et al.'s (2010) study found that all researchers start with a simple query and initially prefer the simplest interface; only one mentioned starting with an advanced search. They start their search based on the nature of their information need. To find specific materials (resources), they follow references and citations or ask an expert. For known topics, they look for background information such as review articles, books, book chapters, and presentations.

Majors (2012) conducted a usability testing study to discover how undergraduate students search through a number of discovery tools (Primo, EBSCO Discovery Service, Encore Synergy, Summon, and WorldCat Local) and found that these students 'treated a single search box as a "Google" like search and would use the search interface to try many kinds of things that were not supported by the discovery interfaces' (p. 190). In addition, they 'generally scanned at least one page of search results in full before selecting resources to look at more closely. Very few participants moved beyond a first page of search results. If the first page of search results were not promising, the participant would typically iterate by trying a different search strategy (i.e. without using any available refinement options first)' (p. 191). Jarrett's (2012) study found that undergraduate students use refinement facets more frequently when the tasks turned out to be more complex.

To sum up, although almost all researchers start with the Internet (e.g. Google search engine), looking for information proceeds by using very different methods and search strategies based on the type of information needed. Researchers might also be influenced by other factors. Vassilakaki and Johnson (2015) recently found that users' experiences during a search are complex due to the complex and challenging thought processes in which the user is likely to be engaged; possible explanations for these actions relate to understanding the system, the query, the search, and—in the case of multilingual retrieval systems—the language and its translation.

2.4.3 User Experiences

The definition of user experience (UX) has been debated and defined widely by a number of interpreters. Xu (2012, p. 172) stated that, in 1999, Donald Norman coined the classic definition of UX, which includes 'all aspects of the user's interaction with the product: how it is perceived, learned, and used'. Xu claimed that this definition obviously proposes that UX involves more than user interface design and usability. Kuniavsky (2007) declared that UX includes a number of broader considerations than HCI theory does; consequently, it is all about the factors that affect the relationship between the user and an organisation when a product (which can be the interface) exists in the middle of that relationship. In addition, in 2010, ISO DIS 9241-210 declared that a UX is perceptions and responses of a person that result from the use and/or anticipated use of a service, system, or product. Taking a different approach, Law et al.'s (2009) study—based on the views of the UX community of researchers together with practitioners from academia and industry—concluded that the 'concept of UX as dynamic, context-dependent and subjective, which stems from a broad range of potential benefits users may derive from a product. UX is seen as something new, which must be a part of the HCI domain and be grounded in UCD (User-Centred Design) practices' (p. 727). User experience is all about the user's satisfaction regarding the component of usability (Bevan, 2009).

User experience is a term that encompasses the users' perceptions and responses, whether these are measured subjectively or objectively (ISO, 2010). User experience is not only about users' perceptions or responses; UX dynamically evolves in terms of users' needs and usages (Xu, 2012). Hence, in order to create a good user experience, the precise needs of the customer (user) must be met without fuss or bother (Nielsen and Norman, n.d.). In their book *User Experience (UX) Design for Libraries,* Schmidt and Etches (2012) noted that libraries should care about UX because content and information are no longer scarce commodities that need the mediation of a library; the web has changed the value proposition of libraries.

The literature discussed how postgraduate students and academics experience libraries' websites or systems. In 2005 and 2006, De Rosa provided views about use of the library by academic and non-academic users in two reports to the Online Computer Library Centre (OCLC) membership. The findings pointed out that, for users, the library is about books. They do not often use the library or its electronic resources; rather, they mostly use Internet search engines to search for information. They do not consider the library when accessing

electronic resources, such as search engines with which they are confident. However, the majority of them believe library resources and information have value so far as the search engines.

A study by Kress et al. (2011) found that 'users expect library systems to behave like Internet searches and are frustrated when they do not. Some participants chose to avoid the complexity of the library website by using Google. Web-scale Discovery Platforms have the most potential to remove some of the burden from the user and place it on the technology' (p. 163).

Kim (2011) examined users' perceptions of university library websites regarding online resource use and found that all the users in general had reservations regarding the design of the university library websites; in addition, all of them found the usability of the websites to be challenging. Doctoral students and faculty members have more experience navigating library searches and thus find it easier than the others, who claimed it was not easy or flexible to navigate them when searching for new information. Doctoral students and faculty members used the university library websites to discover whether the articles and books they needed were available, while master's degree and undergraduate students rarely used the library website to retrieve the reserved materials.

Tam et al.'s (2009) study aimed to identify the features that students prefer for the next generation Online Public Access Catalogues (OPACs), which is called Star. They found that all of the participants had positive comments about the Star catalogue; however, their use of it was limited to doing assignments or preparing for examinations and searching for physical books. They did not use it to access electronic resources. They also did not often use other features, such as advanced searches, or they limited their searches to a specific branch. Yet they all used Google and Google Scholar for their searches, and they generally used keyword searches and rarely used author searches. They also found that participants expected the information they needed to be displayed at the very top ranking or on the first page of results based on their experience of search engines.

Connaway and Dickey (2010) found that students, researchers, and academics are confident in their ability to use information discovery tools, but there is also a particular need to provide training, support, and improved systems to help people find the information they need, as information literacy has not kept up with digital literacy levels. Jarrett (2012) tested undergraduate students performing tasks with the library search interface (Primo) and found

that their experience with it was mostly positive in terms of ease of use, effectiveness, and the ability to find relevant results.

One reason users have poor experiences with library websites or their search systems was identified by Sadeh (2008), who argued that a problem exists with the OPACs that libraries offer: 'Today's library systems are inherently librarian-centric; their design in terms of data structures and workflows is focused on library administration and hence severely limits the possibilities for the end-user interface' (p. 10).

On the other hand, due to the developments in IT and Internet search engines such as Google; several studies have investigated how the user experience and ways of looking for information have changed. Connaway and Dickey (2010) pointed out that search engines are seen as primary; they are frequently the main resource used to start an information search, and the use of keywords is increasingly becoming the dominant search behaviour. In addition, Bhatia and Rao (2011) found that undergraduate students use search engines as a major source to access e-resources for their information needs and to update their knowledge about their subjects of interest.

Sadeh (2007b) examined contemporary trends in information seeking in a study that described and defined the factors that contribute to an up-to-date, user-centric library experience. The researcher identified three reasons explaining why users prefer Internet tools: ease of use, ease of access, and speed. In addition to these features, web search engines are more enjoyable to work with, offer immediate satisfaction, and are easily learned. Sadeh (2007b) reported that users have a tendency to prefer online materials whenever possible and consider web tools to be more convenient for locating and obtaining online information. In another study related to user experience, Sadeh (2008) observed that people are interested in web search engines because they provide materials of multiple types in one place: online books, online articles, websites, images, videos, conference presentations, and so on.

Jamali and Asadi (2010) provided some reasons why academics prefer to use Google, including:

- It's a good starting point.
- It's a popular brand.
- It's a handy tool.
- It has a variety of search functions.

- It’s useful for finding PowerPoint files.

Users’ preference for Google-type search tools might encourage other information and database services and providers of scholarly information to implement some of the characteristics of Google, such as simplicity, into their websites.

Although students rely on the Internet, personal networks, friends, and so on when looking for information, they do not depend on them for information for their assignments or when they are looking for valuable information. Connaway and Dickey (2010) determined that information seekers are aware of the difference between “formal” research literature and basic Internet content. Some students indicated that they prefer using library catalogues to search engines when writing assignments. In addition, Sadeh (2008, p. 5) concluded that ‘many users prefer searching in the scholarly information resources, because the quality of the materials has been verified by the publisher of the materials and confirmed by the institution’s selection of these resources’. In another study, Sadeh stated that ‘numerous libraries hold special collections—physical or digital—that are not available elsewhere’ (2007c, p. 3).

Furthermore, Wu and Chen’s (2014) study found that postgraduate students who used the library website interface found it complicated and had to learn how to use it. As a result, many of them prefer Google Scholar because it has wider coverage and is convenient and familiar to use. Google Scholar is simple, intuitive, and easy to use, and the simplicity of its basic search function enables them to retrieve a relatively large number of documents from which to choose, which is better than advanced searches that retrieve fewer results, which may omit some relevant documents. Nonetheless, although many of the students pointed out that Google Scholar saves time and has a fast response, its search functions—while simple—are also vague. Students believed that, compared with Google Scholar’s search functions, library search functions are usually easy to understand with regard to what kind of search is being performed (e.g. author, title, subject, and keyword search) and how the results are sorted. Furthermore, they liked the majority of databases that provided a variety of sorting functions that support them in refining search results, such as help information (e.g. explanation of search functions) in databases that are extremely better than those used in Google Scholar. In addition, the labels used in Google Scholar search results (e.g. related articles, cached, or all 5 versions) confused them. Filtering the large amounts of retrieved

results on Google Scholar and the unsure quality of documents were the major reasons that they chose to use the library resources as their main source instead.

Prabha et al. (2007) pointed out that, in order for libraries to stay relevant, their systems need to imitate Internet search engines. Features such as facilitating searches and the combining of all types of information (e.g. books, journals, articles, web pages) could improve users' search experiences and eliminate the need for users to understand complex library systems. Some users expect scholarly interfaces to provide an experience similar to the interfaces with which they are familiar (Sadeh, 2008). Sadeh (2008) also mentioned that users today are used for the query syntax of web search engines. They are accustomed to the Google toolbar and Google desktop gadgets, regardless of the particular website visited. Indeed, users encounter difficulty converting to the "other side" of the spectrum, such as the interfaces for library systems and scholarly information resources. Google facilitates users' ability to find what they want in one place. A report titled "The hybrid library: from the users' perspective", written by Akselbo et al. (2006) for Denmark's Electronic Research Library (DEFF), noted that 'the problem with the databases is that you cannot content yourself with just searching one place, like you can with Google. It is hard for the students to differentiate between the different databases' (p. 14). Hence, users tend to search using ways they are already accustomed to, and they are not likely to devote time to mastering a new kind of search behaviour (Sadeh, 2008). For this reason, Connaway and Dickey (2010, p. 45) suggested that 'library systems need to look and function more like search engines, e.g., Google and Yahoo, and services, e.g., Amazon.com, since these are familiar to users who are comfortable and confident in using them'.

2.4.4 Users' Difficulties with Academic Library Websites

Several studies have investigated the difficulties users encounter when using academic libraries' websites, particularly those in information-seeking behaviours and usability domains. The definition of ISB was discussed in Section 2.2.2.5. Usability has been defined by numerous studies. The International Standards Organisation (ISO) defined it as 'the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context to use' (ISO, in Bevan, 2001, p. 536). Shackel (2009, p. 340) defined usability as 'the capacity in human functional terms

to be used easily and effectively by a specified range of users, given a specified training and user support, to fulfil the specified range of tasks, within the specified range of environmental scenarios'. Usability can also be defined as the effectiveness, efficiency, and satisfaction with which specific users can achieve a specific set of tasks in a particular environment (Schoeffel, 2003). Furthermore, Preece et al. (1994) stated that usability, as 'a key concept of HCI, is concerned with making systems easy to learn and easy to use' (p. 14). Nielsen (2012b) provided a series of questions to help define usability:

- Learnability: How easy is it for users to achieve a task they encounter for the first time?
- Efficiency: How quickly are users able to perform tasks?
- Memorability: When users return to the design (e.g. user interface) after being away for a while, is it easy for them to remember how to use it?
- Errors: How many errors do users make? Are they hard? How can users recover from them?
- Satisfaction: Is using the design satisfying?

Numerous other authors have discussed many design principles that support usability. These principles as well as a number of user-interface design principles are provided in the appendices (see Appendix 13).

Previous studies have reported a number of difficulties that users of the academic libraries' websites encounter. Postgraduate students and academics suffer from an unavailability of required resources, whether e-resources, books, old resources (e.g. back issues of journals), or databases in a particular language (Ge, 2010; Khan and Shafique, 2011; Chaurasia and Chaurasia, 2012; Al-Moumen, 2012; Ganaie and Rather, 2014).

The terminology used on libraries' websites and systems was also problematic. Users encountered challenges and obstacles regarding some of the terms used in the library interface and when searching for identified journal titles, as it is a main factor that influenced the ability of them to access resources dependably (Denton and Coysh, 2011; Majors, 2012, Kupersmith, 2012 Singley, 2014). Kupersmith (2012) stated that using natural language such as "find book" or "find article" helped users identify the correct choices. He identified the terms most often misunderstood by users, including acronyms and brand names, as well as the words *database*, *e-journals*, *index*, *periodical* or *serial*, *reference*, *library catalogue*, *resource*, and *interlibrary loan* and subject categories (e.g. *humanities* or *social sciences*). In

the same vein, Singley (2014) revealed that only 49% of library websites can be considered jargon free. Problematic terms include:

- Catalogue or discovery tool: *Catalogue*, *COPAC, LINK+*, *Engine Orange.*
- Fulfilment: *Find It @ UIC, 360Link, Get it, location.*
- Journal and database terminology: *Databases, Periodical, Serial.*
- Research links: *Research guides, Reference Sources, E-shelf, Collections.*
- Locations: *Course reserves*, *Reference.*

Moreover, academics encounter difficulties with some usability issues, as information is scattered across several sources and they lack the time to search for it (Khan and Shafique, 2011). Ge (2010) also found that faculty members and PhD students suffer from a number of difficulties with the library website's usability regarding the poor library interface design: disorganised content, such as databases listed separately on different web pages, incomplete cataloguing of digital materials, ILS (Integrated Library System) systems being unstable or hard to use, and difficulty reading materials on a computer screen which is uncomfortable as they preferred printed materials. Correspondingly, Chaurasia and Chaurasia (2012) found that 50% of the research scholars and postgraduate students were not sufficiently familiar with e-resources.

Singley (2014) also identified several problems with academic library websites.

1. Understanding search tools: Users did not understand what was included in search tools. Users typed database subjects into the catalogue search box rather than navigating to the database's page.
2. Getting lost in silos: Users encountered problems with needing to authenticate too many times when they were transferred to external sites such as publisher and database sites or link resolvers.
3. Understanding bibliographic formats and relationships: Users had difficulty understanding the relationship between articles and journals.
4. Difficulty finding full texts: Users had difficulties obtaining resources. They struggled to find and navigate links to full texts in PDF format. They also found it difficult to determine how to request books not owned by the library.
5. Navigating with tabs: Users often did not perceive or use tabs in search tools and LibGuides.

Lack of access to some resources, databases, journals, or even the libraries' websites was an obstacle for some users. According to RIN (2006), the key frustration is not with the research discovery services themselves, but with the problem of subsequently accessing recognised online sources and materials. The lack of access to journal articles because of a subscription barrier was the most frequently expressed difficulty experienced. In the same way, Al-Moumen (2012) found that postgraduate students and academics have difficulty accessing some websites and experienced failed connections to databases in other universities.

The findability of a library website was also challenging for users. Kress et al. (2011) found that users failed to locate known items in the library website for the following reasons:

- Failure to find the correct starting point for a search.
- Users expected that they could use any of the information in a citation for their search within a system; however, the failure of the systems to index all the information contained in a citation meant that, if the piece of information used for a search was not an indexed term, the search would fail.
- Clicking on the call number did not lead to relevant results.
- The needed information was on the screen but the user did not recognise it.
- Users did not understand the information as presented by the system.
- Users clicked back to a prior screen because the information they were seeking was not presented on the current screen.
- Users input searches with spelling errors.
- Users searched some combination of author alone or with another search term.

Nevertheless, they determined that the complexity of library resources was the major contributor to these failures.

Other difficulties were also found in diverse studies. Al-Moumen (2012) found that postgraduate students encountered a number of problems when looking for information. Those related to the library website included slow download speeds, weak Internet signals, and membership username and password not being provided by the library. Postgraduate students also encountered problems related to the networking as well as the time needed to access resources that require a username and password, which is time consuming (Ganaie and Rather, 2014).

Chaurasia and Chaurasia (2012) found that research scholars and postgraduate students encountered a number of problems when using e-resources: 59.2% of them suffered from the huge amount of information retrieved when accessing e-resources while 13.1% of them declared that they lacked the IT knowledge and skills to effectively utilise the services and 7.8% of them believed that there were not enough links to the e-resources provided by the library website.

Ge (2010) also found that faculty researchers and PhD students encountered a number of obstacles when using electronic resources:

- Uneven source quality: Users suffered from information overload and were not confident that information retrieved from electronic resources was accurate, reliable, or high quality.
- Research topic: discipline and research subject affected the use of electronic resources. For example, 'some disciplines and research projects require less extensive information-gathering from published resources, relying instead on field studies and interviews' (p. 447).
- Lack of awareness: Several participants were unaware of relevant electronic resources offered by the library.
- Personal constraints: Some participants thought they needed to learn how to use electronic information resources effectively.

A number of studies have considered factors that can affect users' search behaviours. These factors can be considered difficulties that users of library websites encounter when looking for information and interacting with the web interface of academic libraries. Urquhart and Rowley (2007) created a model that identified both micro and macro factors that affect students' information-seeking behaviour in relation to the electronic and digital information resources increasingly used to support learning.

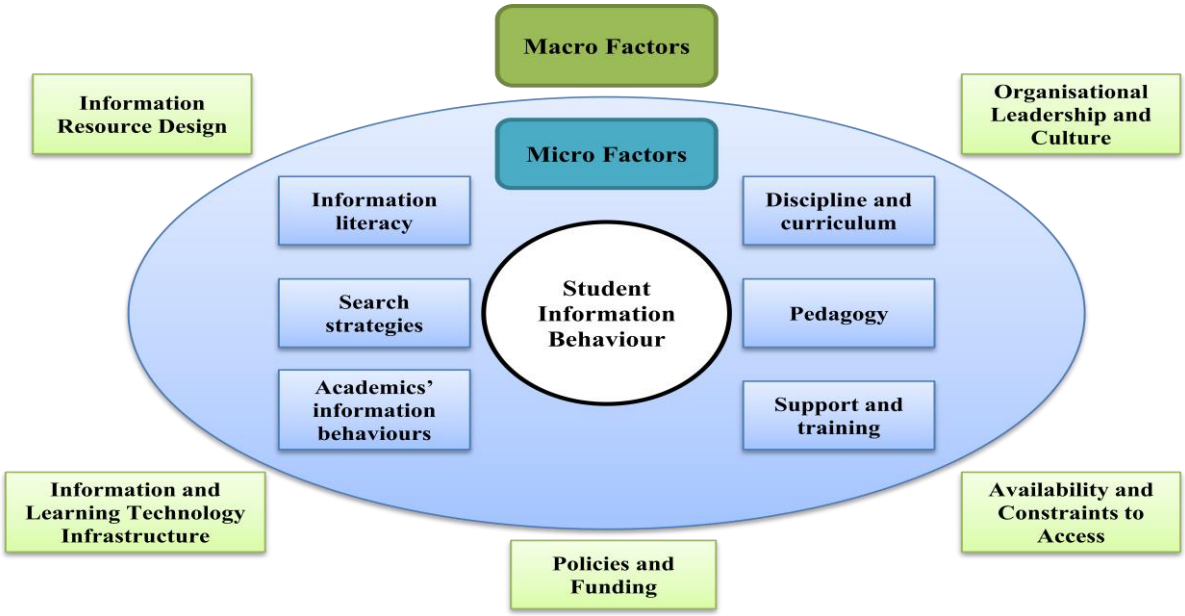


Figure 2.16: Model created to identify factors that affect students' information behaviour. Reproduced from Urquhart and Rowley (2007)

Micro factors are those affecting students' information-seeking behaviour directly, such as:

- Information literacy: Capacities that users bring to their learning situation; these will be in accordance with their previous training, education, work and life experiences.
- Search strategies: This is different from information literacy, as users might know what they want to do but lack adequate search techniques.
- Academics' role in changing information behaviour: Academics are both models and advisers for students; as such, their behaviours have an effect on students' thinking and practice.
- Discipline and curriculum: The field of study and how knowledge and skill development are formulated through the learning experience.
- Pedagogy: The approach to teaching and learning that has been approved by the academic staff.
- Support and training: The regular training and support provided to students in order to improve and increase their information-seeking behaviours via library and information science (LIS) staff or academic staff working with LIS staff.

Macro factors define the context in which the information-seeking behaviour occurs and can impact micro factors. These include:

- Information resource design: It is important that information resources be designed in a way that is appropriate for the level of students and relevant to university learning.
- Information and learning technology infrastructure: There is increasing use of virtual learning environments that support learning with digital learning materials and provide students with access to other digital resources.
- Availability and constraints to access: Access to networked resources from home is a significant improvement for many students; this might include the opportunity to access university-licensed digital resources from home.
- Organisational leadership and culture: Concentration on providing e-learning for students might affect the dedication of other levels of the organisation, such as the provision of resources to provide good access and training, and the commitment of teaching and learning support staff to promote access to e-learning, and digital information resources.
- Policies and funding: These can provide opportunities to help enhance the levels of access or to make information literacy programmes available.

In addition, Al-Moumen (2009) identified several important factors that function as essential determinants of students' information-seeking behaviour, such as:

- Library awareness: Apprehension when using the library and consulting its personnel, such as a general lack of awareness of what the library provides, the negative perception of the library by postgraduate students which leads to less use of its resources, and a lack of communication between the library and students.
- Information literacy: Graduate students encounter difficulties finding appropriate information resources and using databases or Boolean logic. Hence, they prefer to rely on resources that do not require effort (e.g. search engines) or use personal contacts (e.g. friends and colleagues) as sources for relevant information resources.
- Organisational and environmental issues:
    - Faculty members: Students depend on their teachers for information, as teachers use databases more often than students. Teachers should provide tasks that require students to use the library in order to find the required information, especially from databases.
    - Teaching style: Most of the students who write dissertations in order to obtain a master's degree are confident that they can find appropriate information.

- Cultural (language) issues: Students with good English can use electronic resources more easily.

- Source characteristics: These include a lack of individual email accounts, the use of passwords for off-campus information retrieval, misuse of ICT in the library, a lack of Arabic databases, and a lack of adequate personal computers and printers in the library.
- Demographic factors: Females show better understanding of how to use the library to search for information, while males demonstrate more confidence using online information resources and advanced search strategies.

2.5 Summary

This chapter has presented on overview of the historical and theoretical background of information-seeking behaviours and human–computer interaction fields; it has also reviewed the significance models of ISB and HCI that have received the greatest attention in the literature. Moreover, it reviewed the user studies, particularly those pertaining to information needs, information-seeking behaviours, users' experiences, and users' difficulties within the context of academic library websites. The next chapter will provide the significance of ISB and HCI fields as well as the rationale for selecting the models used in this study. In addition, it will discuss and compare the selected models to identify the similarities and differences among them in terms of the ways users look for information and interact with the system as well as what can be concluded from these insights.

Chapter 3: ISB and HCI

3.1 Introduction

In Chapter 2, the steps for interacting with the interface and looking for information were examined based on ISB and HCI models. This chapter explains the significance of the ISB and HCI fields as well as the rationale for selecting models used in this study. This chapter will also investigate and compare the selected models to identify the similarities and differences between them with regard to how users look for information and interact with the system, and the conclusions that can be drawn from them. This chapter addressed the first objective of this research, which is to develop a model that combines ISB and HCI models.

3.2 Significance of ISB and HCI for Academic Library Web Interfaces

As has been discussed in Chapter 2, HCI is the study of human interaction with computer systems, while ISB is concerned with the methods that users follow to obtain the information they require. Several studies have discussed the importance of each field of study in user interfaces and in making the information system easy to use. Hearst (2009) asserts that it is necessary to understand the human information-seeking process in order to design successful user interfaces for searches, including the strategies people employ when engaged in an information search.

Human information-seeking behaviour involves both information processing and interactions with information resources and, nowadays, technological systems. Studies of such behaviours contribute to the design of new systems and tools for organisation of knowledge and utilisation of information in academic and scientific contexts as well as in organisations (Steinerova and Susol, 2005). Furthermore, information systems are designed to help users retrieve specific items that they require from the volume of information available. Consequently, understanding information-seeking behaviour is necessary to identify user search techniques and preferences for information resources (Rowley and Hartley, 2008). This can help design and implement convenient user-centred information systems/services (Rafiq and Ameen, 2009). In addition, Connaway and Dickey (2010) argue that information systems need to be supported by the entire process for information-seeking needs. On the

other hand, Miller (2002) indicates that any improvements in HCI require a deep understanding of human behaviours and needs, which is the most helpful information with regard to evaluating any new technology. Ahmed et al. (2009) suggest that more user-centred studies with web-based systems are needed for significant improvements in the design of user interfaces for such systems.

Hearst (2009, p. 1) states that 'the job of the search user interface is to aid users in the expression of their information needs, in the formulation of their queries, in the understanding of their search results, and in keeping track of the progress of their information seeking efforts'. Undoubtedly, the user interface should be designed to recognise the users' requirements, including their goals, tasks and environment (Karpasov, 2010). Furthermore, Sommerville (2007) suggests that user interfaces should be designed to match the skills, experience and expectations of the anticipated users, and that interfaces should be designed to match the users' skills and their information-seeking behaviour.

Ferreira and Pithan (2005) have integrated the concepts and techniques of HCI (especially usability studies) and information science (in particular, studies on user requirements and behaviours in seeking and using information). The constructivist model for user studies proposed by Carol Kuhlthau (see section 2.2.3.2) and the criteria of usability established by Jacob Nielsen (see appendix 13 section B) were used to analyse the usability of a digital library. Both researchers intended to identify variables that met a number of criteria, variables such as learnability, efficiency and effectiveness of the digital library; management of errors; memorability; the user's satisfaction from the perspective of cognitive and affective aspects; and the actions taken by users during the information-seeking process. They found that systems that apply and/or adopt a design which is familiar to the users' cognitive model tend to be more logical, which makes it easier to memorise its characteristics and functionalities. Users offered evidence of their previous experiences with other search systems. 'Thus, it was possible to observe that the users' actions, feelings and thoughts, as well as their experiences disclose important indications for learning components, memorisation, errors, efficiency of the digital library and mainly users' satisfaction' (p. 320). Ferreira and Pithan concluded that the results they reported are evidence of the possible synergy between HCI and ISB.

A study by Wang et al. (2007) identified academic researchers' information-seeking and communication behaviours in the Internet age, in order to observe the use of Internet-enabled information and communication technologies/resources (IICTs) in research. They developed

a framework based on two dimensions: information behaviours, which adopt Ellis's behavioural model (see section 2.2.3.1) with some revision, and IICTs, which include commonly used tools and resources such as the web, email, digital library, online library catalogue, and e-journal. They found that the use or non-use of Internet information and communication technologies/resources by researchers depends heavily on how well these tools support their recognised information-seeking activities, how dependable the delivered content is perceived to be, and how easy and appropriate it is for the researcher to use the system for information exchange. Hence, they concluded that libraries and librarians need to adopt new roles and new practices in the Internet age, and actively transform traditional libraries from places patronised for service and user instructions to a new kind of information entity. 'It is clear that one of the new domains is the institutional repository for long-term preservation of intellectual output and to facilitate open access' (p. 23). In addition, they suggest that designers and developers of information resources and tools need to be aware of the reasons for terminological and conceptual confusion when existing resources and technologies are transformed, brought together and integrated into a new entity. 'To meet researchers' needs to manage information from various resources, current bibliographic tools are inefficient and must be redesigned to incorporate users' behaviours such as putting digital files in multiple folders' (p. 23).

Nonetheless, several studies have shown that more research is needed to investigate the relationship between ISB and HCI models. Ferreira and Pithan (2005) suggest that there is still a need for more in-depth research integrating contributions from other fields of knowledge, in order to clarify the relationship of usability, information necessity, and the information-seeking process (ISP) with user satisfaction. Moreover, Keshavarz (2008) argues that not enough research has been carried out on the relationship between information behaviour and information system design. Much more research is needed to understand how new technologies and resources can best support user requirements in different contexts (Wang et al., 2007). A review by Ahmed et al. (2009) on research on human-computer interfaces for online information retrieval systems highlighted the need to integrate HCI technologies into information retrieval (IR) interface designs. User interface design has received limited attention from IR researchers, according to this review, and commercial database vendors and distributors have not recognised this issue; therefore, they recommend applying HCI technologies to improve the ease with which IR interfaces can be used.

3.3 Rationale for Selecting the Models

A number of models have been developed in ISB and HCI for different purposes. Chapter 2 provided the models for this study, including six ISB models and four HCI models, that describe the steps (stages) users go through when looking for information and interacting with the system. In fact, none of these models has been actually designed for academic library users or the academic library interface. Although models of Sadeh (see section 2.2.3.6) were created to design a user interface and improve its effectiveness, they were developed for scholars in the scientific community, who are more professional than users of academic libraries.

These models were selected for investigation for various reasons:

1. They clearly identify the steps (stages) that users follow when looking for information and interacting with the system.
2. These models are assessed in terms of their popularity in information-seeking studies and interaction design.
3. These models have wide applicability and can be used in various contexts, roles, tasks and knowledge fields.
4. They are in accordance with the current study's focus on a user-centred, rather than a system-based, approach.
5. They also consider users' needs, experience and other factors that users encounter when engaged in the process of looking for information or interacting with the system.

3.4 Potential Synergy between ISB and HCI Models in Identifying the Steps Users Take When Looking for Information and Interacting with the Interface

The selected models from these fields were compared in order to identify the similarities and differences between them, with regard to the steps that seekers follow when looking for information and interacting with the system (interface).

In fact, these models clearly described the users' seeking behaviours and interactions in steps. Thus, based on the comprehensive descriptions of these models in Chapter 2, it was concluded that the steps users take to look for information or interact with system interfaces

are quite similar in the HCI and ISB models, even though the concept in described differently.

The researcher grouped these models together and examined them to investigate whether there was a possibility of synergy or combination between them. It was found that these models have six common steps; consequently, a new model based on this combination was created. First, the steps are outlined, and then each step is explained in detail, showing how it is derived from the existing models.

The six steps identify the progress from commencement to conclusion of the search, and clarify how users might look for information and interact with the system. Some of these models have more or less than six steps; this is displayed and clarified in Table 3.2. It was also concluded that each step included a number of points, which explain the models' viewpoints on each step.

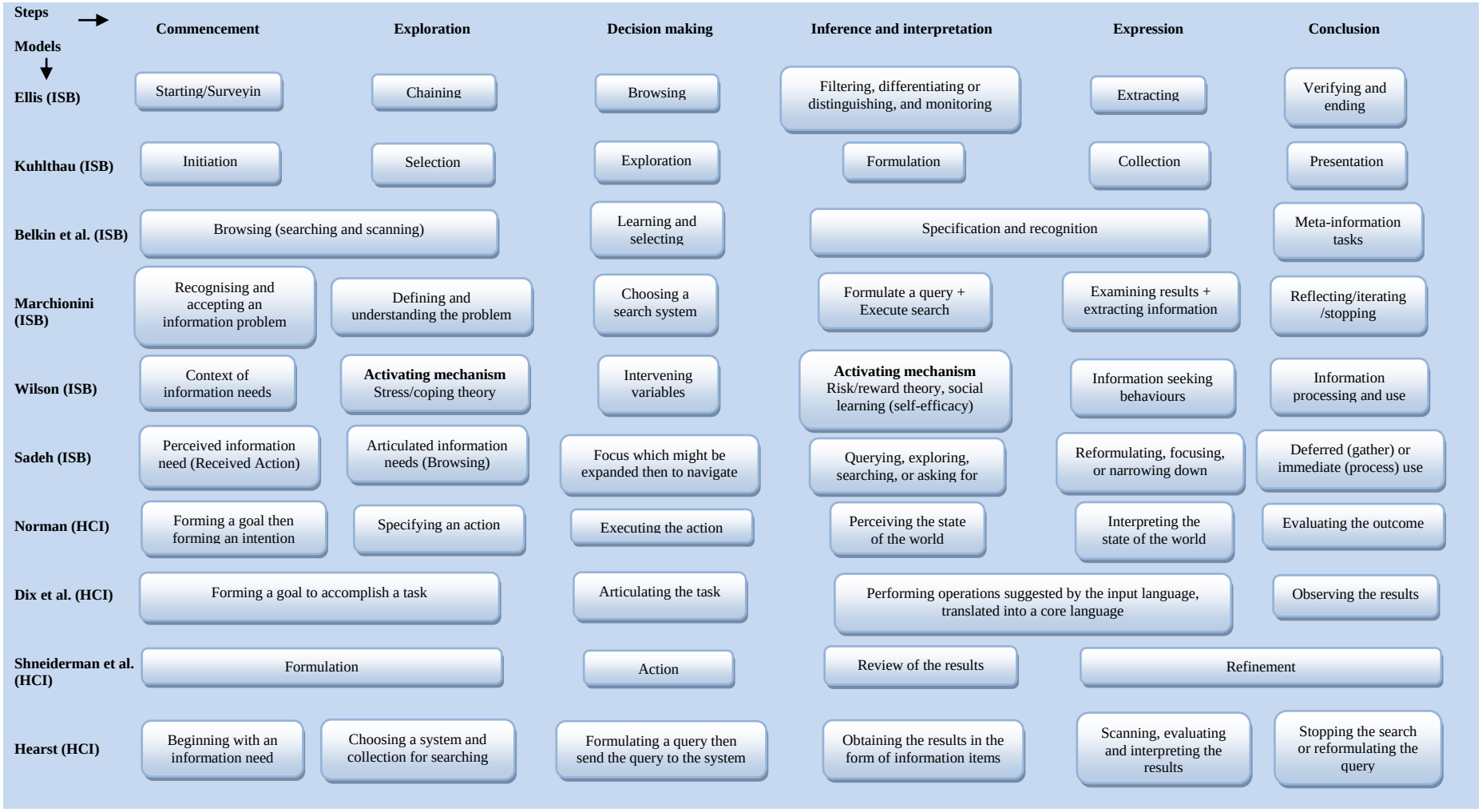
We now present an example of how users of academic libraries look for information and interact with the library interface based on the model created. A postgraduate student is given the task of finding a resource from the library about the value of academic libraries. How the student in the academic library looks for and interacts with the web interface will be described based on each step. Table 3.1 presents the six steps identified and created by the researcher based on the models.

Table 3.1: The steps users take when looking for information and interacting with the system based on the models selected in this research

No	Step	Description
1	**Commencement**	Users start looking for information and the basis for it
2	**Exploration**	Users explore to find relevant information and identify what to do next
3	**Decision making**	Users make a decision based on what has been explored and identified
4	**Inference and interpretation**	Users think about what they did or found in the previous step
5	**Expression**	The process that users follow based on what they obtained from the previous step
6	**Conclusion**	What users do at the end

The next table clarifies how these models were combined and how the new model emerged and was created.

Table 3.2: The steps applied in the ISB and HCI models, and the similarities and differences between the selected models



3.4.1 Commencement

This is defined as the way users take their first step when they look for information, based on the models. The following table explains this step for each model.

Table 3.3. Step 1: Commencement

Model	Commencement	How this step is formulated
Ellis	Starting/Surveying	Users obtain initial information
Kuhlthau	Initiation	Users have insufficient knowledge about the topic
Belkin et al.	Browsing	Users search for an indentified item
Marchionini	Recognising and accepting an information problem	Users start the search when they identify and accept the information problem
Wilson	Context of information needs	Users recognise the need for information
Sadeh	Perceiving an information need (received action)	Users start when they receive a list of items to find or to search for
Norman	Forming a goal and then forming an intention	Users start to identify the goal they need to accomplish and their intention for doing so
Dix et al.	Forming a goal to accomplish a task	Users start to recognise the goal they wish to achieve
Shneiderman et al.	Formulation	Users start with some decisions in mind before starting the search
Hearst	Beginning with an information need	Users start the search when they need information

Table 3.2 displays the first step, commencement that users follow when they interact or look for information, from the point of view of the various models. There some similarities and some differences between these models.

In the ISB models, users start looking for information when they need information in general, without specifying the type of information. This is Wilson's (ISB) point of view, which is similar to Hearst's opinion (HCI).

Marchionini (ISB) mentions that users start their search when they know and accept the information problem. Similarly, Sadeh (ISB) states that users start looking for information when they receive a list of (known) items to find. Shneiderman et al. (HCI) have also stated that users formulate some decisions in their minds prior to starting their search. In addition, Belkin et al. (ISB) mention that in this step, users browse to begin searching for an indentified item. Therefore, there is a specific need to search for. On the other hand, Norman (HCI) and Dix et al. (HCI) have a similar perspective with regard to the first step in interaction—forming the goal that needs to be achieved—to which Norman adds the formation of the intention to achieve it.

Ellis's (ISB) first step is starting/surveying, which aims to gain a general idea of the range of resources in a new field. Similarly, Kuhlthau's (ISB) first step is initiation, which aims to obtain information about a topic about which users have insufficient knowledge.

From the above, we can conclude that that the first step (Commencement) for users interacting and looking for information can be summarised in the four following points:

- Need information.
- Lack information about the topic.
- Look for known or identified information (e.g. items and resources) by browsing to search
- Form a goal to be accomplished and decide (intend) what to do next.

With regard to the example in this step, postgraduate student commences with an information need, which is information (resource) about the topic. He/she might look for information that he/she lacks about the topic to obtain the initial information to start searching once the information problem is identified and accepted. Hence, he/she forms a goal and makes a decision about what is to be accomplished and how it can be done, and then he/she looks for a known item (e.g. article) by browsing to search for an indentified item (e.g. search by articles, journals, database) to begin the search.

3.4.2 Exploration

This is defined as the way users start their second step when they need information.

Table 3.4. Step 2: Exploration

Model	Exploration	How this step is formulated
Ellis	Chaining	Users follow footnotes and citations in an identified resource in two ways—backward and forward
Kuhlthau	Selection	Users identified a general idea and able to start search
Belkin et al.	Browsing	Users scan an interesting item
Marchionini	Defining and understanding the problem	Users start exploring based on their understanding or knowledge of the task field
Wilson	Activating the mechanism Stress/coping theory	Users understand why some information-seeking needs are more urgent than others
Sadeh	Articulating information needs (Browsing)	Users browse and examine the list of items they receive
Norman	Specifying an action	How users accomplish their intention
Dix et al.	Forming a goal to accomplish a task	Users start to explore ways to accomplish the task

Shneiderman et al.	Formulation	Users explore which source to search in, which field, what to search for, etc.
Hearst	Choosing a system and collection for searching	Users choose the system and collection, and then begin the search

There are a number of similarities and some differences between these models with regard to this step. Kuhlthau (ISB) states that users have identified what they need to do to start searching, which might be similar to the explanation provided by Ellis (ISB), who states that users engage in "chaining" what they find in two ways: backward (following a reference cited in the current document) or forward (following the references that cite the current document). According to Ellis, users acknowledge what they want as well as are involved in chaining what they want.

Wilson (ISB) has a different point of view with regard to this step. He connects it to the discipline of psychology, pointing out that when users seek information, some needs prompt information seeking more than others. Niedźwiedzka (2003) gives a good example that explains Wilson's point of view:

'Wilson suggests [that] not all information needs make a person seek information. For example, an individual does not engage in seeking activities if he or she is convinced that the possessed knowledge is sufficient to understand the situation and make a decision. If s/he lacks such conviction, the stress connected with danger of making a mistake, trespassing social or legal norms, financial responsibility or not answering expectations of other people, occurs. The bigger the stress the bigger is the motivation to look for information, up to a certain point where the stress paralyses such activities'.

Marchionini (ISB) points out that users explore in order to identify and understand the problem before they start. Similarly, Sadeh (ISB) states that users examine the list of items they receive to start browsing. In addition, Shneiderman et al. (HCI) point out that users will explore which source to search in, which field, what to search for, and so on. Hearst (HCI) also states that users explore in order to choose the system and collection to start searching. Belkin et al. (ISB) point out that users in this step scan an interesting item to ascertain whether to continue to the next step. Belkin et al.'s (ISB) opinion is quite similar to that of other researchers (Marchionini [ISB], Sadeh [ISB], Shneiderman et al. [HCI], and Hearst [HCI]); during the process of scanning, users encounter a number of resources, but they need to recognise which of the resources is interesting enough to be selected. Norman (HCI) and Dix et al. (HCI) have similar opinions regarding this step: that is, it involves different ways of

exploration to achieve the task in mind, without indication of a specific way of accomplishing the task.

Thus, the second step (Exploration) for users interacting and looking for information can be summarised into six points as follows:

- Browse and examine the items they received.
- Explore to accomplish a task in different ways (e.g. based on their understanding of the field of work, by following footnotes and citations in an identified resource or by determining which source to search, in which field and what to search for).
- Identify what to search for.
- Browse to scan an interesting item.
- Choose the system and collection to start searching.
- They might be influenced by psychological factors.

Based on this step regarding the example, the postgraduate student examines the item (task) in order to understand what is required to start searching, and then browses to scan an interesting item (e.g. one of the resource options available in the library interface) to explore and identify what to search for, which field and where. He/she might uses different ways of looking for information as he/she might select an option (e.g. e-journal) to start searching, then he/she might select an interesting result (e.g. document) based on his/her understanding of the topic or in order to follow references cited in the result or references that cited the result, but he/she may be affected by psychological factors such as stress associated with the danger of making a mistake.

3.4.3 Decision making

This is defined as the way users initiate the third step when they need information.

Table 3.5. Step 3: Decision making

Model	Decision	How this step is formulated
Ellis	Browsing	Users start semi-directed searching in a potential area of interest, using pointers, such as content pages, lists of titles, subject headings, and summaries, to narrow their search
Kuhlthau	Exploration	Users seek general information on the topic, aiming to expand their understanding and reduce their confusion and doubt about the topic

Belkin et al.	Learning and selecting	Users learn something about an item or resource, or select useful ones for retrieval
Marchionini	Choosing a search system	Users choose a search system based on their experience with a particular system, and expectations from the previous step
Wilson	Intervening variables	Users can be influenced by a number of intervening variables: psychological predispositions, demographic background, role-related or interpersonal factors, environmental factors, and characteristics of the sources
Sadeh	Focus which might be then expanded to navigate	Users might expand the information they have obtained and then navigate other types of documents by following links
Norman	Executing the action	Users execute actions such as finding a button or an item to choose and click on
Dix et al.	Articulation of the task	Users articulate the tasks formed and identified in the previous step
Shneiderman et al.	Action	Users determine how to start their search
Hearst	Formulating a query	Users send their query to the system

In the ISB models, users start seeking general information to know, make sure of, and expand their knowledge as well as reduce confusion (Kuhlthau). Similarly, Sadeh (ISB) mentions that users might expand their search, and then navigate the required resources. Belkin et al. (ISB) point out that users learn something about the resources before selecting those required for retrieval. Ellis (ISB) has a similar idea, wherein users start a semi-search for possible areas of interest, but in a different way, by going to content pages, lists of titles, and subject headings, to narrow down their search. Wilson (ISB) and Marchionini (ISB) have rather similar points of view. Wilson mentions that users might be affected by a number of variables that influence their search (e.g. psychological predispositions), while Marchionini states that users are influenced by their experiences and expectations in choosing which system to search. Marchionini's opinion is somewhat different from those mentioned above, as he links this step with the previous step.

On the other hand, Norman (HCI) argues that in this step, users execute the action by trying to find the item or the button to click on. Dix et al. (HCI) point out that users articulate their tasks based on their previous step, which is quite similar to Marchionini's (ISB) point of view. Shneiderman et al. (HCI) have mentioned that in this step, users determine how to start their search. Finally, Hearst (HCI) provides a direct step, which is sending a query to the system; users identify how to proceed by using the system to formulate their query.

Thus, the third step (Decision making) for users interacting and looking for information can be summarised into eight points as follows:

- Articulate the tasks formed and identified in the previous step.
- They might be influenced by variables, such as experiences, expectations or demography, prior to searching.
- Determine how to start their search by choosing a search system based on their experience with a particular system and their expectations from the previous step.
- Formulate their search.
- Start by searching for general information about the topic.
- Check information about their interests to learn something before they select what they want by going to contents pages or lists of titles.
- Select the items for retrieval by finding a button or an item to choose and click on.
- Expand the information they have and then navigate other types by following links.

Based on this step regarding the example, the postgraduate student articulates the task formed and identified in the previous step by determining how to begin the search: he/she formulates the query to start searching for general information about the topic and check information on his/her interests to learn something before he/she select what wanted by going to contents pages, or lists of titles. Then he/she selects interested items (resources) for retrieval by finding a button or an item to choose and click on. Then he/she might follows links required to access the resource; however, he/she might be influenced by variables, such as experience, expectation, or some demographic characteristics, prior to the search, or may be affected by the previous step.

3.4.4 Inference and interpretation

This is defined as the way users initiate their fourth step when they need information.

Table 3.6. Step 4: Inference and interpretation

Model	Inference and interpretation	How this step is formulated
Ellis	Filtering, then differentiating or distinguishing, and monitoring	Users filter the information sources to differentiate or distinguish between the information presented, as well as to monitor the developments in a field by frequently following particular sources
Kuhlthau	Formulation	User uncertainty declines, so users are more confident about moving on to the next step to solve the problem
Belkin et al.	Specification and recognition	Users seek identified items
Marchionini	Formulating a query and executing a search	Users formulate their query in two ways—semantic mapping (using their vocabulary according to the

		system's vocabulary) and action mapping (using strategies and tactics according to the rules and features allowed by the system interface). They then execute the search based on these mappings
Wilson	Activating mechanism Risk/reward theory and social learning (self-efficacy)	According to the risk/reward theory, users might use and prefer some information sources more than others. The social learning concept of "self-efficacy" explains why users can or cannot follow a goal successfully based on their own efficacy
Sadeh	Querying, exploring, searching, or asking for	Users formulate their query and then explore (search for information outside their field), search (conduct an exploratory search), and ask for (information already well-known by the users)
Norman	Perceiving the state of the world	Users perceive and see what has happened (feedback)
Dix et al.	Performing operations suggested by the input language, which is translated into the core language	Users execute the suggestions of the system by inputting language data
Shneiderman et al.	Reviewing the results	Users review the results by viewing the dataset size, layout, sequencing, and contents
Hearst	Obtaining the results in the form of information items	Users receive information items in response to their search

In this step, there are more differences among the models than there are in the other steps, but there are still some similarities. In this step, users are more confident and their levels of uncertainty decline as they obtain information. In addition, they are now ready to solve the problem, according to Kuhlthau (ISB); however, Wilson (ISB) has a different opinion. He argues that users might use some information more than others, and may or may not be able to achieve their goal successfully as this ability is based on their perceptions of their own efficacy. Ellis (ISB) states that users filter their search to differentiate the presented data, and monitor developments by frequently following particular sources. Belkin et al. (ISB) discuss how users seek the identified items. According to Shneiderman et al. (HCI), users review the results by viewing information such as the content and dataset size.

Marchionini (ISB) mentions that users formulate their query by either semantic mapping or action mapping, and then execute their search. Sadeh (ISB) has a similar viewpoint, which is that users formulate their query, but mentions three ways by which the query to be followed is formulated: exploring, searching, and asking for (information). Dix et al. (HCI) also suggest that users formulate their query, but this is based on the suggestions of the system when they enter their query. However, Norman (HCI) states that users see what in fact has happened. Finally, Hearst (HCI) points out that users obtain information in response to their search.

Thus, the fourth step (Inference and Interpretation) for users interacting and looking for information can be summarised into six points as follows:

- They are more confident in their ability to solve the problem.
- Formulate their query and then execute the search to explore or ask for information that is already well known.
- See what has happened (e.g. displayed or through feedback) by receiving information items in response to their search.
- Review the results by viewing the data set size, layout, sequencing and contents to seek identified items.
- Filter the information sources to differentiate or distinguish between the information presented, as well as to monitor the developments in a field by frequently following particular sources.
- They might prefer some kinds of information more than others, and they may or may not be able to achieve their search goals successfully.

Based on this step regarding the example, the postgraduate student is now more confident about formulating the query for searching to explore or asking for well-known information (e.g. keywords related to the topic). Then, he/she sees what has happened (displayed) and then reviews the results by viewing the contents to seek identified items. Then, he/she might filter the results to differentiate or distinguish between the information presented. However, he/she might prefer some types of information more than other types of information, and may or may not able to achieve the search goals successfully, as this ability is based on his/her perceptions of his/her own efficacy.

3.4.5 Expression

This is defined as the way users follow the fifth step when they need information.

Table 3.7. Step 5: Expression

Model	Expression	How this step is formulated
Ellis	Extraction	Users work through the resources, selecting material of interest
Kuhlthau	Collection	Users gather the information that they focused on
Belkin et al.	Specification and recognition	Users identify relevant items through stimulated associations

Marchionini	Examining results + Extracting information	Users examine the results relevant to their goal. They then extract relevant information, using skills such as reading, scanning, listening, classifying, copying, and storing information
Wilson	Information-seeking behaviours Passive attention, passive search, active search, ongoing search	Users can gain information without planning or seeking (passive attention) Users might also obtain results by gathering information relevant to their needs by means such as browsing (passive search) or seeking information actively from diverse sources (active search) Users' searches are carried out to update or broaden knowledge (ongoing search)
Sadeh	Scanning and then reformulating, focusing, or narrowing down	Users scan the results, and then reformulate (if they did not find the required information), focus (on acceptable and relevant results), or narrow down (if they found several results) the results to find the relevant ones
Norman	Interpreting the state of the world	Users perceive the state of the system and identify whether anything has changed
Dix et al.	Performing operations suggested by the input language, which is translated into the core language	The system translates user input into the core language
Shneiderman et al.	Refinement	Users refine their search by feedback received from the system and clustering the results
Hearst	Scanning, evaluating and interpreting the results	Users scan, evaluate and interpret what they obtain from the results

In this step, the similarities among the models are strong. Kuhlthau (ISB) states that users collect the results that they focused on, similar to Ellis (ISB), who points out that users select interesting material from the resources they were working through. Furthermore, Belkin et al. (ISB) maintain that users identify relevant items. Wilson (ISB) has a slightly different point of view, which is that users might collect information in four ways: passive attention, passive search, active search, and ongoing search. Marchionini (ISB) points out that users examine their search results in different ways and then extract the relevant results. This is similar to what Wilson says regarding active searching, but Wilson states that this might happen without planning (passive forms of searching) while Marchionini sees this happening by examination. Sadeh (ISB) provides a similar opinion to Marchionini, that users scan the results and might reformulate, focus, or narrow down their search. In addition, Hearst (HCI) mentions that users scan, evaluate and interpret their results.

Shneiderman et al.'s (HCI) point of view is similar to Sadeh's, with regard to the way users refine their search. Sadeh argues that users might narrow down their search, and Shneiderman et al. mention clustering of the results. However, Norman (HCI) points out that users

recognise what the state of the system is and then check if anything has changed. This is similar to Dix et al.'s (HCI) viewpoint that users will see what the system displays (translate) based on what they entered.

Thus, the fifth step (Expression) for users interacting and looking for information can be summarised into six points as follows:

- They might obtain results by undertaking passive, active or ongoing searches.
- View what the system presents to them.
- Work through the resources to identify and examine what is of interest or relevant to their goals.
- Scan, evaluate and interpret the results they obtained.
- They might reformulate the query, focus on relevant results or narrow down their search results.
- Extract relevant information they focused on, using skills such as reading, scanning, listening, classifying, copying and storing information.

Based on this step regarding the example, the postgraduate student views the results presented by the system, and then he/she scans, reads, focuses on, identifies, examines, evaluates and interprets the results to select an interesting or relevant one. In case he/she does not find what he/she needs in the first attempt, he/she might reformulate the search, or narrow down (refine) the results to find relevant information; this can be through active searching to seek out results actively from diverse sources (e.g. databases, e-journals, and books), then he/she extracts the relevant (interested) information (result).

3.4.6 Conclusion

This is the last step used to search for information.

Table 3.8. Step 6: Conclusion

Model	Conclusion	How this step is formulated
Ellis	Verifying and ending	Users make sure that the information is accurate, thus ending the seeking process
Kuhlthau	Presentation	Information seeking has finished, so users determine whether they have succeeded or failed based on their findings and explain this to others
Belkin et al.	Meta-information tasks	Users interact with the sources of information which might be dissimilar to meta-information, which describes the

		structure and contents of the objects of information
Marchionini	Reflecting/iterating/stopping	Users reflect, iterate, and stop their search based on the information-seeking process itself
Wilson	Information processing and use	Users find what they need and use the results
Sadeh	Deferred (gather) or immediate (process) use	Users finish their search by deferred or immediate use of information
Norman	Evaluating the outcome	Users evaluate what they have gained and whether it relates to what they wanted
Dix et al.	Observation of the results	Users observe the results and verify if they are relevant to their goal
Shneiderman et al.	Refinement	Users extract the results to files, possibly for use in emails
Hearst	Stopping the search or reformulating the query	Users either stop their search or reformulate their query

The last step has many similarities between the models. Kuhlthau (ISB) mentions that users finish the seeking process by identifying whether it has failed or succeeded and then presenting and explaining this to others. Similarly, Wilson (ISB) explains this as the step wherein users use what they have found. Sadeh (ISB) similarly states that users either use what they have found immediately, or defer its use (gather). This is similar to Shneiderman et al.'s (HCI) opinion that users extract the results to files, so they might use them immediately or later on.

According to Ellis (ISB), users make sure that their findings are accurate and then end their search. This is similar to the opinion of Norman (HCI) and Dix et al. (HCI), who argue that users verify and evaluate what they have obtained before they use it. Furthermore, Belkin et al. (ISB) mention that users interact with the sources which might be different from meta-information, which describes the structure and contents of the objects of information. Marchionini (ISB) and Hearst (HCI) have a similar point of view, which is that users might either stop their search or iterate/reformulate their query.

Thus, the final step (Conclusion) for users interacting and looking for information can be summarised into four points as follows:

- Observe and evaluate the results they gained, and ensure that they are correct and relevant to their goal to end their search.
- Make sure that the information obtained is similar to what has been provided in the meta-information.
- Find results (information).

- Reflect, iterate, stop their search or reformulate their queries based on the information-seeking process itself.

Based on the last step regarding the example, the postgraduate student observes and evaluates the results he/she gained and ensures that they are correct and relevant to his/her goal to end their search and this might be by making sure that the information obtained is similar to what has been provided in the meta-information (metadata). When he/she finds the required result (information), he/she extracts it (e.g. downloading it) to use them immediately or later. Finally, he/she either stops the search or iterates or reformulates his/her query it if the result is not relevant.

3.5 Summary

This chapter has explained the significance of the ISB and HCI fields as well as the rationale for selecting models used in this study. Moreover, it proved that the models included shared many similarities and had few differences between them, based on which a new model (figure 3.1) was created by combining these models in order to provide a theoretical background for the current study. This model can be compared to the findings (observations) of this study for further investigation and interpretation.

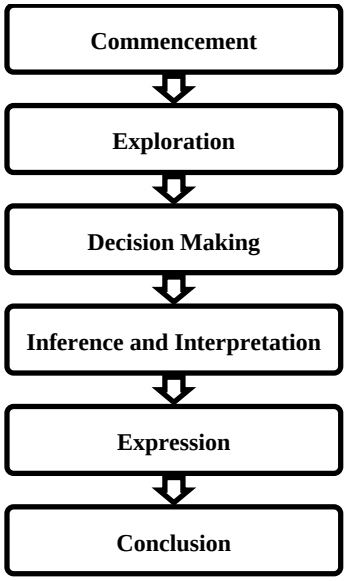


Figure 3.1: The new model based on the models selected in this research

The next chapter will discuss the research method used in this study.

Chapter 4: Research Methods

4.1 Introduction

This chapter discusses and explains the research methods used in the research. With regard to data collection, it reviews, identifies, and selects the approach, strategy, procedure, techniques, research philosophy, and methodological choice. This chapter also justifies the rationale behind the chosen research method.

4.2 Research Method Considerations

Researchers follow procedures to obtain data according to a specific topic. Botan et al. (2000) stated that research methods are particular strategies used by researchers to collect evidence essential to build and test theories. Silverman (2005, p. 112) points out that right or wrong methods do not exist; 'only methods that are appropriate to your research topic'. Benbasat (1984) explains that choosing a research method depends on numerous factors such as the nature of the research topic, length of time, and budget available.

However, many contest the term *research method*. Numerous terms can refer to the research method: research approach (Galliers, 1992), research strategy (Oates, 2006), and methodology (Cornford and Smithson, 1996). According to the Oxford English Dictionary (OED Online), method 'is a system of methods used in a particular area of study or activity'. Thus clearly defining one's terms is important, especially in multidisciplinary research such as HCI, ISB (part of Library and Information Science), and IS (Information Systems of the Libraries called the Integrated Library System). These disciplines employ similar research methods; for example, each one uses interviews and focus groups to collect qualitative data in case studies.

To avoid misunderstanding, Saunders et al.'s (2012) research onion adopted, which is a framework that can provide an efficient sequence through which a research methodology can be designed. They categorised it in six layers; Philosophies, Approaches, Methodological Choice, Strategies, Time Horizons, Techniques and Procedures. In the following sections and sub-sections, these aspects are each considered and explained, and the methods used in this research are detailed and justified.

4.3 Research Philosophy

A research philosophy consists of assumptions about the way in which a person views the world. These assumptions support the chosen research strategy and methods (Saunders et al., 2012). Easterby-Smith et al. (2002) outline three benefits of having a research philosophy:

- It helps the researcher determine the most appropriate research method.
- It provides the researcher with an overview of methodologies and methods. (Early on the researcher may determine the limitations of each particular approach to avoid unnecessary work).
- It assists inexperienced researchers to select and adapt methods.

Orlikowski and Baroudi (1991) mention three philosophical perspectives (i.e. paradigms) on research methodologies: interpretive, positivist, and critical. Guba and Lincoln (1994) note that a paradigm might consist of numerous basic beliefs that transact with initial principles; it represents a worldview that identifies, for its holder, the nature of the world, the individual's place in it and the variety of potential relationships to that world and its parts. In addition, they argue that one can identify the basic beliefs of inquiry paradigms by answering three related questions: ontological, epistemological, and methodological (Guba and Lincoln, 1994; Locke et al., 2010; Silverman, 2011).

Such assumptions determine limitations, which in turn enhance the logic and validity of an inquiry. Assumptions are also helpful in providing researchers with a framework for monitoring the progress of their research. The following table displays questions for identifying inquiry paradigms.

Table 4.1: The basic questions to identify the inquiry paradigms (Guba and Lincoln, 1994, p. 108)

The Ontological Question	What is the form and nature of reality? What can we know about it? If, for example, we assume the world is "real", then we can derive how things are and work. Only those questions that concern "real" existence and "real" action are admissible. Other questions, such as those involving aesthetic and moral significance, will fall outside the realm of legitimate scientific inquiry.
The Epistemological Question	What is the relationship between the knower (or would-be knower) and what can we know? The answer given to this question is constrained by the answer already given to the ontological question; that is, no discernible relationship exists. If, for example, one assumes a "real" reality, then the knower is not being objective and detached. He or she does not want to perceive how things actually are and how they actually work.
The Methodological Question	How can the inquirer (or would-be knower) find the answer to whatever he/she believes can be known? Again, the answer given to this question is constrained by answers already given to the first two questions; that is, no appropriate method exists; for example, a "real" reality pursued by an "objective" inquirer requires control of confounding factors, whether the methods are qualitative (e.g., observational) or quantitative (e.g., analysis of covariance).

The following subsections explain three philosophical paradigms and assumptions for justifying a chosen research method.

4.3.1 Positivist Paradigm

This sub-section focuses on the oldest and most widely used of the three paradigms: the positivist paradigm. Positivism is occasionally called the "scientific method" or "science research", and it has evolved over the past 400 to 500 years. It is based on the rationalistic, empiricist philosophy that originated with Aristotle, Francis Bacon, John Locke, August Comte, and Emmanuel Kant (Mertens, 2005; Mackenzie and Knipe, 2006; Oates, 2006). It has two basic assumptions: (1) the world is ordered and (2) the word can be investigated objectively (Oates, 2006). The positivist approach is suitable for experimental researchers (e.g. chemists, physicists) working in natural science laboratories (Hughes and Sharrock, 1997; Oates, 2006). Positivist research is characterised by formal propositions, quantifiable measures of variables, hypotheses testing, and the drawing of inferences about a phenomenon from the sample to a stated population (Orlikowski and Baroudi, 1991). Generally, positivist studies endeavour to test hypotheses and predict phenomena (Guba and Lincoln, 1994). However, although they have been successful in the natural sciences, arguments have arisen

that dispute their appropriateness for studying human behaviours in the field of social science (Galliers and Land, 1987; Oates, 2006). According to Galliers and Land (1987, p. 900),

'There are only a limited number of factors that can be studied under laboratory conditions, and it is difficult to reproduce a "real world" environment in these circumstances; for example, a study of decision-making aids on the decision-making behaviour of a manager can only be properly studied in the real world decision-making environment (e.g. noisy, stressful, and lacking in information). Studies that do not reproduce that environment may select as "best" a technique that would be ineffective in the real world'.

4.3.2 Interpretivist Paradigm

Eichelberger (1989) mentioned that this paradigm grew out of the philosophy of Edmund Husserl's phenomenology and Wilhelm Dilthey's and other German philosophers' study of interpretive understanding, called hermeneutics, which is the study of interpretive understanding or meaning (as cited in Mertens, 2005, p.16). Researchers developed the interpretivist paradigm as an alternate to the positivist paradigm. Lee (1991) mentioned that interpretivism has garnered more attention than positivist. In contrast to positivism, Braa and Vidgen's (1999) stance on interpretivism argues that humans interpret situations differently; hence positivist methods of natural science are inappropriate. Orlikowski and Baroudi (1991, p. 13) assert that 'the aim of interpretive research is to understand how members of a social group, through their participation in social processes, enact their particular realities and endow them with meaning, and to show how these meanings, beliefs, and intentions of the members help to constitute their social action'. Moreover, interpretive research in information systems (IS) and computing is concerned with understanding the social context of an information system, that is, the social process by which people and social settings develop (Oates, 2006). This paradigm is the opposite of the positivist paradigm. Lee (1991) notes that interpretivism deals with ethnography, hermeneutics, phenomenology, and case studies; positivism, on the other hand, deals with inferential statistics, hypothesis testing, mathematical analysis, and experimental and quasi-experimental design.

Based on multiple interpretivist studies, the basic ontological questions in Table 4.1 assume that researchers perceive reality as subjective and socially constructed (Saunders et al., 2012; Creswell, 2013). Researchers endeavour to remain impersonal as they gather evidence from

biased participants regarding details of a situation, the reality behind those details, and subjective meanings tied to the social phenomena. Methodologically, researchers use inductive logic, contextually relevant studies, previously identified designs, small samples, in-depth investigations, and qualitative data (Saunders et al., 2012; Creswell, 2013).

4.3.3 Critical Paradigm

Critical research, in terms of providing critiques of social order, has a long history encompassing the likes of Aristotle, Socrates, Hobbes, and Marx. It is now evident in the work of a wide variety of social critics, such as Marxists and feminists. The origin of the "critical" term was the critical theory widely associated with the Frankfurt Institute for Social Research (Frankfurt School of Marxism). Members of the Frankfurt School—Adorno, Marcuse, and Horkheimer—criticised scientism and rationalism by revealing the significance of beliefs and values as central constituents of culture (Muncie, 2006). Hence, critical researchers assume that history constitutes social reality, focusing mainly on power relations, conflicts, and contradictions. Although people can produce, reproduce, and change their social and economic conditions, critical researchers take into consideration diverse challenges such as social, cultural, and political domination (Myers and Avison, 1997; Oates, 2006). Cohen et al. (2007, p. 26) describe this paradigm as 'explicitly prescriptive and normative, entailing a view of what behaviour in a social democracy should entail'.

IS seeks to remove the causes of unwarranted alienation and domination so that individuals can realise their human potential (Alvesson and Willmott, 1992; Klein and Myers, 1999). To augment this potential, Klein and Myers (1999, p. 69) contend, 'Critical theorists assume that people can consciously change their social and economic conditions. They, however, acknowledge that human ability to improve their conditions is constrained by various forms of social, cultural, and political domination as well as natural laws and resource limitations'.

Therefore, critical paradigm researchers refute the positivist approach and assert that individuals create and recreate social reality (similar to interpretivisim). The critical paradigm, on the other hand, states that objective aspects of reality (e.g. politics, economics, culture) also influence people's perceptions (Oates, 2006). For that reason, it is unlike the interpretive approach, which puts emphasis on subjectivity. Alvesson and Deetz (2000) mention that several researchers view critical research as being too theoretical and esoteric in asking unanswerable questions. Methodologically, the critical paradigm and the interpretive

paradigm share similar assumptions. The following table provides characteristics of each philosophy.

Table 4.2: Characteristics of Positivist, Interpretivist, and Critical Research based on Oates (2006)

Positivism	Since a physical and social world does not exist in the human mind, the world exists independently of humans. To measure and model the world, one conducts measurements and observations. The researcher must be neutral and objective. Testing hypotheses and theories. Universal laws in research seek to find and display facts. Quantitative data analysis.
Interpretivism	Multiple subjective realities lace the truth. Meaning is dynamic and socially constructed. Researcher is not neutral, so he/she must be reflexive. To study people in their natural social settings Multiple interpretations. Researchers are expected to identify more than one explanation in their studies. Qualitative data analysis.
Critical	Emancipation. Researchers aim to not only understand and explain phenomena but also search for ways to empower people. Researchers do not accept the status quo, so they underline and tackle existing patterns of power and assumptions. Researchers refuse projects that seek to develop or enhance managerial efficiency and control. Researchers confront the thought that technological development follows rules and that people and societies should adjust technology. Reflexivity. Researchers, similar to interpretivists, question the possibility of objective, value-free knowledge (e.g. positivists). They specify that those with power and stakes regularly form research projects and areas of development and knowledge.

4.3.4 Paradigm Choice

This subsection discusses paradigm choice as the analytical framework for contemporary research. Notably, paradigm choice should be made with an unlatched mind, as no one paradigm is superior to another (Markus, 1997).

Multi-paradigm research projects have numerous options (Mingers, 2001). The state of the research, nature of the issue, and objective and questions of the research should determine paradigm choice. Additional considerations involve the tradition of the discipline and the researcher's willingness to challenge the status quo (Oates, 2006).

The main research question of this study is “How do the users of academic libraries search for information and interact with the libraries’ web interfaces?”

In other words, **how** certain events happen. This could lead to several explanations. Thus positivist characteristics and assumptions do not advocate to the aim of the study; instead, the aim is to study people inside their social environment. The positivist paradigm favours a generalisable explanation of reality. For this particular case, critical and interpretive paradigms are more appropriate. However, because this research does not seek to challenge power relations, conflicts, contradictions, and empowerment, the critical paradigm does not comply with contemporary research. Therefore, an interpretive paradigm is the most suitable choice for this study.

The research aim is to address the ways that users of academic libraries search for information and interact with the libraries’ web interfaces. This research also investigates the information needs, information-seeking behaviours, the difficulties and experiences of different groups of users of the academic libraries’ websites. Moreover, this research aims to develop a model combining the ISB and HCI models in order to investigate whether this could facilitate the understanding of how users search for information and interact with the web interface when they use the academic library website. Consequently, the researcher believes that the present situation is subjective, dependent on individuals, and needs an in-depth analysis to understand phenomena. Because the researcher’s views coincide with interpretivism, this was adopted for this study. Table 4.3 denotes the author’s philosophical beliefs about this research using the interpretive paradigm.

The discipline of accounting serves as the basis of Chua’s (1986) original ideas. As a result of the acceptance of Chua’s work, the philosophical level of accounting is similar to other disciplines such as IS, HCI, and LIS, allowing Chua’s views to develop and modify the paradigmatic characteristics of information systems, human-computer interaction, and library and information science research.

Table 4.3: Interpretive Paradigm and Assumptions adapted from Chua (1986). Amendments to Chua's table are italicised

Paradigm / **Assumptions**	**Interpretive**	***This Research***
A. Beliefs about knowledge		
Epistemological *(nature of the researcher - research relationship)*	Scientific explanations of human intention sought. Their adequacy is assessed via the criteria of logical consistency, subjective interpretation, and agreement with actors' common-sense interpretations.	*Researcher believes in subjective reality and actor's common-sense interpretations.*
Methodology *(How can the enquirer find out?*)	Ethnographic work, cases studies, and participant observations are encouraged.	*Supports pragmatist beliefs in real-life case studies.*
B. Beliefs about physical and social reality		
Ontological: *(form of nature and reality)*	Social reality is emergent, subjectively created, and objectified through human interaction.	*Human interaction is essential to understand social reality.*
Human intention and rationality	All actions have meaning and intention that are retrospectively endowed and that are grounded in social and historical practices.	*Reflexive examination of actions and social practices.*
Societal order/conflict	Social order assumed. Conflict mediated through common schemes of social meanings.	*Assumes social order.*
C. Relationship between theory and practice		
	Theory seeks to explain action and to understand how social order is produced and reproduced.	*Aim is to obtain explanations of situations being studied.*

4.4 Research Approach

Hayes (2000) and Burney (2008) provide explanations about two common approaches to deductive and inductive research.

- Deduction involves testing hypotheses and analysing results to determine validity (i.e. from the general to the specific).
- Induction begins with a collection of data and observations that the researcher uses to interpret (i.e. from specific to general).

As shown in the following table, Saunders et al. (2012) clarify the differences between deductive and inductive approaches.

Table 4.4: Differences between deductive and inductive approaches to research (Saunders et al. 2012, p. 144)

	Deduction	Induction
Logic	In deductive inference, when premises are true, conclusion must also be true.	In inductive inference, known premises generate untested conclusions.
Generalisability	From general to specific.	From specific to general.
Use of data	Data collection is used to evaluate propositions and hypotheses related to existing theories.	Data collection is used to explore phenomena, identify themes and patterns, and create conceptual frameworks.
Theory	Theory falsification or verification.	Theory generation and building.

Based on the research aim and objectives which are aim to generate untested conclusions, analysing the collected data (from the specific to the general), and not aimed to test hypotheses or theories. Thus, the inductive approach is appropriate for both this research and the researcher's interpretive beliefs.

4.5 Methodological Choice

As this research takes an inductive approach and interpretive research paradigm, qualitative methodologies are the most appropriate.

Saunders et al. (2012) argue that qualitative studies use the inductive approach to enhance existing theoretical perspectives. They also argue that 'qualitative research studies participants' meanings and the relationships between them, using a variety of data collection techniques and analytical procedures, to develop a conceptual framework' (p. 163). Furthermore, Cooper et al. (2007) point out that qualitative research can provide researchers with real-world details that reflect the complexities of human situations (i.e. what, how, and why). Quantitative research, on the other hand, addresses questions about "how much" or "how many," along with a few reductive axes. They also claim, 'social scientists have long realised that human behaviours are too complex and subject to too many variables to rely solely on quantitative data to understand them' (p. 50). They cite several reasons to support the values of qualitative research:

- Unlike quantitative research, qualitative research is useful in facilitating the recognition of user domains, contexts, and constraints.

- It supports the identification of patterns of behaviours among users and potential users of online interfaces.
- It promotes the understanding of how users use existing interfaces.
- Qualitative research is typically faster, less expensive, and more useful in providing answers to questions that lead to superior designs.

Therefore, the qualitative method was selected due to the basic philosophical assumption that behaviours, interactions, and experiences of the people play a crucial role in this research.

4.6 Research Strategy

Research strategies enable researchers to use methods that are appropriate for collecting information successfully. Punch (2005) states that a research strategy is a series of ideas that a researcher uses to answer research questions. Similarly, Saunders et al. (2012, p. 173) define a research strategy as 'a plan of how the researcher will go about answering her or his research question'. However, Creswell (2013) points out that most people in qualitative research have a hard time choosing from the many available approaches. Miller and Crabtree (1992) give 18 approaches that differ according to the domain of human life and the researcher's interests (as cited in Creswell, 2013, p. 7). Saunders et al. (2012, p. 163) also highlight this difficultly by stating that 'qualitative research is associated with a variety of strategies'.

To design research well, a researcher must choose a strategy that fits him/her. After that, the researcher must select one strategy to investigate and then figure out its relation to the research aims and objectives. This section will investigate seven research strategies commonly used in interpretive IS, HCI, and LIS: design and creation, surveys, experiment, action research, grounded theory, ethnography, and case study (Oates, 2006; Lazar et al., 2010; Pickard, 2013).

4.6.1 Design and Creation

The strategy of design and creation focuses on developing new information technology products and artefacts. Frequently, contemporary IT products are computer-based systems,

but it can also be an element of the developmental process (i.e. a new construct, model, or method).

This strategy consists of four types of IT artefacts:

- **Methods** use IT to devise steps and solve problems.
- **Constructs** are the terminology used in a particular IT-related field (e.g. entities, objects, data).
- **Models** are the way constructs join and present situations. Used to devise solutions and run development (e.g. diagram[s] for data flow).
- **Instantiations** are running systems that validate whether ideas, models, genres, methods, theories, and constructs are implementable in computer-based systems (Oates, 2006).

However, this strategy is not suitable for this particular study since it involves the development of new artefacts and products. These elements are therefore not applicable to this research.

4.6.2 Surveys

Survey strategies aim to collect data from people through standardised, systematic means (Oates, 2006). Researchers use this strategy for exploratory and descriptive research to answer questions such as who, what, how much, and how many. Accordingly, because survey strategy goes from general to specific, it is connected to the deductive research approach (Saunders et al., 2012). Its usefulness in collecting data may be limited to interviews, observations, and questionnaires. In addition, it shares an association with interpretive and critical research as well as the positivist philosophical paradigm (Oates, 2006).

For this strategy, the researcher seeks to answer questions such as what, who, how much, and how many. However, for this particular type of research, the researcher ultimately seeks to answer questions involving how and why. In addition, this study focuses on current phenomena where exploration and explanation are vital elements of the process. Hence, this strategy may not provide opportunities for understanding phenomena, even though researchers can apply it interpretively. Consequently, survey strategies are inappropriate for this research.

4.6.3 Experiment

Oates (2006, p. 128) defines an experiment strategy as ‘a particular kind of research strategy that aims to isolate cause and effect by manipulation of what is thought to be the casual, or independent, variable and measurement of its effect on the dependent variables’. The natural sciences (e.g. physics, chemistry) notably use it as the primary research strategy. This method is also applicable for researchers in the field of social science; however, few social researchers use it because experiments typically require controlled conditions to measure the effects of certain variables (David and Sutton, 2011). In addition, when conducting experiments in research, researchers first develop a theory about their topic. This leads to a statement of focus and then empirical testing. Researchers can design experiments to either prove or disprove hypotheses (Oates, 2006). Seeking a connection between theory and evidence is a strategy known as deduction. This experimental method is also known as the hypothetico-deductive model (David and Sutton, 2011). Hence, it was decided to reject experiment as the strategy used to control conditions in order to measure the effect of certain variables upon other variables, which will undermine the nature of this research. In addition, this strategy typically tests theories and hypotheses. Ultimately, this particular study does not aim to test theories.

4.6.4 Action Research

Reason and Bradbury-Huang (2001, p. 1) define action research as the following:

‘A participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview which we believe is emerging at this historical moment, it seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities’.

In addition, Benbasat et al. (1987) argue that a researcher in action research is both a participant in the implementation of a system and an evaluator of intervention techniques. Professionals use action research to investigate and develop their respective working practices; that is, they use action research to put research into action. This strategy can

encompass any of the three philosophical paradigms: positivism, interpretivism, and critical research (Oates, 2006).

Rapoport (1970, p. 499) declares that 'action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable framework'. Using diverse forms of knowledge, action research aims to design an iterative process of inquiry to improve solutions of real organisational problems through participative and collaborative approaches, carrying implications for both participants and organisations beyond the research project's original scope.

Action research also encourages organisational learning to produce practical outcomes. It does this by recognising issues, planning actions, taking actions, and evaluating actions (Saunders et al., 2012). Educational studies frequently employ this strategy. Numerous authors declare that action research is valid in the fields of education and organisational development (Kemmis and McTaggart, 1988; Elden and Chisholm, 1993). In addition, action research includes a five phase cycle then a later seven stage cycle (Checkland, 1991; Whyte, 1991).

However, this strategy does not fit the needs of this research in that the researcher works in a place other than the one under investigation. It is impractical given the time and resource constraints of PhD research. It is very rare that a PhD can be a piece of genuine action research because of the need to keep going through the cycles.

4.6.5 Ethnography

Ethnography is the oldest strategy in qualitative research. Its origins began with colonial anthropology in the eighteenth century and later developed into the study of colonial cultures and societies (Saunders et al., 2012). Simply put, ethnography is the study of peoples and cultures. Researchers of this strategy aim their studies at people; that is, an ethnographer devotes time out in the field, participating in people's lives, and conducting observations. It is far from the role of being a detached observer. Becoming involved provides researchers with opportunities to examine and attain additional details of people's behaviours in a variety of situations, such as those involving interpretations of personal experiences, cultural beliefs, and social interactions (Oates, 2006; Wilson and Chaddha, 2010; Saunders et al., 2012).

However, gathering data while living amongst participants and sampling enough participants to produce results require extended periods of time. Wilson and Chaddha (2010, p. 2) contend that 'ethnography ought to be used to generate hypotheses that could then be tested with quantitative data. Accordingly, the major objection to using ethnographic research in the context of validation is the inherent difficulty of generating a sample representative of a larger population'.

Although this study investigates participants from two universities in two different countries, it does not strive to understand their respective cultures. Ethnography requires a great deal of time and participants. It encompasses more than mere observations, requiring detailed interviews and elaborate focus groups to identify how participants use the library web interface. This strategy, therefore, is a poor fit for this research.

4.6.6 Grounded Theory

Glaser and Strauss (1967, p. 2) define grounded theory as 'the discovery of theory from data systematically obtained from social research'. Notably, this particular strategy has no connection to any school, discipline, or scholar. Grounded theory is simply a general research method, one that goes beyond testing hypotheses and into the discovery and creation of theories. Moreover, collecting data can be quantitative, qualitative, or mixed (Andrew and Scott, 2013). It works with inductive and interpretive research, ideal for collecting and analysing qualitative data.

However, data in grounded theory is built without theoretical frameworks. Its literature review follows the emergence of substantive theory (Eisenhardt, 1989). When one follows the guidelines and procedures of grounded theory, the nature of the qualitative data can lead researchers to the discovery and creation of conceptual properties and categories. IS researchers ideally choose from among three concepts of grounded theory that are significant to the interpretive research process. Below are the three concepts:

- **Theoretical sampling** develops conceptual categories through coding and integration.
- **Theory** is how previous concepts form a hierarchy of integrated categories and emerging theories (Hughes and Jones, 2003).
- **Constant comparative** analysis recognises conceptual categories, their properties, and their influential role on data.

Nowadays researchers claim that they use grounded theory to help them identify themes and to analyse qualitative data inductively. However, grounded theory has its own set of practices:

- **Interviewing** is a primary form of data collection.
- **Selection of people and instances** begins with one person or incident (usually).
- **Theory** is the aforementioned practices that generate a theory of practical relevance for people being studied under specific situations (Oates, 2006; Creswell, 2013).
- **Method of data analysis:**
  - Open coding are data terms and concepts.
  - Axial coding is the emerging lists of codes that form a theoretical model.
  - Selective coding is the intersecting categories that turn into theories.

Indeed, the strategy of grounded theory uses inductive and interpretive research to collect and analyse qualitative data, as well as to generate theories not based on testing hypotheses (similar to this study). However, with regard to this research, it is inappropriate in that this research needs to identify research problems through a preliminary review of the existing literature. Grounded theory, on the other hand, does not.

4.6.7 Case Study

A case study thoroughly examines one or more specific situations (Lazar et al., 2010). Yin (2013 pp. 16-17) divides it into two parts:

1) **Scope of case study** means 'a case study is an empirical inquiry that investigates a contemporary phenomenon (the "case") in depth within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident'.
2) **A case study inquiry** 'copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result relies on multiple sources of evidence, with data needing to cover in a triangulating fashion, a result benefits from the prior development of theoretical propositions to guide data collection and analysis'.

Within information systems, many researchers use the case study method (Orlikowski and Baroudi, 1991). Benbasat et al. (1987) confirm its practicality by citing three reasons:

- Aids in new or rarely explored areas of research.
- Generates theories from practice by studying information systems in natural settings.
- Helps researchers find answers to questions involving how and why, that is, raises awareness about the nature and complexity of real-time processes.

Oates (2006) and Benbasat et al. (1987) point out that a case study:

- Puts emphasis on current events.
- Uses multiple sources and methods.
- Investigates how and why questions.
- Collects data through more than one way.
- Observes cases in their natural settings, not in laboratories.
- Examines one or several entities (e.g. person, group, organisation).
- Concentrates holistically on the complexity of units and relationships.
- Focuses on depth instead of breadth (i.e. more details about the case).
- Deals with operational links that occur over time (instead of frequency or incidence).
- Explores, classifies, and hypothesises the developmental stages of knowledge-building processes.

Research using the case study approach can incorporate the underlying philosophical paradigms of positivism, interpretivism, and critical research (Oates, 2006). Furthermore, Walsham (1995) claims that in-depth case studies are the most appropriate method for interpretively-based empirical research. A case study does not usually test prior hypotheses; instead, it investigates experiences for detail and meaning (Yin, 2009). This study uses qualitative data (i.e. interviews, focus groups, and observations). It is both interpretive and inductive. It does not aim to test hypotheses.

Therefore, a case study strategy complements the given research questions. Based on Yin's (2013) conditions, the choice is justifiable:

- It has a contemporary research focus that investigates existing phenomena.
- The type of research question centres on *how* and *why* (an ideal rationale for conducting case studies).
- The extent of control a researcher has over behavioural events in real world contexts. He or she cannot control the ways in which participants use, seek, and interact with the library website.

Yin (2003) divides case studies into three types: exploratory, descriptive, and explanatory (as cited in Oates, 2006, p. 143).

- **Exploratory study:** Defines questions and hypotheses to better understand research problems. It might be used when there is little literature about a topic.
- **Descriptive study:** Provides an in-depth analysis of phenomena and its context. The analysis tells a story, including discussion of what occurred and how different people perceive what occurred.
- **Explanatory study:** Explains why events and outcomes happen. The case study analysis seeks to identify the multiple, often inter-linked, factors that had an effect, or compares what was found in the case to theories from the literature to see whether one theory matches the case better than others.

Lazar et al. (2010) cite four purposes of case studies in HCI:

- **Demonstration:** shows how new tools were used successfully.
- **Explanation:** develops models to understand the use of technology for particular contexts.
- **Exploration:** promotes the understanding of novel problems and situations with the hope of formulating new designs.
- **Description**: involves documenting systems, the use of technologies in context, and the processes leading to designs.

Given the types of case studies, this study provides in depth analysis to discuss and identify the information needs, information seeking behaviours, difficulties and experiences with academic libraries websites perceived by different groups of users. It also investigated a number of ISB and HCI models. Accordingly, a unified model was created to determine whether it could help to understand how users search for information and interact with the web interface when using the academic library website (see Chapter 3). Finally, the research aim is to identify how the users of academic libraries search for information and interact with the libraries' web interfaces, which means how certain events happen. This could lead to several explanations. Therefore, this research is both descriptive and explanatory in nature.

4.6.7.1 Multiple Case Studies

Two types of case study methods exist: single and multiple. This study took place at Kuwait University and the University of Salford with the adoption of multiple case study types. The use of multiple case studies can sometimes provide additional insight into issues. Creswell (2013, p. 100) argues that 'it is better to select cases that show different perspectives on the problem and process'. Similarly, Yin (2003) declares that 'involving two or more cases is a highly-recommended technique for increasing the credibility of both analyses and results' (as cited in Lazar et al., 2010, p. 147). Moreover, researchers consider it more convincing and stronger to draw evidence from multiple cases (Herriot and Firestone, 1983, cited in Yin, 2013, p. 57). Simply put, the use of multiple case studies helps the researcher conduct a good case study (Yin, 2013).

4.6.7.2 Holistic vs. Embedded Multiple Case Studies

Yin (2013) explains that multiple case studies can be composed of multiple holistic or embedded cases (Figure 4.1). Holistic design examines only the global nature of an organisation or a programme, but embedded design involves units of analyses at multiple levels.

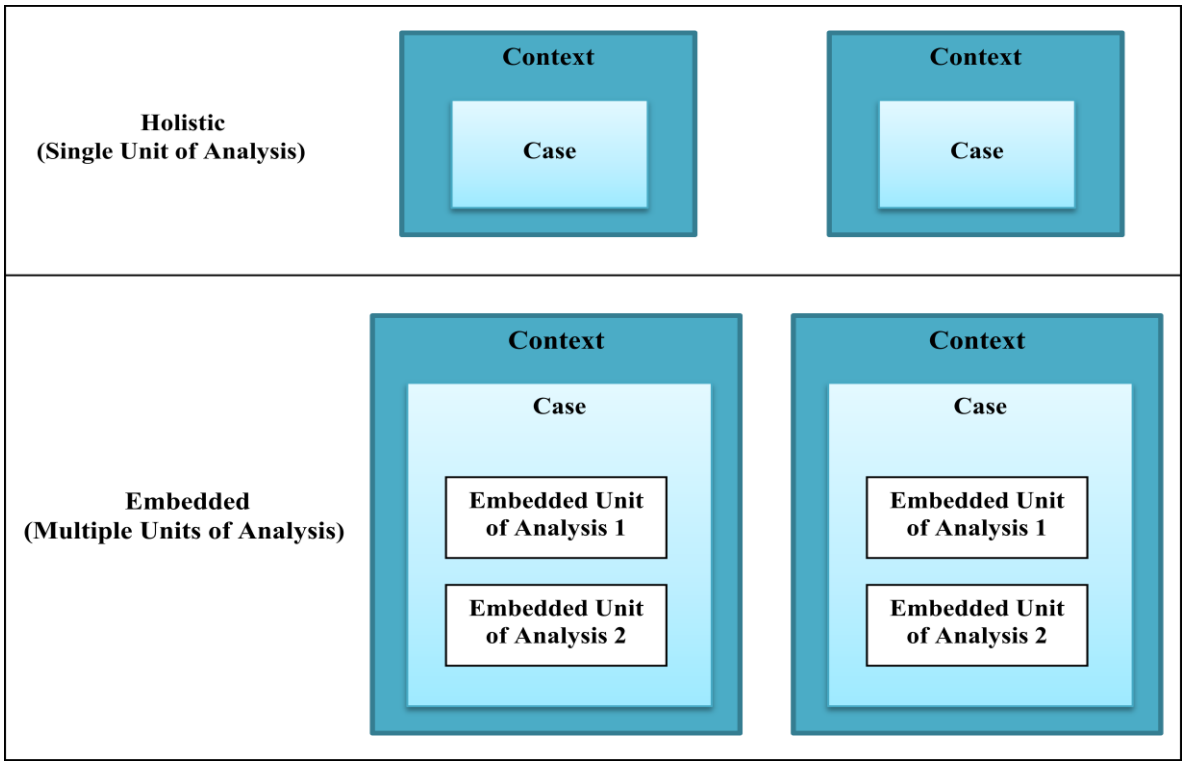


Figure 4.1: Basic types of designs for multiple case studies (based on Yin, 2013, p. 50)

This study uses the embedded multiple-case method. This study consists of multiple sub-units of analyses at two organisations (i.e. Kuwait University and the University of Salford). Sub-units are libraries; users are both organisations.

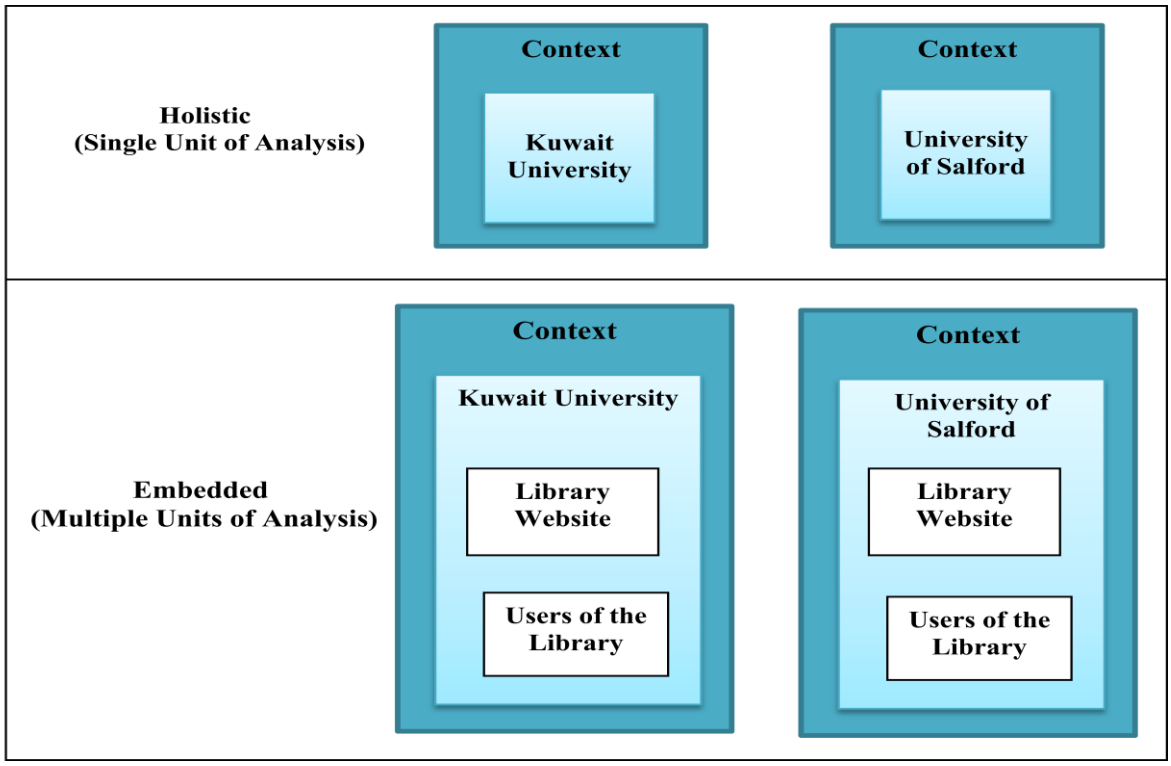


Figure 4.2: Embedded for multiple case studies design in Kuwait and Salford Universities' Libraries

4.6.7.3 Case Selection

Shakir (2002, p. 192) indicates that 'Methodological guidelines for case selection differ between single and multiple case designs'. However, in a multiple case design, two approaches exist:

- **Literal replication logic** selects cases that lead to predicting similar results and when rival theories are different.
- **Theoretical replication logic** selects cases that lead to predicting contrasting results, when rival theories have subtle differences, or to increase the results' degree of certainty (Shakir, 2002; Yin, 2013).

In this study, the researcher assumes how users search and interact with academic library web interfaces; therefore, theoretical replication logic is the most applicable. Although users'

experiences and needs will be somewhat similar to those in Kuwait and the UK, their environments will be dissimilar.

4.7 Data Sources

Researchers can use a variety of data sources (e.g. interviews, observations, questionnaires) in case study research (Oates, 2006). The opportunity to use multiple data sources is a major strength of case study data collection. It further enhances the picture of events and issues (Sawyer, 2001; Yin, 2013). It can also improve the converging lines of investigation (Patton, 1999; Yin, 2013). Jick (1979) calls this method of combining numerous data sources *triangulation*. Using diverse sources of information makes case study findings more accurate and convincing. Thus, to provide more accurate and persuasive findings, this study uses interviews, focus groups, and observations as its data sources. The following sections detail the data sources (Interviews, Focus Groups, and Observations) used in this research and discuss in greater detail the rationale for choosing these data sources. Figure 4.3 shows the data sources; and how they map to the aim and objectives.

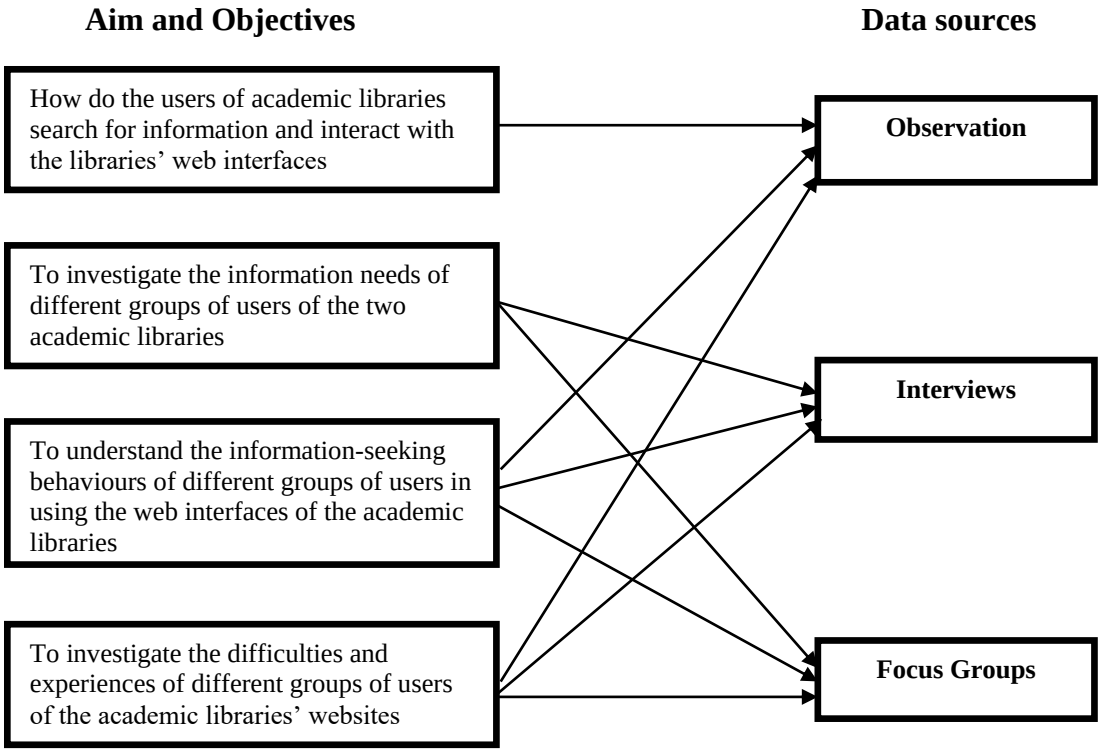


Figure 4.3: How data sources are used to investigate the research aim and objectives

4.7.1 Interviews

Interviews are particularly valuable in acquiring the stories behind participants' experiences. An interviewer can follow up by gaining access to in-depth information about a topic, enabling people to explain situations and perspectives in their own words (Kvale, 1996).

Qualitative research has three types of interviews (Oates, 2006):

- **Unstructured interviews** give less control to the interviewer, allowing the interviewee to speak freely and to develop his or her ideas about events, beliefs, and behaviours.
- **Structured interviews** mean that the interviewer pre-determines and standardises questions. He or she also regulates interviewees (usually using pre-coded answers). This type of interview cannot change the direction of questions since they are pre-scripted.
- **Semi-structured interviews** permit the interviewer to change questions depending on his or her conversations with interviewees, that is, in relation to issues that arise or the need to elicit details beyond pre-scripted questions. This type of interview provides both the interviewer and the interviewee with a greater degree of flexibility.

Semi-structured interviews provide researchers the opportunity to probe for answers and allow interviewees to explain or build their responses (Saunders et al., 2012). Seidman (1991, p. 4) declares that a semi-structured interview 'provides access to the context of people's behaviour and thereby provides a way for researchers to understand the meaning of that behaviour'. Stone and Harris (1984) list the following advantages of a semi-structured interview:

- It provides participants with flexibility and freedom.
- It provides participants with the ability to answer questions naturally.
- It provides researchers with the freedom to form and ask questions spontaneously.
- It provides researchers with the flexibility to cover a particular subject of interest.

Based on these advantages, this particular study uses the semi-structured interview.

4.7.2 Focus Groups

The focus group is a research method data collection technique that gathers data from groups of people. Kitzinger (1995, p. 299) asserts that 'focus groups are a form of group interview

that capitalises communication between research participants in order to generate data'. Gorman and Clayton (2005, p. 144) declare that the 'focus group is a small group discussion guided by a facilitator and used to gain an understanding of participant's attitudes and perceptions relevant to a particular topic'.

Debates exist on the optimal number of participants in a focus group. Researchers have claimed conflicting maximums and minimums. Adams and Cox (2008) argue that this number should not be over six or seven; instead, the maximum number of participants should be eight and the minimum number should be three. Gorman and Clayton (2005) contend that the ideal number ranges between six and 12 participants. Robson (2002), on the other hand, suggests eight to 12 participants. Saunders et al. (2012, p. 400) emphasise that 'typically group interviews (and the focus groups) involve between 4 and 12 participants, the precise number depending upon the nature of the participants'.

This study uses the focus group method as one of its forms of data collection. Numerous researchers cite benefits in using focus groups to attain data. Based on their own observations, Lazar et al. (2010, p. 192) claim that 'Focus groups provide a reasonably effective and inexpensive tool for easily gathering a broad range of opinions'. Below are the advantages of using focus groups (Gorman and Clayton, 2005; Oates, 2006; Lazar et al., 2010; Creswell, 2013):

- They create a consensus among views.
- They allow a broad range of views and insights to emerge.
- They are valuable during interactions of similar and accommodating interviewees.
- They motivate participants to reveal issues that they may not have acknowledged in a one-to-one interview.
- They encourage participants to interact with one another, eliciting different attitudes and beliefs.
- They elicit diverse responses (i.e. others may challenge a participant's views or encourage him or her to express different ideas).
- They promote the ability to note participants' non-verbal communication in focus groups by allowing researchers to take into account not only what is said, but gestures, facial expressions, and other forms of non-verbal communication that might be helpful to reveal depth of meaning.

There are also disadvantages when using focus groups (Gorman and Clayton, 2005; Oates, 2006; Krueger and Casey, 2009):

- Participants in the focus groups tend to be intellectualise as some of them when discuss their past behaviours, they might tend to portray themselves as thoughtful.
- Participants in the focus groups may make up answers as they might be asked about topics they have limited or no experience.
- Focus groups might provide trivial results.
- Some participants might be unwilling to state their views in front of the others
- Some opinions might be expressed in order to be acceptable within the group.
- Focus group can be dominated by some members. For example:
  a) 'A strong individual, perhaps a senior manager, with the result that its members acquiesce to a single viewpoint and perhaps do not even bother to mention their own convictions' (Gorman and Clayton, 2005, p. 143). Or
  b) 'Some members (often men or those higher up in a company hierarchy) might dominate the talk and the quieter ones (often women or those lower down in a company hierarchy) struggle to be heard' (Oates, 2006, p. 195).

Nevertheless, minimising these disadvantages is possible when the group discussion is well managed. A skilful moderator with strategies he/she uses can play a crucial role to minimise problems that might occur (Gorman and Clayton, 2005; Krueger and Casey, 2009). Moreover, a pilot study can support the moderator in order to identify any problems and then he/she will be able to avoid that in the real focus group.

Recruiting participants who have similar backgrounds can be useful in focus groups. Oates (2006) suggests that inviting participants of the same status can reduce feelings of anxiety. Furthermore, Adams and Cox (2008) propose that the process of facilitating participant communication is easier with homogenous groups. In addition, they cite an example of a homogenous group of participants but admit that 'It is very difficult to get seven software designers from different companies to agree to attend a focus group'. Lazar et al. (2010) agree with Adams and Cox's (2008) claim about homogenous groups with similar backgrounds and experiences. Indeed, such groups are better able to engage in collaborative exchanges.

Therefore, this study uses the focus group technique: two groups of four postgraduate participants with similar backgrounds attending the aforementioned universities. Notably,

using two or more focus groups raises the study's chance of success (Krueger and Casey, 2009).

4.7.3 Observations

Interviews and focus groups provide an effective means of collecting data. In addition to these methods, this study also includes observational data. Cooper et al. (2007) mentioned that combining interviews and observations is an effective technique for gathering qualitative user data.

Observation is a data generation method that observes what people do instead of what they say they do (Oates, 2006). In qualitative research, observation is a key tool for collecting data (Creswell, 2013). Observation plays a crucial role in helping designers better understand users' tasks, goals, and contexts (Rogers et al., 2011).

Moreover, observation is invaluable for recognising how users access the library interface. Neilson (2001) recommends focusing on what users do, not what they say, to design an easy-to-use interface. Cooper et al. (2007) claim that most people are unable to assess their own behaviours, particularly when they are removed from the context of their activities. Rogers et al. (2011) concur with the Cooper et al. claim that users struggle to clarify what they do and how they accomplish a task. Hence, interaction designers normally do not attain the full story through interviews. Observation, on the other hand, can fill in the details that other forms of investigation cannot.

Two types of observation exist: direct and indirect. Researchers can either directly observe users performing their activities or indirectly observe through post-activity records. According to Wilson (1999a), observations can be direct (e.g. researcher as observer) or indirect (e.g. researcher relying on the reported observations and self-observations of others). When direct observation is not possible or observers are unable to attend the duration of the study, researchers can use indirect observation as an alternative, tracking activities indirectly through diaries and interaction logs (Rogers et al., 2011). Therefore, direct observation was adopted in this research.

4.7.3.1 Direct Observation

Yin (2013) states that direct observation can occur during fieldwork, including instances of interview data collections. Two types of direct observation exist: structured and unstructured.

A. Structured Observation

Structured observation, or systematic observation as Oates (2006) describes, is a predetermined event or activity where the observer uses prearranged instruments to record specific activities. Alternatively, it involves the use of a predesigned schedule to document the frequency and duration of activities (Gorman and Clayton, 2005; Oates, 2006). However, structured observation is fundamentally a quantitative research method that usually involves counting, timing, and frequency of actions, thus generating quantitative data (Gorman and Clayton, 2005; Oates, 2006; Saunders et al., 2012).

B. Unstructured Observation (Participant Observation)

Participant observation, or unstructured observation as Gorman and Clayton (2005) define it, is where an observer records a behaviour or event related to their research question(s). In addition, Oates (2006) defines it as a researcher getting involved and experiencing participants' viewpoints. Sometimes participants are aware that a researcher is analysing their actions. Sometimes the researcher successfully conceals his or her intent; that is, participants view him or her as a "normal" person, not as a researcher. Yin (2013) declares that participant observation forces researchers to become active observers. In doing so, a researcher may undertake diverse roles while conducting fieldwork, documenting his or her actions and adding them into the study.

Gorman and Clayton (2005), on the other hand, claim that this process is more open-ended and, as with qualitative research, has advantages in exploratory research and in vaguely understood situations. Saunders et al. (2012) concur with Gorman and Clayton; they argue that participant observation is qualitative and, therefore, is significant in uncovering the meaning behind participants' actions.

- **Types of Participant Observation**

According to Creswell (2013), four types of participant observation exist:

- **Complete observer** means participants are not aware of the researcher.
- **Complete participant** means the researcher is fully engaged. This type of observation may help the researcher establish a greater rapport with participants.
- **Non-participant/observer as participant** means the researcher is an outsider to the group. He or she simply watches and takes field notes at a distance. The researcher records data without direct involvement.
- **Participant as observer** means the researcher participates in on-site activities. Such a role is more salient than the role of a researcher. This type of observation also provides inside information and subjective data. Conversely, it may prove distracting for the researcher while he or she attempts to balance both participation and data recording.

Becoming a good qualitative observer requires that a researcher change his or her role during an observation, such as starting as a non-participant and then becoming an active participant (and vice versa) (Creswell, 2013).

4.8 The Think Aloud Technique

The observer, within the observation, can encounter problems; that is, the observer might be unable to identify what participants are thinking and therefore must rely on what he or she sees. By using the Think Aloud technique, the observer can attain additional information about participants' actions and thoughts. Charters (2003) claims that Think Aloud is a research method in which participants think aloud as they complete tasks. Moreover, Rogers et al. (2011) point out that the Think Aloud technique enables the observer to better understand what is happening inside participants' heads. Nielsen (2012a) defines Think Aloud in the following way: 'In a thinking aloud test, you ask test participants to use the system while continuously thinking out loud—that is, simply verbalising their thoughts as they move through the user interface'.

Nonetheless, there are some disadvantages when using the Think Aloud technique. One of the main problems is that some users might be silent when doing some part of the task (Rogers et al., 2011). Nielsen (2012a) indicated that some problems might emerge when using thinking aloud, such as:

- Users are assumed to say things once they come into their minds rather than reflect on their experience and provide an edited commentary after the fact. Subsequently, most of them desire to appear smart. Hence, there is a risk as they might not speak until they have thought through the situation in detail,
- Biasing user behaviour: from an untrained moderator, some interruptions can easily change user behaviour. In some cases, the resulting behaviour does not represent real use. Thus, prompts and providing clarification of questions are usually essential,
- Unnatural situation: generally users do not sit and talk to themselves all day, so it will be difficult to keep up the required monologue.

This study gives participants (ten postgraduate students from each of the aforementioned universities) a set of tasks to complete on the library's website. They must locate information resources and services. The researcher asks participants to think aloud while performing each of these tasks. Initially, the researcher begins as a non-participant. Later on he becomes an active observer, thus which will help to minimise the disadvantages of the Think Aloud technique. The purpose of this method is to find out how users search for information and interact with the web interface.

4.9 Participants

The participants in this study are as follows: postgraduate students, academics, and library staff from two universities (Kuwait University and the University of Salford). The number of participants in each sample is outlined in table 4.5.

Table 4.5: Participants from both universities

Universities	**Kuwait University and the University of Salford**			
Participants	**Postgraduate Students**		**Academics**	**Library Staff**
Data Sources	**Focus Groups**	**Observations**	**Interviews**	**Interviews**
Kuwait	2 Groups (2x4)	10	6	6
Salford	2 Groups (2x4)	10	6	6
Total	16	20	12	12
	60 Participants			

4.9.1 Recruitment of Participants

Diverse strategies played an integral role in recruiting participants.

- **The Interviews:** Faculty members at both universities and librarians of the University of Salford were interviewed after they positively responded invitations via e-mail. Librarians of Kuwait University were interviewed after a phone call invitation. The permission of conducting these interviews was granted by the head of the Libraries Administration of Kuwait University.
- **The Focus Groups:** the researcher initially sent invitations by e-mail to postgraduate students; however, this method proved ineffective as the recipients replied that there was a conflict with the time and location of the focus group. As a result, the researcher used two additional recruiting methods. First, the researcher met with postgraduate students face-to-face, explained the purpose of the study, and then asked whether they would like to become participants. This method succeeded with only one group at the University of Salford. Second, the researcher used intermediaries to contact postgraduate students at both universities. This method proved successful in recruiting participants. However, according to Bloor et al. (2001, p. 36), 'this method leaves the researcher dependent on the goodwill of the intermediary and reduces control over the process of recruitment.' They go on to state that 'if recruiting via an intermediary, care should be taken to ensure informed consent is obtained from all participants.' At Kuwait University, academics from the Department of Chemistry and the Department of Mechanical Engineering served as intermediaries. At the University of Salford, an academic from the Department of Information Systems was the intermediary.
- **The Observations:** The researcher initially sent invitations by e-mail to postgraduate students; however, this method proved ineffective. None of the recipients replied. As a result, the researcher proceeded to follow three additional recruiting methods. First, the researcher went to libraries to meet with postgraduate students face-to-face, explaining the research purpose of the study and then asking whether they would like to become participants. Consequently, roughly half of the participants in the observations joined. Second, the researcher sought the assistance of friends. This form of networking undoubtedly played a crucial role in reaching out to more students at each university. Finally, the researcher asked academics from both universities to persuade their students to participate. This method proved successful in recruiting participants.

4.10 Techniques Applied to Carry Out Interviews, Focus Groups and Observations

Due to the practical constraints, the researcher had trouble contacting participants at the same time. Therefore, the researcher chose to employ two types of interviews: face-to-face and telephone. However, face-to-face interviews are the most ideal, as Opdenakker (2006) argues, 'social cues, such as voice, intonation, body language, etc. of the interviewee can give the interviewer a lot of extra information that can be added to the verbal answer of the interviewee on a question'. Participants received information about the purpose of interviews, focus groups, and observations before and after by e-mail. All data collection methods took into account confidentiality and ethical considerations (see Appendices 9, 10, 11 and 12). Interviewees knew that these were audio-recorded interviews; they could accept or decline participation. For the focus groups, the researcher informed participants that everything had to be audio recorded. These were all completed face-to-face. For the observations, the researcher used the screen capture software *Snagit* from TechSmith.com. Snagit performed audio and video recordings of participants using the library's website as well as their attempts to complete tasks. The researcher used this screen capture software for two reasons. First, it captures how participants use the library website. Second, it records participants' voices, particularly useful for the Think Aloud technique. According to Imler and Eichelberger (2011, p. 446) 'video screen capture technology is an inexpensive, user-friendly way to enhance electronic resource usability studies in any library'. Finally, in deciding when and where to hold each interview, focus group and observation, the researcher followed participants' individual preferences.

4.11 Piloting

The pilot study helped determine the validity and reliability of questions for participants. Adams and Cox (2008) point out that recognising potential problems is essential before beginning full-scale research. Preliminary small-scale pilot studies test whether participants understand questions. In developing interview techniques, taking into consideration possible issues is imperative. According to Sridhar (1995, p. 18) 'a pilot study helps in estimating time required, detecting flaws, weaknesses and ambiguities, using pre-formulated questions and/or responses (instead of open end question), knowing in advance the kind of data likely to result, the kind of analysis required, expertise available for analysis, computer facilities required, estimating the resources required and finally gaining access to and cooperation of

respondents'. Before the main study, several participants from each of the three samples (i.e. academics, library staff, and postgraduate students) participated in a pilot study to assess the validity and reliability of questions. Pilot study focus group and interview samples comprised of four University of Salford postgraduate students (a single focus group) as well as two librarians and two academics from Kuwait University. Observations consisted of two postgraduate students from the University of Salford. Based on participants' feedback from the pilot study, interview and focus group questions along with tasks for observations underwent changes for enhanced validity and reliability.

4.12 Summary

This chapter has presented a detailed account of the research method and the data collection tools and techniques. The development of the research method took into consideration achievement of the research aim and objectives. This study fits with an interpretivist paradigm and uses the case study strategy; it employed an inductive approach based on qualitative data methods including: interviews, focus groups, and observations, which have been explained in-depth. The next chapter explains how the data was prepared, the data analysis approach and the process of analysis that was applied in all interviews, focus groups and observations. Then, it presents the analysis of the interviews.

Chapter 5: Data Analysis of Interviews

5.1 Introduction

This chapter starts with the data preparation methods, the data analysis approach and process of analysis that was applied in all the interviews, focus groups and observations. Then, it presents the analysis of the interviews conducted with librarians and academics at Kuwait University and the University of Salford. The next chapter (6) will present focus groups analysis, while chapter 7 will present observations analysis with more detail regarding the observations and task analysis process. Due to the length of the data analysis and for more clarity, the analysis was divided into interviews, focus groups and observations, into three chapters. In addition, for more clarity regarding the participants' responses, the libraries' websites that the participants used and asked about are fully presented in images in Appendices 3 and 4.

In this chapter the data is divided into two sections:

- **Section 5.5:** presents analysis of the data gathered from the librarians at both universities.
- **Section 5.6:** presents analysis of the data gathered from the academics at both universities.

5.2 Preparation for Analysis

To make data retrieval easier for analysis, the researcher organised the data in order to make it easy for retrieval during the analysis. Before analysing the data, the researcher followed two steps. The first step was to transcribe. According to Miles et al. (2013, p. 71), 'A write-up is an intelligible product for anyone, not just for the field worker. It can be read, edited for accuracy, commented on, coded and analysed using several methods'. The discussions for all of the focus groups and most of the interviews used an audio recording device; in addition, all observations used the Snagit software to record audio and video content. By doing this, it proved effective in developing a coding scheme (Bogdan and Biklen, 1998). Thus, transcribing ensures that the data is both effective and accessible for the researcher. The

second step involved translating half of the interviews, focus groups, and observations from Arabic to English.

5.3 Data Analysis Approach

Data collected from qualitative data undergoes numerous approaches of analysis, but content analysis and thematic analysis are the most common. These methods are similar in nature in that many researchers choose not to differentiate them. However, Vaismoradi et al. (2013) elucidate the differences between these approaches by analysing and examining their aims, definitions, methodological subtleties, philosophical backgrounds, and methods for gathering data. Although their investigation found several similarities, they notably found a main difference: the ability for content analysis to quantify data. Content analysis cautiously measures the frequency of different categories and themes as a proxy for significance.

According to Hsieh and Shannon (2005, p. 1278), content analysis is 'A research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns'. Researchers from various disciplines use content analysis regularly, defining it as an in-depth process of analysis that creates new knowledge by uncovering theoretical interpretations (Lazar et al., 2010). Library and Information Science (LIS) uses qualitative content analysis to reveal or model people's information-related behaviours and thoughts (Zhang and Wildemuth, 2009). However, content analysis can use both qualitative and quantitative data. Furthermore, based on the study's purpose, it can be either inductive or deductive (Elo and Kyngäs, 2008). The inductive approach is best suited for fragmented knowledge about a particular phenomenon. The deductive approach is best suited for analyses based on testing theories of previous knowledge (Kyngäs and Vanhanen, 1999, cited in Elo and Kyngäs, 2008, p. 109).

This study uses inductive content analysis for its interviews, focus groups, and observations. Notably, to start the process, inductive content analysis requires that the researcher first organises the data (e.g. open coding, category creation, abstraction) (Elo and Kyngäs, 2008).

To work with the collected data, the researcher performed the following analytical procedures based on guidance in the literature (Jakobson, 1971; Dey, 1993; Miles and Huberman, 1994; Graneheim and Lundman, 2004; Elo and Kyngäs, 2008; Zhang and Wildemuth, 2009):

1. Define the unit of analysis, which is the text that is transcribed based on the participants' responses.
2. Organise and reference all data from interviews, focus groups, and observations.
3. Read the transcripts individually and make notes of first impressions.
4. Predetermine the themes based on the research aim and objectives.
5. Start the open coding process by highlighting relevant parts, words, ideas, phrases, concepts, opinions, and sentences.
6. A variety of codes that emerged from the coding process were compared based on differences and similarities. The codes present a framework for the elements that seem sensible.
7. Group the codes which have similar meanings together to sort in sub-categories. Then create categories to sort the similar sub-categories together. A category refers mostly to a descriptive level of content and consequently can be seen as an expression of the manifest or latent content of the text. Also, a code or a category can fit into more than one theme.
8. Create categories by grouping codes (sub-categories) together. Based on interpretation, the researcher decides which codes to place in the same category. Develop a coding scheme and categories based on data, theories, and related studies.
9. Display data by grouping sub-categories of similar events and incidents under categories, and then group categories under a theme which has been predetermined based on the research aim and objectives.
10. Draw conclusion(s) and verification(s) to formulate useful explanations based on interpretations of data findings along with research aims and objectives.
11. Quote and italicise the participants' direct responses.

Observations, on the other hand, use task analysis (TA) in conjunction with content analysis; Chapter 7 discusses the process of this in greater detail.

5.3.1 Using Quotes in Analysis

Creswell (2013) points out that quotes are one of the techniques in qualitative writing which give participants a voice. Quotes play a decisive role in how participants explain their

viewpoints; '[they] are used to support researcher claims, illustrate ideas, illuminate experience, evoke emotion, and provoke response' (Sandelowski, 1994, p. 479). However, Richardson (1990) describes three types of quotes (as cited in Creswell, 2013, p. 219):

- **Longer quotations** clarify complex understandings.
- **Embedded quotes** prepare readers and writers for a shift in assertions or the introduction of a point.
- **Short eye-catching quotations** are readable and compact. To add to the significance of multiple perspectives, they are extracted from narrators' texts.

Therefore, this study adopted the use of quotes in all data collection tools.

5.4 The Analysis Process

The procedures mentioned above were followed in the data analysis. The librarians', academics', and postgraduate student responses are displayed in tables and show the theme, category, and sub-category (which reflect the codes that have been underlined [extracted] from the text) for more clarity. An example of the analysis and coding process is described in Figure 5.1.

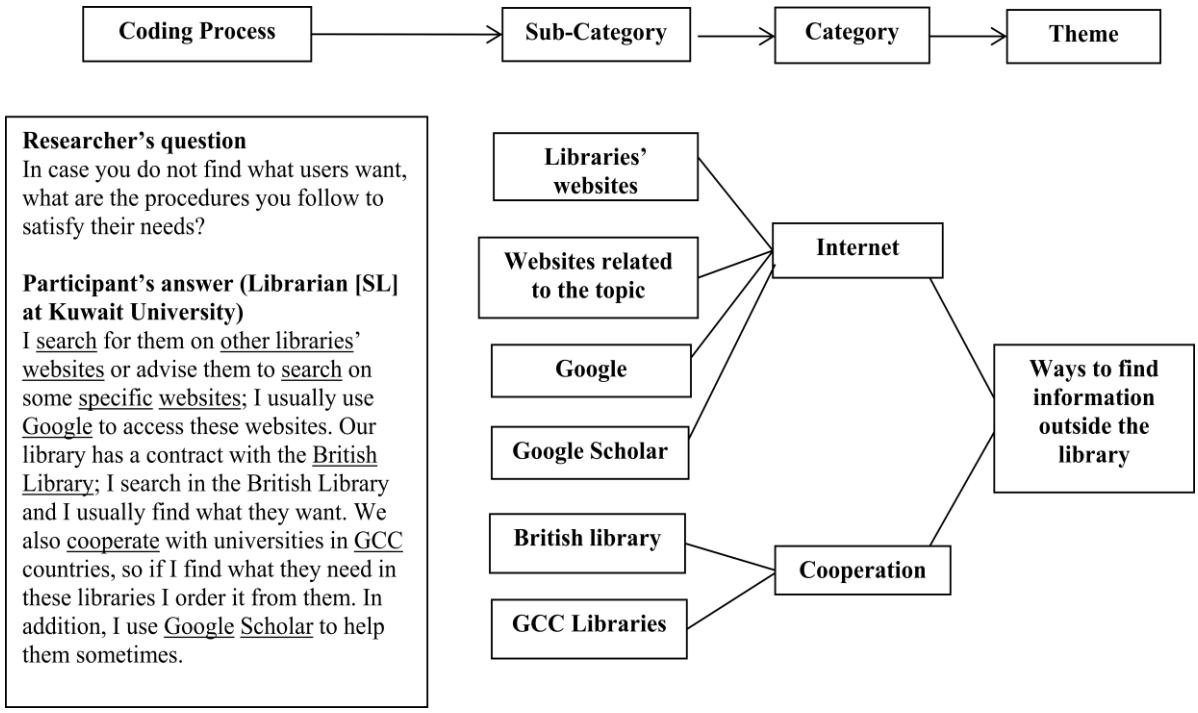


Figure 5.1: Example of the analysis and coding process

In the example in Figure 5.1, two categories, Internet and Cooperation, are drawn from the received data and researcher interpretation. Although accessing the libraries with which a specific library cooperates can be done by going to the Internet, this is different. Going to Google, Google Scholar, other libraries' websites or websites related to the users' queries or research interests can help librarians provide users with an immediate answer for their queries. However, if the librarians do not find what they want in those methods and find the desired information in cooperating libraries, the librarian will order the material for the users based on procedures with which the librarians are familiar. Also, even if users find what they want in those libraries, they cannot access what they need by themselves and must ask the library for help. Therefore, creating two categories was necessary and this procedure was followed to create the categories with the rest of the data during the analysis.

5.5 Librarians' Interviews

This part presents the analysed data, which reflect librarians' responses from both universities to the questions (Appendix 5). Librarians were asked a number of questions that were designed in order to achieve the research objectives (2, 3 and 4). They were also designed to give participants more flexibility to share their needs and experiences in using the library website.

Samples of six librarians working at each university were selected. Information about the librarians and the codes referring to them are shown in Tables 5.1 and 5.2.

Table 5.1: Information and codes referring to librarians at Kuwait University

Library	No. of Librarians	Gender	Code
Education Library	1	Male	EL
Engineering and Petroleum Library	1	Female	EPL
Jaber Al-Ahmed Central Library	2	Male	JACL1
		Male	JACL2
Science Library	1	Female	SL
Law Library	1	Male	LL

Table 5.2: Information and codes referring to librarians at the University of Salford

Library	No. of Librarians	Gender	Code
Adelphi Library	1	Male	AL
Allerton Library	1	Female	ALA
Clifford Whitworth Library	3	Female	CWL1
		Male	CWL2
		Male	CWL3
MediaCity Library	1	Female	ML

5.5.1 Library Resources

Librarians were asked about the library resources that postgraduate students and academics frequently ask for.

At Kuwait, the librarians mentioned several resources required by postgraduate students and academics such as books, dissertations, theses, reference books (e.g. dictionaries, encyclopaedias), databases, articles, specific articles in databases, specific topics in books, information based on recommendations from lecturers, information based on assignments, and newspapers. All librarians said that they most frequently seek electronic articles, databases and printed books. They also pointed out that postgraduate students seek dissertations and theses. Moreover, they said that all academics and postgraduate students generally ask for all types of resources when they need information. Some mentioned that postgraduate students ask for a particular kind of information based on recommendations from their lecturers. They also ask for information that helps them complete an assignment without indication to the type of resource they need. All of them, especially the academics, ask for particular articles in a database or particular topics in a book. While one of them mentioned that some users ask for newspapers to find information about famous crimes or crises and those users are interested in law. Three participants commented as follows:

'Both of them need e-articles and books, also the postgraduate students ask for dissertations and theses as well' (SL).

'I noticed that postgraduate students are looking for resources based on the recommendations of their lecturers or any information that can help them to do their assignments' (EL).

'Generally, both of them ask for all types of resources, some of them come to ask for newspapers; those are law researchers who need information about famous crimes and crises mentioned in the newspapers. Actually, the academics are more focused than the postgraduate students regarding their questions and needs' (LL).

At Salford, the librarians agreed that postgraduate students and academics ask for all the resources provided by the library without indicating the type of information they need and two mentioned this based on their field of study. Two participants commented on this as follows:

'Some subject areas use books, some journal articles, some conference papers, some technical standards; it does vary according to the subject area' (CWL1).

'In the art and design subject, for example, quite often people are after material on a particular design or a particular artist' (AL).

5.5.2 Library Services

Librarians were asked about the library services that postgraduate students and academics frequently ask for.

Table 5.3: Services most frequently requested by postgraduate students and academics based on the librarians' responses

Theme	Category	Sub-Category
Services	Locating Information	Finding information
		Finding resources
		Finding articles in the database
		Finding the location of printed resources
		Searching a specific topic in the database
	Interlibrary Loan[6]	Requesting article or book that is not available at the library
	Reservation	Reserving books and rooms
	Information Technology Support	Support for software

[6] Interlibrary loan, document delivery, document supply or library interlending are terms used in different libraries to request resources not available in the home library. The library of Kuwait University uses the interlibrary loan, while the library of the University of Salford uses document delivery.

Locating information was ranked as the most important service based on the librarians' responses at both universities. At Kuwait, all librarians mentioned that postgraduate students and academics ask for help (e.g. how to find articles in the database, how to find the location of printed resources, how to search for a specific topic in the database). According to JACL1,

'All postgraduate students and academics always ask for help to find what they need, especially the postgraduate students, while some academics come to us directly because they know that the library does not have this specific resource they need'.

At Salford, the majority of the librarians said that postgraduate students and academics ask for help to find information or to find resources. Two participants commented on this as follows:

'They have difficulty in finding something; they need to be given more support than what we can provide in the library' (AL).

'They know that the information they need is in some resources and ask us for help in finding these resources, also we offer one-to-one support and assistance when users encounter issues in finding information on a topic' (ALA).

An interlibrary loan (document delivery) was also an important service mentioned by many librarians at Salford and some at Kuwait, as they usually asked to request articles or books that are not available in the library.

At Kuwait, some librarians also pointed out that postgraduate students ask for books that academics have reserved. One librarian mentioned that postgraduate students ask to reserve a room for study, while academics reserve a room to teach students inside the library. Two participants commented on this as follows:

'Some academics ask to reserve books, and usually the postgraduate students come and ask for these books reserved by academics' (JACL2). JACL1 clarified that *'[Reserving] books is only for academics and cannot be done online'.*

'Academics ask to reserve a room to teach their students inside the library and postgraduate students reserve rooms for study' (JACL1).

At Salford, two librarians mentioned that they ask for support in learning software. ALA stated that, *'We offer help with using things like word processing and bibliographical libraries such as EndNote and Mendeley'*.

5.5.3 Finding Information outside the Library

Librarians were asked "If you cannot find what a postgraduate students and academics are looking for, either information services or resources, what methods (search strategies) do you follow to meet their needs?"

Table 5.4: Librarians' methods (strategies) to find information outside the Library

Theme	Category	Sub-Category
Finding information outside the library	Internet	Google and Google Scholar
		Libraries' websites
		Websites related to the topic
		Searching databases
		NHS[7] website
	Cooperation	GCC[8] libraries and British Library
		SCONUL[9]
		Document delivery
		Ask the enquiry desk and or academic support librarians
		Asking someone with more experience
	Physical Activity	Bookshops
		Newspapers
		Buying the resources frequently requested by users

At Kuwait, all the librarians said that searching on Google and Google Scholar was their first method in finding what postgraduate students and academics want. Use of these means was justified in that the librarians usually find what postgraduate students and academics need, and cannot find due to their lack of searching ability or skill, especially postgraduate students. Also, most of them search the websites of libraries with which they cooperate, such as Gulf Cooperation Council (GCC) state libraries and the British Library and request resources by the interlibrary loan. Some ask a senior librarian or someone with more experience for help if they do not find what they are looking for. Moreover, one of them mentioned that recommendations are given about going to a bookshop, or specific websites based on their topic, or using a newspaper to find information about events such as crimes or crises. Several participants commented on this as follows:

[7] NHS: National Health Services.
[8] The GCC consists of six countries: United Arab Emirates, Kingdom of Bahrain, Kingdom of Saudi Arabia, Oman, Qatar and Kuwait.
[9] SCONUL: Society of College, National and University Libraries.

'I always search Google or Google Scholar at the beginning because I usually find what they want, because postgraduate students and some academics do not know how to search' (EL).

'After Google, I search in the British Library and GCC libraries' (SL).

'I request help from my colleagues or from the head of the department to deal with the users' needs' (JACL2).

'I recommended that users go to bookshops which sell the book they need, especially for new books or new editions of book, or advise users to search on specific websites regarding their topics as well as to check relevant newspaper articles in our archives, especially for law researchers who look for famous crimes or crises that occurred in the past' (LL).

At Salford, the librarians also go to the Internet, using Google and Google Scholar; to help users find what they want and search the databases, few of them mentioned using the NHS website. Most of them said that they recommend using SCONUL or they use document delivery to request resources outside the library, and few of them mentioned that they sometimes request help from the help desk or academic support librarian. One librarian mentioned we might even buy the resource they frequently ask for. Three participants commented on this as follows:

'If the topic is regarding the NHS, I go to the NHS website' (CWL1).

'We've got two main options for unavailable resources. One of them is we get things through document delivery, and the other one is we're part of a scheme run by SCONUL. Another option is to give borrowing rights to staff, academics and postgraduate students to go on the SCONUL website, get access and drop down to Manchester or Lancaster or wherever' (ML).

'Ask for help from the enquiry desk, or ask the academic support librarians, or request what they need via an interlibrary loan, or we might even buy what they want if many of them ask us about that resource' (CWL3).

5.5.4 Obstacles and Difficulties

The librarians were asked "what are users (postgraduate students and academics) frequently asked questions regarding the obstacles and difficulties they encounter with the library website? Why?"

Table 5.5: Obstacles and difficulties that postgraduate students and academics encounter based on the librarians' responses

Theme	Category	Sub-Category
Obstacles and difficulties	Lack of Skills	Lack of searching skills
		Unaware of how to use the library
		Dependent on librarians
		Difficulty in identifying the subject or understanding databases
	Lack of Findability	Difficult to find existing resources
		Difficulty of searching
		Hidden information
		Retrieval inaccuracy
	Lack of Organisation	Separate search options
		Complexity of interface
	Lack of Resources	Resources not provided by the library
		System offers only printed resources
	Lack of access to the Website and Resources	Difficulty in accessing full-text articles
		Glitches in the library website
	Complexity of system and Searching Options	Vagueness of search options
		Not easy to use
	Experience	Used to use Google and Google Scholar

Lack of skills: All of the librarians at Kuwait and two at Salford linked the difficulties that users encounter to their lack of searching skills. Thus, they might create difficulties and obstacles for themselves. Librarians at both universities pointed out that users are unaware of using library and system functions. Several participants commented on this as follows:

'They don't know how to search the library; either manually in the library or electronically via the library website. Generally, I can say they have no idea about the library services and resources and how to use them; or their skills are weak' (EL).

'Some of them have sophisticated information-searching skills, while some do not have enough skills' (ALA).

'I think the library skills are low, not like 20 years ago. Knowing how to search is I think quite often knowing how to think of alternative keywords to use' (AL).

'The users' are unaware that the system functions similarly to the Google search engine, as the system provides links to the needed information that lead the user to related results and information from other databases' (CWL1).

At Kuwait, most librarians declared that users depend on librarians to find what they need. According to LL:

'There is no problem with the library website; the users depend on librarians to do everything for them. They believe that this is the job of the librarian. They are, in fact, lazy and do not want to make any kind of effort. Sometimes I feel that I am like a waiter in a restaurant and they are like customers of this restaurant; I have to do that for them. I think there is something wrong in their culture regarding the nature of librarians' work'.

At Salford, some librarians mentioned that users may have high level queries and needs which makes it difficult to know what subject or database should be searched. CWL3 pointed out that '*Their questions actually are high-level queries in a specific subject or they need a specific database or journal or theses'.*

Lack of findability: At Kuwait, all the librarians linked the difficulty to the system's findability as the users sometimes search for resources and do not find them even though they are available as the search within the library depends on the terms entered and may not be accurate in retrieving information. Similarly, at Salford, two librarians linked the difficulties that users encounter with the system's findability as some information is hidden and the system is not good in retrieving. Several participants commented on this as follows:

'Searching is difficult; it depends on the specific keywords that users entered' (SL). EPL added, '*The results are not accurate in retrieving'.*

'The problem is that most of the information is hidden and users encounter difficulties in locating stuff in the library website' (CWL1).

'The library system is actually not very good at returning a refined, clear set of results. It's designed for massification rather than focused minimal results. So, it's about quantity rather than accuracy. The system is actually not terribly good at finding that level of result' (ALA).

Lack of organisation: Librarians at both universities indicated that the organisation of the library website is problematic as their resources are separated and cannot be searched from one single search tool. At Kuwait the librarians added two points; the library website interface is complex and is not clear or intuitive and the resources and services are not well organised (see Figure 1 in Appendix 3). Three participants commented on this as follows:

'Users need to go to the database option if they need it, or go to the e-journal option or to the books option and so on' (SL).

'Not all databases and journal articles are linked in the system and users do not know that. So, they have to go to individual databases to search' (AL).

'The library website interface should start directly with the search box. Some users do not know how to start their search. Our website interface unfortunately starts with information about the library and its collection; this information is good, but users do not want that. Also, the services are useless, and information about them is not organised on the website; this discourages users from using the library' (EPL).

Lack of resources: At Kuwait some librarians indicated that some resources are not available in the library, and the library system applies only to printed resources. According to SL,

'Sometimes users cannot find resources as they are not available; also, the system of the library is only for printed resources and users cannot find e-resources when searching within the library system'.

Lack of access to the website and resources: At Kuwait some librarians mentioned that there are obstacles such as not being able to access full-text articles, glitches or an out-of-service website. Two participants commented on this as follows:

'Users cannot access the full text of the article in some databases; they can only find the abstract. We have subscriptions to some databases providing only abstracts; this confuses users, so they ask us about that frequently' (JACL2).

'The library system or library website sometimes has glitches or is out of service, which is an obstacle for users so they come and ask us for help' (EL).

Complexity of system and searching options: Some of the librarians at both universities provided reasons other than users' poor skills for their encountering these difficulties and obstacles. This obstacle was related to the complexity of the system and at Kuwait searching options within the library as the search options are vague. Two participants commented on this as follows:

'Users do not know where they should start their search when they go to the system interface. There are three search options which are basic, advanced and power searches' (JACL2).

'The system often does not offer what researchers want; they often want something more sophisticated and I think it can actually be quite frustrating to use something like the library system' (ALA).

Experience: At Salford, some of the librarians linked the obstacles and difficulties that users encounter to their experience, such as their being influenced by Google, their light use of the library website, their age and their unfamiliarity with some resources. According to AL:

'Users used to use Google and still rely heavily on Google and Google Scholar. They avoid using the library because they are used to selecting a quick solution like Google'.

While CWL3 said, *'I think users in the 20s and 30s ages are sometime familiar with the digital resources, while the old users they might need some assistance in that'*.

5.5.5 Librarians' General Experience

The librarians were asked to share their general experience regarding the library website and its usability as well as the library system.

5.5.5.1 General Experience with the Library Website

Table 5.6: Librarians' general experiences with the library website

Theme	Category	Sub-Category
Experience with the library website	User Satisfaction	Easy to use
		Outdated website
		Unattractive website
		Lack of learnability
	Lack of Organisation	Separated search options
		Disorganised links and options
		A website for each library
		Contact not provided in the library website
		Presents information without priority
		Overly large images
		Illogical structure
	Lack of Functionality	Useless information
	Lack of Access to the Website	Glitch in the library website
	Lack of Findability	Hidden options
		Non-specific headings
	Lack of Navigation	Difficulty in finding the way through
	Not User-centred	Designed by technicians

User satisfaction: Three librarians at Kuwait and one at Salford were satisfied with the website and described it as good and easy to use; they suggested that users just need to practise more. However, the others at Kuwait had completely different viewpoints as they were not satisfied: they all agreed that the website was old, difficult to use, out of date, unattractive and confusing when used for the first time. SL declared:

'The website needs to be specified and classified in order to be clear and so that the user can get information very fast. The way the website interface is arranged is quite difficult for any user for the first time'.

Lack of organisation: At Kuwait the majority of librarians declared the problem with the website is that the resources are not organised and are listed in different places, many links when looking for electronic resources, a website for each library (see Figure 5 in Appendix 3), and it cannot contact the library from its main website. Two participants commented on this as follows:

'E-resources exist just to tell the users we subscribe to them. They should open within the library website and there is no need to send users to the electronic resource website. Users can go to that website without using the library website, but they need the library to be like an intermediary to help them access these resources fast without any barriers' (LL).

'*Users cannot contact us via the main library website. We have a website for each library, and users need to go to that website to contact their library. The problem is that most users, perhaps all of them, do not know about these websites'* (JACL1).

At Salford, most of the librarians pointed out that the library website does not organise information based on its priority, the images are too big, which confuses users, and its structure is poorly organised (see Figures 1, 2, and 3 in Appendix 4). Three participants commented on this as follows:

'*The website is making information available rather than actually prioritising it'* (ALA).

'I can never find anything either; the images are too big. They can dominate the whole screen in whatever you do. You have to scroll. I think that these images need to be smaller' (ML).

'The website can't be used, it's a mess; its structure is not logical' (CWL2).

Lack of functionality: At Kuwait some librarians said that services are useless as users cannot use them online. One librarian said that the website provides useless information and that the library has these resources, such as audio-visual resources, but the users do not know what they are and how to access them. Two participants commented on this as follows:

'Most of our services on the website are useless. Users need to contact the librarians for any service. Only the renewing of borrowed books can be done online without help' (SL).

'There is a problem with the library website; it tells users that the library has audio-visual and photography resources, but it does not tell them what they are or how to access them' (EPL).

Lack of access to the website: At Kuwait, some librarians pointed out that the website sometimes has glitches that make the website inaccessible. EL mentioned:

'*The website sometimes becomes disabled or is out of service; this confuses and disappoints users, and they ask us for help'.*

Lack of findability: At Salford, most librarians mentioned a problem with finding information on the website; most information is hidden and the headings are not specific. CWL1 said:

'The menus are hidden and you need to click on them. I do not think that users would necessarily guess: we know because we know where our information is, but I am not sure that someone would click through all the links to find what they want and it all just looks the same, they are just confusing'.

Lack of navigation: At Salford, only one librarian (ALA) mentioned that it *'is not easy to find your way through the library website'.*

User-centred: At Salford, two librarians declared that that the website is not easy for users, as it was designed by technicians who may not have similar minds. According to AL:

'The website was designed by technicians; I mean it speaks with a technician's mind. Or perhaps they looked at how nice everything looks on the screen rather than how the users will follow through'.

5.5.5.2 General Experience with the Library System

Table 5.7: Librarians' general experience with the library system

Theme	Category	Sub-Category
Experience with the library system	User Satisfaction	Ease of use
	Lack of Organisation	Separated search options
	Lack of Findability	Retrieval of disorganised results
		Inaccurate information retrieval
		Lack of indication of resource type
		Lack of supportive services
		Hidden information
		Too much information in the interface
	Complexity of Searching	Not easy to learn
		Difficulty of searching
	Linguistics Mistakes	Linguistic mistakes with Arabic resources
	Lack of Resources and Information	Lack of information
		System only for printed materials

User satisfaction: Only two librarians at Kuwait and one at Salford said that the library system is good, helpful and uncomplicated, but librarians at Kuwait indicated that the users' lack of skills makes it difficult for them to use the system.

Lack of organisation: At Kuwait two librarians indicated that the system interface provides three types of searches, which confuses users and leads them to ask the librarians for help. JACL2 pointed out that:

'It is complicated, especially with the search options which are basic, advanced and power searches; users usually ask about this and it is obvious they are frustrated and do not know how to use it'.

While at Salford, some of the librarians indicated that the system has disorganised search options. According to AL:

'There is a problem with the system which is putting users off using individual databases – they have to go to those database links and then choose a specific database from there; users do not know which are the good databases to choose'.

Lack of findability: At Kuwait the majority stated that the system displays results randomly and not in an organised manner; the system does not specify the type of resources and lacks basic services which facilitate access and help find the information. Two participants commented on this as follows:

'The way that results are displayed with the system is not well-organised, sometimes alphabetically; it is complicated. Also, the system displays resources without indicating the type of resource' (EPL).

'*There is a big lack of services which are well-known in other systems or websites. It does not provide auto suggestions, and auto corrections. It also doesn't help users minimise their results to choose resources by date, topic, type of resource and so on'* (SL).

At Salford, some librarians mentioned that the library system does not provide features which support searching, is not accurate regarding retrieved information and contains hidden and too much information. Three participants commented on this as follows:

'It should have features like alternative topic, alternative headings, auto fill and auto suggest. For example, if I deliberately misname an artist, the system does not correct my spelling but just gives me a suggestion such as, "Did you mean ..." (AL).

'It's not straightforward; whatever's driving the search algorithm is downright weird. So, to give you a particular example, I searched for the term "Anglo-Saxon England" a couple of weeks ago. I was looking for a particular journal and it's the premier journal in the field. It ranked about 15th on the search results and number one was a Wikipedia entry on Anglo-Saxon England' (CWL2).

'There is a lot of useless information, as well as much information that is hidden; thus, the front search screen is cramped. You cannot do a particularly sophisticated search on it, or find what you want' (CWL1).

Complexity of searching: At Kuwait, the majority of librarians asserted that the system is impractical and difficult to use and that users need training to use it. In addition, search terms need to be entered skilfully. According to EPL:

'*Searching is complicated and not easy. Users do not have sufficient skills to identify the required options or search in order to find resources as they really need some training on it'.*

Linguistic mistakes: At Kuwait, some librarians pointed out linguistic mistakes regarding information, which might occur because the resources are entered incorrectly. EL stated:

'When you search for some resources, especially Arabic resources, it fails to find them although they are available, but I think these resources may be entered incorrectly'.

Lack of resources and information (metadata[10]): At Kuwait, some librarians indicated the non-availability of resources provided by the system and a lack of information about such resources. Two participants commented on this as follows:

'The problem with the library system is that it is only for printed materials and books' (JACL1).

'When you click on the resource or the title you are interested in, you cannot find information about the book, such as what it is about, the abstract, the table of contents or the topics it covers. It displays only information about the location of the book and its classification number, date and author. Most users, when they come to the library, know the book and the author. They need to know more information about these books to see if they are interesting or not' (LL).

5.5.6 Librarians' Suggestions

Librarians were asked to share their suggestions for improving the library website. This question was intended to encourage the librarians to speak more freely about everything they knew about the library website rather than answering a predetermined question about a specific issue. Hence, this question contained the potential for serendipitous discovery, but also had the problem of producing results that cannot be easily categorised as they are slightly subjective and open-ended in nature.

At both universities they suggested creating a single search tool for searching all the resources.

At Kuwait their suggestions were to:

- Have all the library services online so users can interact with them without having to come to the library for help.
- Maximise and minimise searches by providing facilities or services, such as search by type of resource or date or library.
- Remove all unnecessary information from the library homepage as it confuses users.

[10] Metadata is data about data. It provides descriptive information about a particular data set, object or resource, including how it is formatted and when and by whom it was collected. Although metadata most commonly refer to web resources, it can be either physical or electronic resources. Metadata can be created automatically using software or entered by hand (www.kb.iu.edu/d/aopm).

- Minimise the number of icons on the website interface; some of them do not work and some of them confuse users as they are disorganised.
- Fix the problem with the subject headings of the entered Arabic resources; they need to be entered correctly.

At Salford their suggestions were:

- Remove Athens and use only a login so that both on-campus and off-campus users can use the system. Users struggle with Athens and it is sometimes difficult for them to remember how it works.
- Minimise the number of clicks.
- Provide easy access to full texts.
- Develop metadata; the system should have a good search tool to search the developed metadata.

5.6 Academics' Interviews

This part presents the analysed data, which reflects academics' responses from both universities to the questions (Appendix 6). The questions were designed in order to achieve the research objectives (2, 3 and 4). They were also designed to give participants more flexibility to share their needs and experiences in using the library website.

Samples of six academics working at each university were selected. Information about the librarians and codes referring to them are shown in Tables 5.8 and 5.9.

Table 5.8: Information and codes referring to academics at Kuwait University

College	No. of Academics	Major	Gender	Code
College of Education	1	Education Technology	Male	CE
College of Sciences	1	Chemistry	Female	CS
College of Law	1	Law	Male	CL
College of Arts	1	Arabic Language	Male	CA
College of Social Sciences	1	Geography	Male	CSS
College of Engineering and Petroleum	1	Chemical Engineering	Male	CEP

Table 5.9: Information and codes for academics at the University of Salford

School	No. of Academics	Major	Gender	Code
Business School	1	Information Systems Use and Human Factors	Male	BI
Nursing, Midwifery & Social Work School	1	Midwifery	Female	NM
Humanities, Languages & Social Sciences School	1	English Literature	Male	HE
Environment & Life Sciences School	1	Geography	Female	EG
Arts & Media School	1	Tailor	Male	AT
Built Environment School	1	Computer Science	Male	BC

5.6.1 The Purpose of Seeking Information

The academics were asked "when you use the library website, what is the purpose of that? If not when you look for information in other place, what is the purpose of that?"

All the academics at both universities declared that they use the library website based on information needed for research purposes (e.g. write up research or publish a paper). However, two at Kuwait mentioned that they have not used the library website for a long time and now they do not use it anymore (Section 5.6.4 clarifies the reasons). They mentioned that they use other websites for purposes similar to those mentioned by the other academics. The majority at Kuwait and two at Salford mentioned that they look for information to use when teaching their students. Two participants commented on this as follows:

'I seek information in order to find the new articles in my major and if I want to write a paper. In addition, if I need some information for teaching students' (CS).

'I search books I need for my lectures and for research publications' (EG).

At Kuwait, two of them use it to look for new information or to verify existing information. According to CL: *'I use it for research or to find new information or to make sure about information I have'.*

Only one at Salford uses it to compare PhD theses.

5.6.2 Methods and Places in Looking for Information

The participants were asked "what methods do you follow when you look for information? (e.g. Library, Internet, ask colleagues?)"

Table 5.10: Academics' methods (strategies) in looking for information

Theme	Category	Sub-Category
Methods to look for information	Internet	Google
		Google Scholar
		Databases in the field
		Journals
		Websites specialising in the topic
		Libraries websites
	Library Website	SOLAR[11]
	Cooperation	Asking colleagues
	Physical Activity	Reading about the topic
		Finding keywords to start the search

At Kuwait, using the Internet, especially Google, was ranked at the top for all the academics as their first method in looking for information, while half used Google Scholar as well. Two (CL and CSS) mentioned that they visit websites and databases that are related to their fields, while only one mentioned reading about the topic in books and only one mentioned sometimes asking colleagues. Two participants commented on this as follows:

'I usually read about the topic I need in the books I have and extract the terms which I will use for searching, then I go to Google and sometimes to websites which are specialised and related to my research' (CL).

'I use Google in the beginning, and then go to some databases I used to use in order to find what I want, such as ScienceDirect and Isiknowledge. Sometimes, I ask some of my colleagues who have experience in the area I am looking for' (CS).

At Salford, the academics follow different methods in looking for information they need. Four of them start with Google, however; they mentioned that they do not only use Google, but prefer to use it as a first step. Only one starts with journals then moves to databases on that topic and does not go back to Google. Another starts by finding keywords for the search via Google then goes to SOLAR. While one also finds keywords but his PhD students do that

[11] SOLAR is the acronym standing for Search Our Library's Academic Resources, which is the Library Search tool at the University of Salford.

for him then he uses Google. Only one uses Google alone. Some go to databases and journal websites in their field area and only one visits the other libraries' websites to which she has access after Google. Several participants commented on this as follows:

'I Google the topic then I go to the library system to get what I need' (BI).

'I use Google then check the library's databases for my field' (HE).

'I use Google then the library; sometimes I use other libraries' websites where I am an honorary researcher' (EG).

'I Google it because it's faster and easier' (AT).

'First I find keywords, actually my PhD students usually do that, then I Google it' (BC).

The academics were also asked about the places from which they look for information. All of them at both universities look for information from both their office and their home. CEP at Kuwait justified why he looks for information from his office by saying, *'From my office I can access all the databases and academic journals that the library subscribes to'.*

EG at Salford stated *'Usually either from office or from home. I do download and store a lot of PDFs, so I can access them from my Smartphone. I am going to read my journal articles on the train because I commute by train. I store them like on Dropbox so I can access them where and when I want'*.

Two at Kuwait said that they very rarely look for information from the library, but use that only for printed resources.

6.6.3 Library Resources

The academics were asked "what type of library (information) resources do you often need in your practice or teaching?"

At both universities, all academics mentioned diverse types of resources regarding their practice and teaching but they generally look for all types of information for both purposes. At Kuwait they mentioned articles, books, references, new resources, and the Internet. However, they all often need articles for their practice, while the majority also often need books for teaching. CL mentioned:

'Usually books, references and research articles, actually, I search for everything'.

Similarly, at Salford all of them said they need journal articles and most of them need books for both purposes. One (AT) mentioned mostly the Internet rather than the library resources because of the nature of the subject area. Three participants commented on this as follows:

'All types of information resources' (BI).

'A lot of information I need is actually on the Internet because a subject like fashion information changes by the minute' (AT).

'Usually I need journal articles and books for practice or research, but I often need journal articles for both' (NM).

5.6.5 Reasons for Use or Non Use the Library Website

The academics were asked "do you use the library website? If not, why? If yes, how often do you use the library website? If rarely, could you explain why you rarely visit the library website?"

At Kuwait, two of the academics (CE and CSS) mentioned that they have not used the library website for a long time and are not using it anymore. According to CE,

'I have no idea about the library website. I only went to the library once two years ago to borrow some books. The library administration did not provide me with any improvements or any advertisements regarding their resources or services. I mostly find what I need on the Internet. Sometimes I need to prepare presentations (PowerPoint) regarding my topic so I can supplement my teaching. I search for articles and can access them from my office. In addition, I use Google Scholar, which helps me find or identify whether an article is important via the number of citations. Through the citations I can also find important related articles'.

CSS justified not using the library by saying, *'In fact, there are no Arabic books regarding my topic, and no new English ones for my subject area'.*

For the academics who use the library website, two (CL and CEP) mentioned that they use it sometimes, while one mentioned using it regularly and another rarely. The academic who

uses the library rarely (CS) pointed out that *'Everything is available on the Internet, and the library website is very bad for searching. As far as searching in databases, I can access them from my office without needing to use the library website'.*

At Salford, all the academics use the library, but four use it rarely. They stated a number of reasons, including other websites being up-do-date, easy to use and fast like Google and the lack of resources in the library. Several participants commented on this as follows:

'I Google it, because it is easier and faster and I can access the information at any time. So, I use it for resources like blog sites and WJSN and BoF business fashion. These great websites are really up-to-date with information and produce specific information about the things that happen in fashion' (AT).

'I use Google because it is easier. For example, in my field of midwifery, on the website, the number of harmony births in the North West is available to all so you can just go in and see repeatable results of how many births occurred in the North West' (NM).

'I do use it rarely because our holds here are not particularly good in my field' (HE).

'I prefer Google; it is a good source of information, and at the same time it can bring up points of study and electronic journal abstracts and things for a particular journal' (BC).

5.6.6 Library Services

The academics were asked "what kind of library services do you feel you need most? (e.g. Borrowing, Renew borrowing, reserve resources or room, document delivery etc...)"

All academics at both universities mentioned the service they need most is the interlibrary loan. Three of them at both universities mentioned that they require instructions and orientation (library induction) services for their students. Two participants commented on this as follows:

'I use instruction and orientation services at the beginning of each semester for my students as they are weak and suffer when searching for information resources. I also use the interlibrary loan when I need resources that are not available in the library' (CL).

'I call the library, and I go to them with the students to get an induction about the library' (AT).

5.6.7 Obstacles and Difficulties

The academics were asked "when you seek information in the library website, you might encounter difficulties or obstacles, could you speak about what kind of difficulties or obstacles you encounter? (e.g. inform me about the problems you have in using the library website? If so, explain?"

Table 5.11: Obstacles and difficulties that academics encounter when using the library website

Theme	Category	Sub-Category
Obstacles and difficulties	Complexity of Searching	Slow, complicated options, and not good for searching
	Lack of Resources	Unavailable resources
	Lack of Findability	Cannot find existing resources
		Not recognising name of book, name of
		conference, journal article title
		Lack of supportive services
	Lack of Organisation	Disorganised links and options
	Complexity of Services	Renewal of borrowed books by university ID not an option
	Lack of Navigation	Difficult to find way around
	Lack of Access of the System	Page isn't available
	Complex Terminology	Incomprehensible words

Complexity of searching: Some academics at both universities indicated the slow speed of the system. At Kuwait some mentioned that the catalogue search options are complicated. While at Salford some mentioned that the system is not good for searching. Two participants commented on this as follows:

'Searching is slow and the catalogue options for searching are confusing as they are complicated and I don't know which one is better for searching' (CL).

'It is slow and not good for searching and does not look good as well' (AT).

Lack of resources: Some academics at both universities mentioned that some resources are not available in the library, which is an obstacle when using the library. Two participants commented on this as follows:

'The library does not have most of the resources I need' (CS).

'It doesn't always have what I want' (EG).

Lack of findability: At Kuwait, most of them declared that it is difficult to find available resources. According to CEP, *'Sometimes I search for information and I do not find it, but when I go to the library for help, the librarians usually find it'*.

At Salford, most of them mentioned that the system does not recognise the name of a book, conference, or journal article and does not provide help for incorrect spellings used in a search. Three participants commented on this as follows:

'I've typed in the name of the book and, nothing. Also, I put the name of a conference in and in fact pasted it from a reference and it didn't find it' (BI).

'I put in a journal article; it just doesn't recognise it. But if I then go into Web of Science and pull it up through there, I can go through and find a link to get it. It is accessible through our library, but SOLAR doesn't tell me that it's available' (EG).

'In SOLAR, if you spell it wrong, you tend not to get it. It does not guess for a lot of midwifery things. For example, anti-natural, people spell it all one word depending on which country they are from. In another word like anti, the hyphen is natural. So, sometimes you can miss important things because you must be so precise in what you search' (NM).

Lack of organisation: At Kuwait some of them pointed out that many links and options are not organised. CA stated,

'The library provides me with links to these resources. When I click on any one I need, the link takes me to the resource website and then I search for what I need. Why? I can go to these websites and search. Another point is that when I am on campus I can access any e-journal or database and get what I need if the library subscribes to it, while off-campus I can't even do that if I log in with my user info for the library. I have to go to the resource website and use my Athens password'.

Complexity of services: At Kuwait, some of them mentioned that renewing borrowed books cannot be done by using only university ID; the software also requests a civil ID[12] number. According to CA, *'When I need to renew books I borrowed, they request my civil ID and university ID numbers, and they should only request my university ID number'*.

Lack of navigation: At Salford, one of them mentioned the difficulty of finding how to secure resources through searches.

'I can't find my way around in SOLAR; I don't know how to find out where to go to find a book' (BI).

Lack of access of the system: At Salford, two of them mentioned that the system can experience technical problems during searches.

'One is that when we go into SOLAR, it says that this page isn't available, I don't know why' (BI).

Complex terminology: At Salford, two of them mentioned that there are some words or phrases that are incomprehensible on the library website.

'Search by shelf mark. Uh, I've no idea what the shelf mark is' (BI).

On the other hand, one of the academics at Salford had a different viewpoint as he said that the students do searches for him because he rarely uses the library. According to BC, *'My students do everything regarding the library'*.

5.6.8 Finding Information outside the Library

The academics were asked "in case that you did not find what you wanted - either information services or resources, what are the methods (search strategies) you follow to satisfy your needs?"

Table 5.12: Academics' methods (strategies) to find information outside the Library

Theme	Category	Sub-Category
Finding Information outside the Library	Internet	Google
		Google Scholar

[12] The civil ID is an ID smart card made by the Public Authority for Civil Information for all residents of Kuwait (http://www.paci.gov.kw).

		Libraries' websites
		Websites specialised in the field
	Cooperation	PhD students
		Asking the library staff
		Contacting the author of the resource
	Re-searching	Going through the library website

At Kuwait, all of them stated that they go to the Internet to find information that is not available in the library whether Google, other libraries' websites or websites specialised in the field. The majority declared that they go directly to Google. Some mentioned that they go to other libraries' websites or websites that specialise in their topics. Two participants commented on this as follows:

'I go to Google or search in other libraries' websites and sometimes I go to the library and ask for help' (CA).

'Actually, I do not go to the library website first. Everything I need is on the Internet in the websites I know for my major' (CS).

At Salford, they provided diverse methods of satisfying their needs that are not available in the library. The majority mentioned that they use Google or Google Scholar. Some search other libraries' websites or contact the author of the resource. Some ask the library staff and one has his PhD students ask. Only one stated that he re-searches the website or goes to Google or the library for help. Several participants commented on this as follows:

'I cycle the website or go to Google or the library' (BI).

'I go to Google, but the problem with Google is that you do not often get a full article anyway, or I would ask the library for help' (NM).

'If I cannot get it here, I go to John Ryland library[13] *or ask them to get it for me through an interlibrary loan'* (HE).

'I go to Lancaster University's website, Google Scholar, or email the authors directly and ask them if they've got a copy they can send me' (EG).

'I will contact the library staff or Google it' (AT).

[13] The John Ryland Library is a part of the University of Manchester and holds the Special Collections of the University of Manchester Library (www.library.manchester.ac.uk/rylands/ourhistory/).

'My PhD students do that and I used to use Google' (BC).

The academics were also asked if they ask librarians for help when they encounter difficulties and what kind of questions they ask. At Kuwait all of them said they ask librarians by going to them at the library, except one (CS), who mentioned *'[using] my research assistant'*. The majority were actually upset over the way they must seek help from librarians. According to CL, *'I often hope that they can respond by email or by phone or even via chatting. But they usually do not answer the phone or emails, so I must go to them'.*

At Salford, only one (BC) mentioned that his students do that. The other academics make requests of the librarians via telephone, email or going to them.

At both universities, all of them pointed out that their queries usually involve finding information that does not exist on the library website or information that cannot be found. At Kuwait some of them mentioned that they ask for information that is available on the website but cannot access or arrange library instruction and orientation for their students. Two participants commented on this as follows:

'I ask them about information I need but do not know how to find on the library website' (CL).

'I ask them for help in finding information I did not find in the library website, and if I want to arrange library instruction and orientation for my students' (CA).

5.6.9 Academics' General Experience

The academics were asked to share their general experience with the library website and its usability, the library system and their viewpoints about the advantages of other websites that are not available through the library website.

5.6.9.1 General Experience with the Library Website

Table 5.13: Academics' general experiences with the library website

Theme	Category	Sub-Category
Experience with the library website	Lack of Organisation	Separate search option
		Many clicks to get what you want

	Lack of Resources	Lack of resources
	User Satisfaction	Easy to use
		Confusing and difficult to use the first time
	Lack of Navigation	Not clear where go to make a search

Lack of organisation: At Kuwait, two academics said that the website is not well organised regarding resources. CL declared that,

'It is quite complex and not easy to use. Anything I need I have to search in depth to find; for example, if I need a journal in English, I have to go to the e-journals option and then search for what I want, while for an Arabic journal I have to go to the Arabic databases. This is really complicated and unorganised'.

At Salford, some of them mentioned that there are several clicks needed to obtain what they need.

Lack of resources: At Kuwait, two academics indicated a lack of resources on the library website. CS mentioned *'The only problem is a lack in the resources I need'*.

User satisfaction: At Kuwait only two academics declared that there is no problem with the website and that it is generally good even though it is a bit confusing when using it the first time. According to CEP *'It needs to be used more than once to be able to use it easily. I think it is generally quite good and easy to use'*.

Lack of Navigation: At Salford, some of them pointed out the difficulty of finding their way through the website. Three participants commented on this as follows:

'It is a terrible interface; it looks quite complicated and it takes many clicks to get what you want' (BC).

'Universities' websites are designed by brand management; how many things can I press and check on that page? about 60' (BI).

'On the opening page, it is not totally clear where you go in order to make a search' (EG).

On the other hand, one academic at Salford (NM) mentioned that *'I only use SOLAR'*.

5.6.9.2 General Experience with the Library System

Table 5.14: Academics' general experience with the library system

Theme	Category	Sub-Category
Experience with the library system	Lack of Findability	Difficult to find existing resources
		Results displayed randomly
		Inaccurate in retrieving information
		Not recognising name, phrase or title entered
	Lack of Organisation	Three types of searches: basic, advanced and power
	Lack of Resources	Lack of resources
	Complexity of Searching	Slow and difficult

Lack of findability: At Kuwait, the majority stated that the system displays results randomly, it is difficult to find existing resources and it is not accurate in retrieving information. Two participants commented on this as follows:

'The only problem is sometimes with the difficulty of finding existing resources' (CEP).

'Unfortunately I need to be more accurate regarding the words I use when searching, because I often fail to find what I want. Also, there is no order of priority in the search results; it simply retrieves everything randomly regarding the terms I entered. For example, when I enter a strange name that might be the only name in the catalogue, the system retrieves it for me quickly, but if I type the whole name of the author it doesn't provide any results' (CA).

Similarly, at Salford, most of them indicated the difficulty in recognising the name, phrase or title entered. The system does not find available resources, and is not accurate in retrieving information. According to BI, *'I search, and I put in a phrase, and nothing comes up. I often find a lot of stuff that's irrelevant. So, it's easy to find the name with Google, not like SOLAR, which is not accurate and is complex when retrieving information'*.

Lack of organisation: At Kuwait, one academic indicated that the system interface provides three types of searches, which makes it confusing to use. CA stated *'the searching itself is weird; it provides three ways to search (basic, advanced and power), which confuses me. Sometimes I use all of them to find what I need'*.

Lack of resources: At Kuwait, two academics were generally satisfied with the library system although they said they do not use it frequently, but they acknowledged its problem with the lack of resources they needed.

Complexity of searching: At Salford, some of them indicated the slowness of searching makes it difficult to retrieve information. According to AT, *'It is difficult and slow for me to retrieve information'*.

On the other hand, at Salford, one academic (BC) declared that *'I did not use the system as my PhD students do that'*, and another (HE) was satisfied with the library system.

5.6.9.3 General Experience with Other Websites

All of the academics at both universities agreed that they use Google as well as databases and journal websites that are related to their specific subject areas for seeking information. However, all the advantages they experienced were related to Google. Their comments mentioned ease of use, ease of searching and accessibility of different resources, updated with new elements, makes different resources available in diverse formats, access to the books' contents and corrects spelling errors and provides suggestions for further results. Several participants commented on this as follows:

'It is easy to use and everything is available by searching only the title, author and subject, and the results display in a convenient way and in different formats such as books, articles, HTML, PDFs and so on' (CS).

'Searching is easy in Google: only one click from the results takes me to the information I need. Most of the information is classified correctly. E-books are easy to use, and sometimes you can access the contents of the books to determine whether they are appropriate or not' (CL).

'I just type my terms and Google takes me to what I want. Google is the GPS [Geographic Positioning System] of the Internet; it takes you to whatever you want' (CSS).

'With a search engine, you can find anything and be connected to the world' (CEP).

'Google is easy to search; it gives me stuff with words that mean the same as what I mean' (BI).

'All the features in Google are perfect, such as auto suggest and auto correct and so on' (NM).

'Google allows me to capture kind of what is out there already, you know, open publications, and that also gives me an idea of what keywords I should be searching in journals and documents' (BC).

5.7 Academics' Suggestions

The academics were asked to share their suggestions for improving the library website. They provided different suggestions.

Academics' suggestions at Kuwait University were;

- Inform users where they can obtain information (resources) that is not available in the library.
- Follow the manner in which Amazon displays books and their contents and Google's search techniques for searching for information.

At the University of Salford, their suggestions were:

- Make it easy to find the way around, and design it to be user-centred, not for brand management.
- Avoid annoying pictures as there is no time to read the text, and avoid words that users do not understand.
- To be more open-minded and correct spelling mistakes and give accurate results like Google.
- Requesting the resources from outside the library via SOLAR to avoid asking anyone for help.
- Decrease the number of things on the library websites.

5.8 Summary

This chapter analysed and presented the data obtained from the interviews with librarians and academics at Kuwait University and the University of Salford. The data obtained from librarians provided in-depth information about the needs of library users (postgraduate students and academics) with regards to library resources and services, the difficulties and obstacles they encounter when using the library web interface, the methods that the librarians

follow to find information outside the library, their experience regarding the library website and the library system and their suggestions for the library website. In addition, the data obtained from academics provided a comprehensive picture of their purposes of seeking information, their needs with regards to library resources and services, the methods involved and places from which to search for information, the difficulties and obstacles they encounter when using the library web interface, the methods they follow to find information outside the library, their experience regarding the library website and library system, the advantages of other websites they use to find information that does not exist on the library website and their suggestions for the library website. The next chapter will present the data analysis of the focus groups conducted with postgraduate students.

Chapter 6: Data Analysis of Focus Groups

6.1 Introduction

This chapter presents the analysis of the focus groups collected from postgraduate students at Kuwait University and the University of Salford. The questions to the focus groups (Appendix 7) were similar to those asked of the academics in the interviews, except question 4, which was slightly different, as they were asked about resources that they need for their studies, whilst academics were asked about the resources that they need for their practice and teaching. A similar data analysis process followed the interviews (see Chapter 5). The four groups from both universities were considered together for further analysis and interpretation.

Samples of the eight participants from each university, divided into two groups (four participants in each) were selected. Information about the participants and codes referring to them are shown in Tables 6.1 and 6.2.

Table 6.1: Information and codes referring to participants at Kuwait University

Major	Degree of Study	Stage of Programme	Gender	Code
Chemistry	PhD (Full time)	First year	Female	C1
Chemistry	PhD (Full time)	Second year	Male	C2
Chemistry	PhD (Part time)	First year	Female	C3
Chemistry	Master (Full time)	Third year	Female	C4
Engineering	Master (Full time)	Second year	Male	E1
Engineering	Master (Part time)	First year	Male	E2
Engineering	Master (Part time)	First year	Male	E3
Engineering	Master (Part time)	First year	Male	E4

Table 6.2: Information and codes referring to participants at the University of Salford

Major	Degree of Study	Stage of Programme	Gender	Code
Information Technology	PhD (Full time)	Second year	Male	P1
Information System	PhD (Full time)	Third year	Male	P2
Marketing	PhD (Full time)	Third year	Male	P3
Information System	PhD (Full time)	Third year	Male	P4
Terrorism and Security	Master (Full time)	First year	Male	M1
Petroleum and Gas Engineering	Master (Full time)	First year	Male	M2
Gas Engineering and Management	Master (Full time)	First year	Male	M3
Construction Management	Master (Full time)	First year	Male	M4

6.2 The Purpose of Seeking Information

The participants were asked "when you use the library website, what is the purpose of that? If not when you look for information in other place, what is the purpose of that?"

In Kuwait, only two participants (C4 and E2) used the library website, while the others declared that they have not used it for a long time and now they are not using it any more. They stated that they use other places for their needs such as Google and databases related to their subject area (Section 6.5 clarifies the reasons). PhD students at both universities mentioned that they use the library website or other places for their research study, whilst all masters students, whether they use the library website or not, declared that they look for information in order to do their assignments and the master students at Salford, to do their dissertations.

6.3 Methods and Places in looking for Information

The participants were asked "what methods do you follow when you look for information? (e.g. Library, Internet, ask colleagues?)"

Table 6.3: Postgraduate students' methods (strategies) in looking for information

Theme	Category	Sub-Category
Methods in looking for information	Internet	Google
		Google Scholar
		Databases in the subject area
		Databases from their workplace
	Library Website	SOLAR

In Kuwait, Google was ranked as the top method for all the participants when looking for information. They also mentioned that they use databases in their subject area or databases provided by their employer in their workplace. Whilst at Salford, all PhD students stated that they generally start either by using the library (SOLAR), the Internet such as Google or Google Scholar and databases in their subject area as methods to look for information. Whilst masters students start with Google, Google Scholar or databases in their subject area and then with the library. Only two of them (P2 and M2) mentioned that they start first with SOLAR. Several of the participants commented as follows:

'I use Google, but usually I go to the database that is specialised in the topic I am looking for. I usually find what I need' (E2).

'Google is a really good starting point to get a general idea about something that I need and then for more specifics I can go to the Science Finder database to search the Google results' (C3).

'If I find something in Google and cannot access it, I search either in my workplace databases or in the university library to get it' (E3).

'I prefer going into SOLAR. If I can't find what I want then I go to Google Scholar' (P2).

'If I didn't find what I'm looking for in the library, I go to Google' (M2).

At both universities, the participants mentioned a number of reasons that make them use Google or Google Scholar first rather than the library. Their reasons included:

- Easy access to the articles' abstracts,
- Ease of use and searching,
- Good to get a general idea about any topic,
- Accurate in retrieving information,
- Provides many results and suggestions,
- Availability of resources.

Several of the participants commented as follows:

'Google provide many suggestions and takes me to the closest articles relating to the title and words I entered, but the library confuses me, it doesn't give the exact words or the title I entered; if they are not available, it doesn't even provide me suggestions or similar results' (E1).

'It is handy and covers everything. I don't want to go to different areas or different journals; it brings you the information from everybody' (P3).

'I use Google because in my subject area, there are not enough resources in the library' (M1).

The participants were also asked about the places in which they look for information. They mentioned a number of places. In Kuwait, some of them mentioned they search at their workplaces and use the resources provided by their employer. While some search from the

lab that they used to be in. Moreover, some search from home to save time as they are working and studying simultaneously. Lastly, when they are at the university, they generally search from any place they are able to access resources via the university Wi-Fi. Two participants commented as follows:

'I search from the lab where I used to be, and sometimes from home or I go to the library and search for printed resources when I cannot access online' (C4).

'Home but usually from any place at the university because the resources can be accessed but at home access is restricted. Sometimes I search in my workplace resources because it provides several resources and databases which I need for my study' (E2).

At Salford, similar issues were mentioned as some participants (master students) search from home to save time as they are working and studying simultaneously. In addition, some masters and PhD students added that they search from home for more privacy. Also, masters and PhD students search from the library because it is a better study environment, provides faster searching and it is easy to get help from the library helpdesk. Most PhD students prefer to search from their offices rather than any other place because it is a better study environment, provides faster searching, easy access to online resources, they can save resources on their computers, and they have easy access to friends for support and help. Several participants commented as follows:

'From my office, because the environment helps me to achieve and is better than home and the library. Also I can print everything and I can ask my friends about ideas or some key words to search. Whilst in the university you can open some websites that you can't access from outside and you can store everything in your university computer' (P3).

'From the library, as when I use the library resources and don't get the information I need I can always go to the helpdesk' (P2).

'Usually in my accommodation, because sometimes it takes a long time for me to travel to the library' (M1).

'I prefer home because I am working, and I like the privacy at home' (M3).

6.4 Library Resources

The participants were asked "what type of library (information) resources do you often need in your studies?"

All of the participants at both universities mentioned four types of resources they mostly search for: articles, e-books, books and theses.

In Kuwait, all of them declared that they always need articles either printed or electronic, but they frequently seek electronic articles as they are easy to search for. According to E2, *'I use E-books and online articles because they are easy to search in, I can click CTRL F to find the keywords I am looking for'.* Three of them (C2, E2 and E3) mentioned that they also need printed books and e-books, while C4 and C2 mentioned that they need theses. However, all of them indicated the necessity of obtaining any resource that can help them in their studies, but they most frequently needed the resources mentioned above.

At Salford, all PhD students pointed out that they always look for articles, theses, and books for their study. They stated that they need articles as they are updated and that it is important to do PhD research and read books regarding the research methodology of the study. They use theses to find out what previous researchers wrote and how they can learn from those theses. Two participants commented as follows:

'I always need articles; they are up to date with new results and they are the most important references for the research, books are also important as most information regarding research methods are in books' (P3).

'I also need theses; they are important as you can learn from the previous researchers in your field' (P1).

On the other hand, all masters students indicated the need for articles; they also indicated a need for books and e-books for their assignments and dissertations. According to M1, *'I use mainly articles, and sometimes I use e-books and books'.*

6.5 Reasons for Use or Non Use of the Library Website

The participants were asked "do you use the library website? If not, why? If yes, how often do you use the library website? If rarely, could you explain why you rarely visit the library website?"

At Kuwait University, only two of them (C4 and E2) mentioned that they use the library website and that only if they encountered problems in accessing resources in databases that the normally used, or if the lecturer recommended that they use the library to find resources, they would do so. They commented on this as follows:

'I use it when I encounter a problem with accessing some resources in the some databases. I can say rarely, because I usually find what I want in other places on the Internet' (C4).

'I used it once because one of the lecturers asked me to use it, because there is a part of the e-book I am studying is available in the library, and I can say I use it rarely because I find most of my resources through the databases that my employer provides' (E2).

On the other hand, the participants who do not use the library website indicated a number of reasons why they do not use it, including the difficulty of searching, the complexity of the website, the access of resources from their workplaces and ability to access the resources they need when they are on campus through the university Wi-Fi. Several participants commented as follows:

'I don't need it and I can find what I want via the Science Finder database when I am in the lab. When off campus I cannot access the library resources' (C1). C3 added '*I might use it if I need printed resources'.*

'Searching is difficult. I used to search for information from home, but I know that I cannot access the library resources, so what do I need it for' (E1).

'I used it when I was studying for my bachelor's degree. But now no, searching is too difficult and complicated' (E3).

At Salford, all participants use the library websites, but they vary in the intensity of use, as the majority do not use it frequently. They use it only to find books, or to find books based on reading lists provided by their lecturer or resources that cannot be accessed by Google or Google Scholar. The participants who use it rarely mentioned a number of reasons, including the difficulty of the library website, the ease of use and availability of resources on Google and Google Scholar, and the ease of getting resources from friends and relatives studying in other universities. Several participants commented as follows:

'I use it only when I can't find or access an article on Google Scholar or other databases' (P1).

'I use the library website only when I am looking for books. So I use it rarely because I have Google Scholar. If did not find what I need I might use Google or I may ask my brother who's studying in the United States in order to find what I want' (P3).

'If I want a book, I use the library, while for other resources I use Google Scholar and usually find what I want. If not I use databases and journal websites' (P4).

'I can say rarely; it depends on what type of information I am looking for. If I am looking for something that is already in my reading list I will go to the library, but for other resources I used to use Google because of the lack of resources in the library regarding my subject area' (M1).

'I use it rarely because I can find everything in Google' (M4).

6.6 Library Services

The participants were asked "what kind of library services do you feel you need most? (e.g. Borrowing, Renew borrowing, reserve resources or room, document delivery etc...)"

In Kuwait, the only two who used the library stated that they do not use the library services and one stated that she had not used them for a long time.

At Salford, the masters students mentioned that they do not know anything about the library services; they only ask the library helpdesk if they do not find what they want. On the other hand, the PhD students mentioned that they use some of them, such as document delivery, reserving rooms or books, live chat and book renewal, but rarely as they are not familiar with all services. Several participants commented as follows:

'We only request articles we cannot find and are not available in the library' (P1). P2 added *'I go to the helpdesk when I encounter difficulties and sometimes I use the live chat service'.*

'I renew books online and sometimes I reserve some books' (P4). P3 added *'I reserved a room once'.*

6.7 Obstacles and Difficulties

The participants were asked "when you seek information in the library website, you might encounter difficulties or obstacles, could you speak about what kind of difficulties or obstacles you encounter? (e.g. inform me about the problems you have in using the library website? If so, explain?"

Table 6.4: Obstacles and difficulties that postgraduate students encounter when using the library website

Theme	Category	Sub-Category
Obstacles and difficulties	Lack of Findability	Difficult to find existing resources
	Lack of Organisation	Separated search options
		Disorganised information
	Lack of Familiarity	Changes in interface they used to use
	Lack of Resources	Resources unavailable
	Complexity of Searching	Slowness in searching
		Difficulty of searching

In Kuwait, C4 and E2, the only participants who used the library, mentioned the difficulties in finding existing resources and the separate search options for the resources. They commented on this as follows:

'I have to search in every database; I prefer searching once and then having the results displayed from all the databases that the library has about the topic I am looking for' (C4).

'It is difficult to search. My lecturer told me about e-book available in the library, I searched to find it but I couldn't, and then he sent to me the link of that resource which was actually available, but I didn't find it when I've searched previously' (E2).

At Salford, the PhD students mentioned two difficulties, including the huge amount of information and options in the library interface which are disorganised and confusing. Two interviewees mentioned that changes have occurred in the library interface they used to use and were trained on. Two participants commented on this as follows:

'It's not at all well organised and sometimes we have too much information on the front page. I usually got lost' (P3).

'They have changed the interface which I've been trained on. For example, now I do not know how to renew a book I borrowed' (P4).

The masters students identified three points: lack of resources, slowness and difficulty of searching. They commented on this as follows:

'Many resources are not available, especially in my field of study' (M1).

'I put in some words and search, but I'm not finding any related articles or information' (M4).

'It is not as fast as other web engines that you could use. It is slow when searching, difficult and does not give you what you need' (M2).

6.8 Finding Information outside the Library

The participants were asked "in case that you did not find what you wanted - either information services or resources, what are the methods (search strategies) you follow to satisfy your needs?"

Table 6.5: Postgraduate students' methods (strategies) of finding information outside the library

Theme	Category	Sub-Category
Finding Information outside the Library	Internet	Google
		Google Scholar
		Databases
	Cooperation	Lecturers, friends and relatives

In Kuwait, C4 and E2, who were only the participants who used the library, mentioned they go first to Google, then lecturers or friends. According to C4, *'I Google it or I ask my supervisor, or even my friends who are studying in other universities'.*

At Salford, all of them also stated that they go to the Internet to find information that is not available in the library. The masters' students declared that they go directly to Google, while PhD students declared they go first to Google Scholar, then Google then they might go the databases' websites, asked their lecturers, friends or relatives. Two participants commented on this as follows:

'I go to Google because of the time; I don't want to waste my time going to the library' (M2).

'I go to Google Scholar or Google, they are easy and I can find all related articles to my research topic. Sometimes I go to databases' websites and search there' (P1).

At both universities, they were also asked if they ask librarians for help with specific problems. Participants at Kuwait University who used the library stated no, as they prefer the methods they have mentioned. At Salford University, all of them said that they personally ask librarians for help, while one of them (P4) stated that *'I sent them email and I said, [Can you please provide that for me?] I never got any reply. They didn't send any reply so I tend to forget about it'.* The participants pointed out that their queries usually involve finding information that cannot be found or that does not exist on the library website.

6.9 General Experience

The participants were asked to share their general experience about the library website and its usability, the library system and their viewpoints about the advantages of other websites that are not available on the library website.

6.9.1 General Experience with the Library Website

Table 6.6: Postgraduate students' general experiences with the library website

Theme	Category	Sub-Category
Experience with library website	User Satisfaction	Good
		Confusing
	Lack of Organisation	Separated search options
	Lack of Findability	Large amount of information on the homepage

In Kuwait, all of them declared that the library website is confusing. In contrast, all the masters' students at the University of Salford indicated that the website looks good. However, all of them (masters' students) at both universities declared that the main thing they used the website for was to search for information, not necessarily for everything in the website.

At the University of Salford, there were two issues mentioned by PhD students. All of them indicated that the number of steps to search when looking for information was an issue, and one of them (P4) mentioned the large amount of information on the library homepage. Two participants commented on this as follows:

'The first page is full of information which makes it confusing' (P4).

'There are many steps you have to follow just to get what you need. If you need a book, you have to choose the book option; if you want an article you have to choose the article option. Why? It is time consuming. It should be one step like Google Scholar. Type what you want then search' (P3).

6.9.2 General Experience of the Library System

Table 6.7: Postgraduate students' general experience with the library system

Theme	Category	Sub-Category
Experience with the library system	Lack of Findability	Inaccurate at retrieving information
		Lack of supportive services
		Results displayed randomly
	Complexity of Searching	Slow and difficult
	Lack of Resources	Resources unavailable
	Complex Terminology	Incomprehensible words

In Kuwait, the only two participants who use the library system indicated two points: the difficulty and complexity of the method of retrieving information, and the lack of some supportive services such as suggestions and that the display of random results was not organised. They commented on this as follows:

'It is not easy to find what I want. For example, in Google when I write something, Google provides me with many different results and suggestions, but the system does not support that' (C4).

'It is difficult, complicated and not accurate at retrieving what I need. Results are displayed randomly and not based on what I entered' (E2).

At Salford, all participants declared that searching is slow and difficult as well as inaccurate when retrieving information. The masters' students added that there was a lack of resources and that some words were incomprehensible. They commented on this as follows:

'It is slow when searching and not good in retrieving information I searched for' (P2).

'I did not understand what SOLAR and repository mean?' (M3).

6.9.3 General Experience with Other Websites

All students at both universities agreed that they use Google. In Kuwait, some participants mentioned databases provided by their employers and databases that are related to their specific subject areas. Whilst at Salford, PhD students added Google Scholar. However, all the advantages they experienced were related to Google. Their comments address availability of different resources that were easy to use, fast and accurate for searching and providing query suggestions. Google is good for getting a general idea about the topic and for finding citations. Several participants commented on this as follows:

'Google is fast at providing suggestions; it takes me to the information fast and, highlights the entered keywords. It provides the most important resources related to the keywords I entered' (E1).

'I can obtain exactly what I am looking for' (M4).

'Google is easy, while the library website is not easy and not accurate in searching' (E2).

'Availability of information resources, there are many resources which are not available in the library. Accessing resources from anywhere' (E3).

'Through Google I can get an idea about the topic I need and usually I find at least the abstract about it. I can easily access the abstract through Google' (C4).

'It easy to find different resources related to your query' (P3).

'Provides citations of the articles found' (P4).

6.10 Participants' Suggestions

The participants were asked to share their suggestions for improving the library website.

They provided different suggestions. Participants' suggestions in Kuwait were:

- Access to library resources should be from everywhere, not only when on campus, and
- Searching in the library should be similar to Google, as Google is easy to use and fast with good features during searching such as auto suggestion, auto corrections, accurate searching and retrieval.

At Salford, their suggestions were:

- The searching should be similar to Google Scholar as it is easy and quicker.
- Avoid the number of clicks which usually send us through one page to another and then there will be nothing, this is confusing and time consuming.
- It should provide more options to search; for example, there is no option for searching theses in the library.
- There is a need to link all the resources to be searched via the main search tool of the library.
- Reduce the amount of information on the homepage.
- We need someone who specialises in our search topics to help us with queries.

6.11 Summary

This chapter presented an analysis of the data obtained from the focus groups with the postgraduate students at Kuwait University and the University of Salford. The data obtained provided a comprehensive picture of their purposes of seeking information, their reasons to use the library website and the reasons for not using it, the library resources and services most frequently needed, the methods involved and places from which to search for information and the difficulties and obstacles they encounter when using the library web interface. It reports the methods they follow to find information outside the library, their experience regarding the library website and library system, the advantages of other websites they use to find information that do not exist on the library website, and their suggestions for the library website. The next chapter will present the data analysis of the observations conducted from postgraduate students.

Chapter 7: Data Analysis of Observations

7.1 Introduction

This chapter presents the analysis of observations conducted with postgraduate students at Kuwait University and the University of Salford. It begins with the method and process of analysis, followed by an analysis of the pre-tasks questions. Then, the chapter will analyse the tasks, task by task, including the steps that participants follow and the researcher's observations. This is followed by observations conducted on all tasks and the participants' comments. Finally, the post-tasks questions are analysed.

7.2 Method and Process of Analysis

The tasks given to postgraduate students for observational purposes were designed to achieve the main aim of the research and objectives 2, 3 and 4. Hence, the tasks were aimed at discovering participants' behaviours and interactions with the library's web interface. The tasks were also designed for comparison with the model created from combining models of the ISB and HCI (see Chapter 3). Moreover, the think-aloud technique was utilised alongside the observations to ensure the observer could gather additional information about participants' actions and thoughts to identify their needs, experiences and difficulties, as well as the obstacles they encountered when performing the tasks.

The observations included ten postgraduate students at each university with different majors. The researcher used the screen capture software which performed audio and video recordings of participants using the library's website. Observations started with the presentation of a number of pre-task questions to the participants. They were asked if they use the library website, what they use it for and how often they use it. If they answered that they did not use it, they were asked why as well as what they used as an alternative.

The researcher followed several procedures before starting the tasks to ensure the tasks were performed smoothly without any problems for the participants. These procedures were as follows:

- The researcher asked participants to use his personal laptop to perform the tasks, as the software used is installed on his laptop, and steps were taken to ensure that participants were comfortable using the laptop before performing the tasks.
- Participants were given the option to choose the place they prefer to perform the tasks (e.g. the library, the lab or the PhD student's room).
- Participants were given the option to choose their preferred browser (e.g. Google Chrome, Explorer, Firefox).
- Participants were given the option to skip the task they were working on and move to the next task if they encountered difficulty or did not know how to complete it.

The tasks had a set time limit: four to five minutes were given for tasks one to six, while seven to eight minutes were given for tasks seven and eight. The time limit helped ensure that participants were able to perform all tasks within the predetermined, agreed-upon session, as the researcher informed participants that the session would be no longer than 45 minutes. In fact, the researcher did not inform the participants about the time limit for the tasks in order to allow them to freely perform the tasks without any additional stress, as the participants might be under pressure while performing the tasks if they were informed about the time limit. Instead, the researcher asked participants to move to the next task if they did not complete it within the predetermined time.

The tasks were started when the researcher provided the participants the eight tasks to be completed using only their respective library website. The library websites that participants used to perform the tasks are fully enhanced with images (Appendices 3 and 4). The researcher asked them to think aloud while performing the tasks. Initially, the researcher began as a nonparticipant. Later, he became an active observer. When the tasks were completed, participants were presented with a number of post-task questions intended to gather information about the positive and negative features that they experienced; the difficulties or obstacles they encountered while performing the tasks and their viewpoints and suggestions to improve their respective library's website.

Data received from pre-task and post-task questions were analysed by using content analysis. Regarding the tasks, task analysis (TA) was used in conjunction with content analysis. This combination stems from participants' thoughts and beliefs as they think aloud while using the academic library web interface.

TA is the process of analysing how people perform their jobs, the things they do, the things they act on and the things they need to know (Dix et al., 2004). The aims of TA include the following:

- To explain the procedure that the users employ to recognise the difference from the expected series of actions.
- To predict the time taken to learn a new task. It might help someone to know how difficult one method is to learn compared to another.
- To predict the time a proficient user will take to achieve the set task; this can reflect whether the interface is good at supporting exploration.
- To predict the time taken for expert execution of the set task – i.e. how long does it take to become an expert once a procedure has been discovered? This may be affected by the design of an interface (Draper, 1990).

Hackos and Redish (1998, p. 8) pointed out that using TA is helpful to understand the following:

- What users' goals are; i.e. what they are trying to achieve.
- What users actually do to achieve those goals.
- What experiences users bring to the tasks (e.g. personal, social and cultural).
- How users are influenced by their physical environment.
- How users' previous knowledge and experience influence how they think about their work and the workflow they follow to perform their tasks.
- What do users value the most that will make a new interface a helpful and delightful experience? For example, do they value speed? Accuracy? Help in recovering from errors? Human contact? Fun? A challenge?

The tasks were first transcribed by the researcher after watching the videos of the participation. The researcher transcribed what the participants said; each step they took to achieve the tasks; the researcher's observations of each task and the time taken in each task by all the participants. An example of task analysis is as follows:

Task one is as follows: 'Is the *International Journal of Sport and Health Science* available in the library?'

Participant K1 at Kuwait University performed this task as follows:

'Scanned and explored the library interface options - chose e-journals option - typed health and sport - executed search - explored the results - read their information carefully - completed the task based on the information that came with the results'.

Participant K1 spent 130 seconds to complete this task. He commented as follows: *'It is slow, I used to use the databases option and it is not slow like this'.*

Participant S1 at the University of Salford performed the same task as follows:

'Scanned and explored the library interface options - did not find journal option to search - chose find everything - typed the whole title of the journal but with the wrong spelling - executed search - explored the results - read their information carefully - limited the results by journal title - explored the results and read the information carefully - returned to the result page - changed search option to e-journal - typed the journal title - executed the search - explored the results - read the information carefully - completed the task based on the information that came with the results'.

Participant S1 spent 155 seconds to complete this task. They commented as follows:

'No journal option. I might start with find everything. The first two results are not from this journal. I might refine them here. Here, we have what results came in, in what journal. This only says that no entries are found. It doesn't say it's not available, but you might infer that it's not available. I think I need to click on the e-journal and search by journal title name'.

The researcher's analysis was as follows:

After observing the participants, it became clear that they followed six steps:

1. Scanned and explored the interface options.
2. Chose an option.
3. Formulated the query and executed the search.
4. Explored the results.
5. Read and verified the results.
6. Made a decision.

It was observed that when S1 failed in the first attempt, he limited the search results, and then repeated steps 4 and 5. When he failed again, he repeated steps 2, 3, 4 and 5, and then finished the task. K1's comment indicated the slowness of searching.

The task analysis will provide the average time spent in each task by all the participants, the steps they followed in each task and the researcher's key observations in each task. Then, the researcher will provide the observations that were repeated in all tasks with the participants' comments at both universities, which is followed by the observations and participants' comments that were unique to each university.

A sample of ten participants studying at each university was selected. Information about those participants and the codes referring to them are shown in tables 7.1 and 7.2.

Table 7.1: Information and codes referring to the participants at Kuwait University

Major	Degree of Study	Stage of Programme	Gender	Code
MBA	Master (Part time)	Second year	Male	K1
Geography	Master (Part time)	Second year	Male	K2
Information Technology	Master (Full time)	Second year	Male	K3
Chemistry	Master (Full time)	First year	Male	K4
Computer Science	Master (Full time)	Second year	Male	K5
Mathematics	Master (Full time)	Second year	Male	K6
Mathematics	Master (Full time)	Second year	Male	K7
Computer Science	Master (Part time)	First year	Male	K8
Geographical Information System	Master (Full time)	First year	Male	K9
Civil Engineering	Master (Full time)	Second year	Male	K10

Table 7.2: Information and Codes Referring to University of Salford Participants

Major	Degree of Study	Stage of Programme	Gender	Code
Acoustics and Audio Engineering	PhD (full time)	First year	Male	S1
Information System Management	Master (full time)	First year	Female	S2
Information System Management	Master (full time)	First year	Female	S3
Project Management	Master (full time)	First year	Female	S4
Acoustics	Master (full time)	First year	Male	S5
Interpreting	Master (full time)	First year	Female	S6
Interpreting	Master (full time)	First year	Female	S7
Management Information System	Master (full time)	First year	Male	S8
Project Management in Construction	Master (full time)	First year	Male	S9
Database and Web-based Systems	Master (full time)	First year	Male	S10

7.3 Pre-Task Questions

All participants at both universities use the library website with the exception of two participants at Kuwait for the following reasons:

- They are able to access the library resources through the university Wi-Fi.
- Ease of accessing resources from Google Scholar, other websites and their workplace.

These two participants commented on this as follows:

'I can access all resources through the university Wi-Fi. Also, I go to Google Scholar and some websites I know have what I need. Actually, I do not know what the benefit of the library website is. I do not even know anyone who uses it' (K8).

'I did not need the library website because I always find what I want through the databases that my workplace provided to me' (K4).

Additionally, all of the participants at both universities use the library website based on their needs. At both universities, they use it to complete assignments. At Kuwait, they use it to complete projects and based on recommendations from their lecturers, while at Salford, they use it to write research and proposals. The frequency with which they used the library website varied. Some use it frequently; depending on the assignments they have, while others use it occasionally in order to accomplish the following:

- To find resources not available in other sources, such as Google, Google Scholar and other websites.
- To find only books, as searching on the library website for other resources is confusing.
- Based on recommendations from their lecturers.

Two of the participants commented as follows*:*

'I use the library to find books because my study often depends on books. My lecturer occasionally tells me about some books that I cannot find on the Internet, so I go to the library to get them' (K6).

'I use it only to find books. I don't trust that it's giving me everything. I think I have more confidence in Google Scholar if I'm looking for papers because it has extra functionalities, such as checking citations or ordering them by year' (S5).

However, some participants use the library website very rarely because of the lack of resources on the website as well as the ease of use and availability of resources on Google or Google Scholar. Two of the participants commented on this as follows:

'There is not enough new information. Also, most resources I need are not available. When I search Google for some specific areas, I can find some free books. Also, I can find lots of papers online' (S10).

'The website is a bit confusing. Sometimes I cannot find what I want, and it leads me to a lot of other websites. I use and prefer Google' (S6).

Furthermore, two participants at Salford made an interesting point: they only use the computers in the library to find information. They pointed out that the interface they use is different from the library website interface. They only use the SOLAR interface, not the library website interface (see Figures 7.1 and 7.2). Participants stated that they are accustomed to using SOLAR from their home, and they access it from the student channel page (see Figure 7.3). These two students commented as follows:

'I use the SOLAR interface. The SOLAR interface is different than the library website; the library website is a bit confusing. When I use the computers in the library, they only show me the SOLAR interface. I don't use the library website interface, and if I use it from home, I go directly to SOLAR from the student channel to start searching directly. Therefore, I don't use the library website' (S2).

'I use SOLAR, not the library website. I have no idea about the library website. In our induction, the person who was giving the induction just pointed out SOLAR. Also, I remember in my first assignment, he just said that you can find resources and journals through SOLAR. When they said, 'You can go through SOLAR from here', they meant the student channel' (S4).

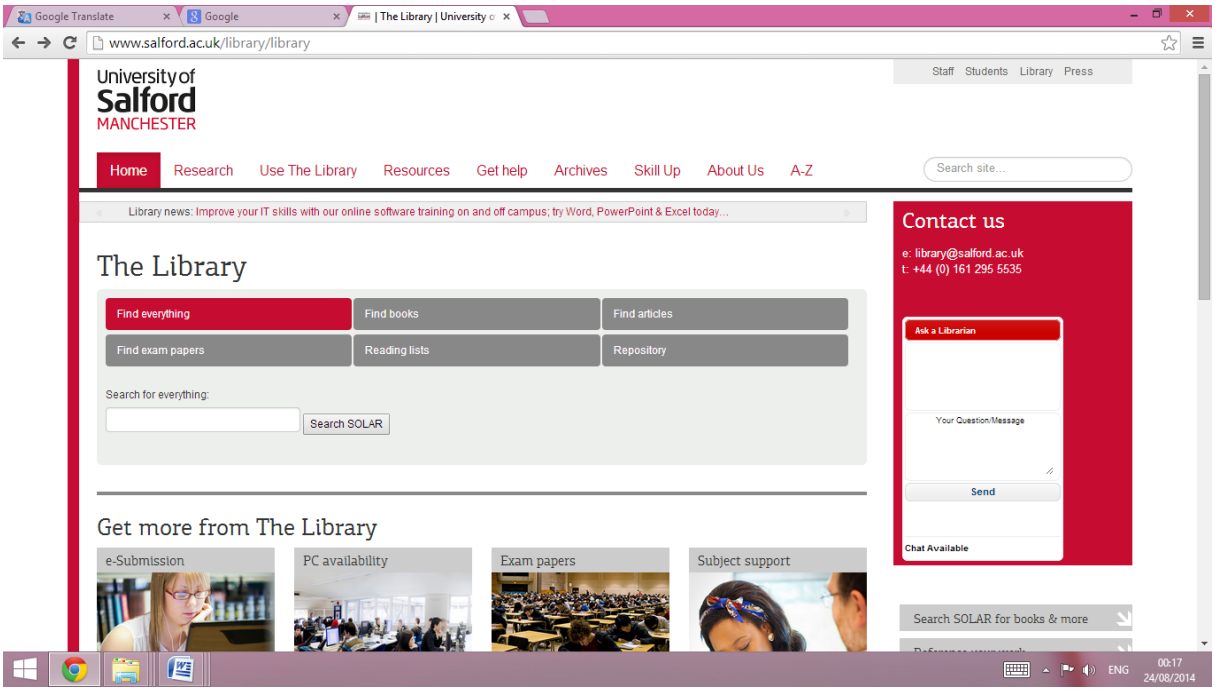


Figure 7.1: Salford Library website interface

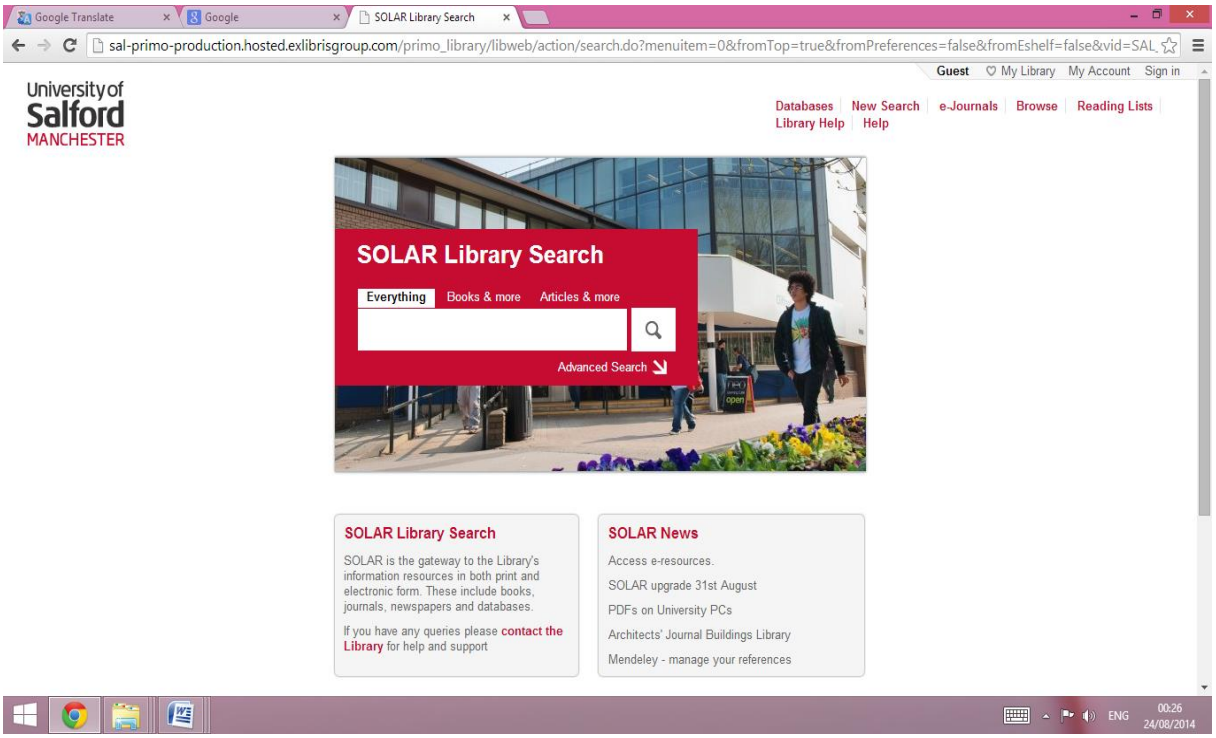


Figure 7.2: Salford SOLAR interface

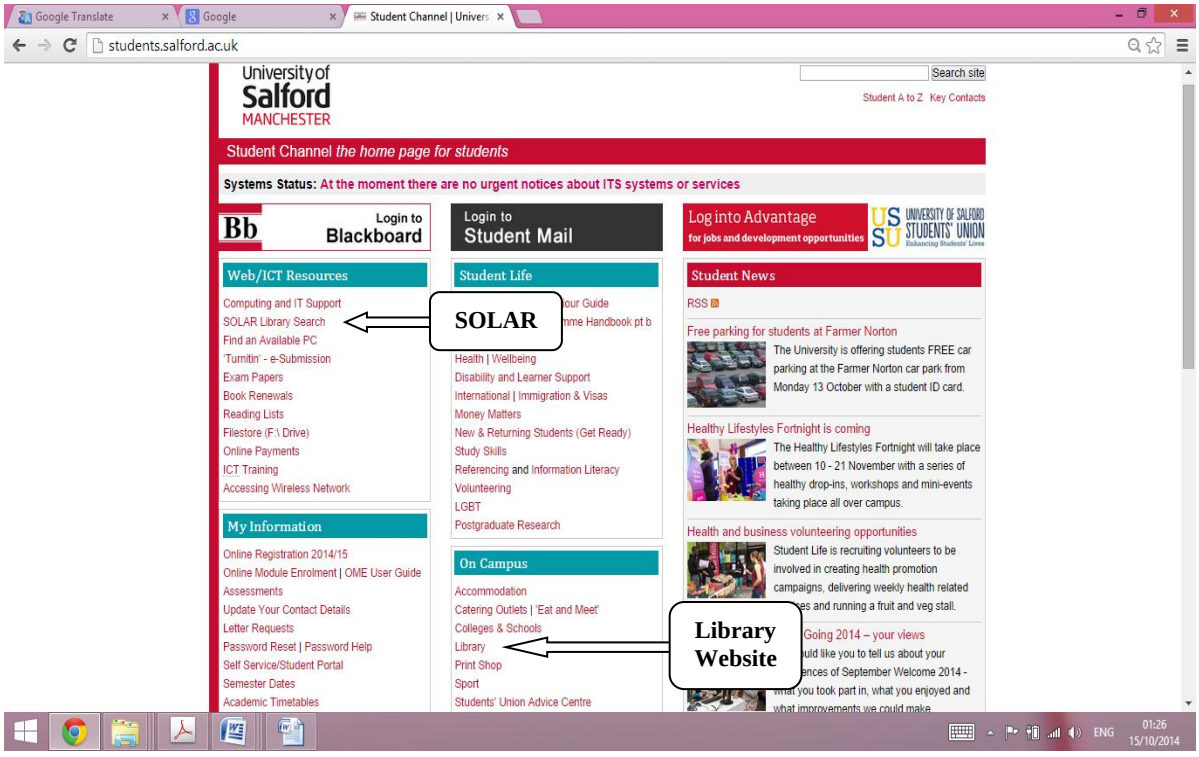


Figure 7.3: SOLAR and library website options in students' channel interface at Salford

7.4 Tasks Analysis

7.4.1 Task One

Task one was as follows: “Is the *International Journal of Sport and Health Science* available in the library?”

This task aims to find out what the participants do when they are looking for a journal title. Participants took an average time of 126 seconds at Kuwait and 108 seconds at Salford to complete task one. They followed these six steps to perform the task:

1. Scan and explore the interface options.
2. Choose an option.
3. Formulate the queries and execute the search.
4. Explore the results.
5. Read and verify the information of the results (metadata).
6. Make a decision to finish the task.

Some participants did not perform the task successfully due to the following reasons:

a) They chose the wrong option to search, such as the catalogue option, which is only for printed resources, and most of these resources are books (Kuwait).
b) They typed an insufficient query, such as “international sport” (Kuwait).
c) They typed the query with misspellings (Kuwait and Salford).
d) They did not recognise or understand the option to search in (Kuwait).

The majority of the participants typed different terms that did not match the exact title of the journal. The vast majority of them did not scroll up and down the page when scanning and exploring the options of the library interface. It was observed that when they failed in the first attempt, they either repeated steps 2, 3, 4 and 5; repeated steps 3, 4 and 5; or repeated steps 4 and 5 until they finished the task.

7.4.2 Task Two

Task two was as follows: “You were asked to write a report about the history of any discipline of science. Please find an e-book about that”.

This task aims to identify how participants determine the topic to search and how to find an e-book. Participants took an average time of 89 seconds at Kuwait and 178 seconds at Salford to complete task two. They followed these seven steps to complete the task:

1. Scan and explore the interface options.
2. Choose an option.
3. Formulate the queries and execute the search.
4. Explore the results.
5. Read and verify the information of the results (metadata).
6. Select (click on) the result to examine and make sure it is correct.
7. Make a decision to finish the task.

One participant did not perform the task successfully because he typed an insufficient query (Kuwait). All of the participants typed different topics because the task did not specify an exact topic for the e-book. With two exceptions, when choosing the e-book option, all of the participants at Kuwait chose the first option provided without reading the information provided for the other options.

7.4.3 Task Three

Task three was as follows: "You were asked to write an essay about the importance of vitamin D for the human body. Please find an article and printed book about that topic".

This task aims to identify how participants look for two different resources on one topic, and how they look for a printed book and article. Participants took an average time of 249 seconds at Kuwait and 175 seconds at Salford to complete task three. They followed the same seven steps as in task two. Some participants did not perform the task successfully or did not complete it for the following reasons:

a) They did not know where to search for articles (Kuwait).
b) They did not know which database contained the topic they were looking for (Kuwait).
c) They did not find results, as they searched using the Arabic language (Kuwait).
d) They did not find relevant results, as they were dependent only on the information (metadata) that comes with the results (Salford).

Only one participant at Kuwait tried to find out how to use the library website when encountering a problem.

7.4.4 Task Four

Task four was as follows: “Please find out how many books you are permitted to borrow from the library and for how long. Also, how can you renew the borrowed book online?”

This task aims to find out what methods the participants utilised and what options they chose in order to do so. Participants took an average time of 120 seconds at Kuwait and 169 seconds at Salford to complete task four. All of the participants followed these four steps to complete the task:

1. Scan and explore the interface options.
2. Choose an option.
3. Explore and examine the options in the interface of the option selected.
4. Make a decision.

Some participants did not perform the task successfully or did not complete it due to the following reasons:

a) They did not know where to find it (Kuwait and Salford).
b) They believed it was unavailable (Kuwait).
c) They believed that borrowed books cannot be renewed online (Kuwait).
d) They did not know the borrower ID number or they do not have their civil ID (Kuwait).

Noticeably, the vast majority of them scrolled up and down the page when they were scanning the library interface and exploring the options. Moreover, they went to each option by using the mouse pointer when they were exploring the library interface and the interface of the option they selected.

Only two participants at Salford selected the library search site box, typed their query, executed a search and then explored and examined the options until they finished the task. Only one participant at Kuwait tried to find out how to use the library website when encountering a problem. If they did not get what they needed on the first attempt or wanted to

complete the other part of the task, they either returned to the homepage to choose another option or changed the option from the interface they were in and then explored and examined the options until finishing the task or leaving it.

7.4.5 Task Five

Task five was as follows "Please find a book about the Second World War written by Addison Griffin".

This task presents false information as there is no book written by Addison Griffin. The task aims to find out what the participants do if they did not find what they are looking for. Participants took an average time of 126 seconds at Kuwait and 132 seconds at Salford to complete task five. They followed the same six steps as in task one. Not all of the participants were successful. The majority of the participants at Kuwait did not use the advanced search; however, the majority of the participants at Salford used it. When they failed in the first attempt, all participants repeated steps 2, 3, 4 and 5, while four participants at Kuwait repeated steps 3, 4 and 5 until they left the task.

7.4.6 Task Six

Task six was as follows: "You have read an article written by Peter Ferdinand Drucker, who is a management consultant, and you would like to find out if the library has any copies of his published works. Can you find an available copy? And can you determine what kind of resource it is?"

This task aims to identify the methods participants use if they are looking for a resource for a particular author. Participants took an average time of 99 seconds at Kuwait and 83 seconds at Salford to complete task six. They followed the same seven steps as in task two. Most participants got what they needed on the first attempt, with the exception of one participant at Salford and three at Kuwait due to the following reasons:

a) They typed the author's name with a misspelling.
b) They typed the author's entire name and then the system failed to retrieve it.
c) They did not find the author's full name in the results.

Only one participant at Kuwait left the task after the first attempt.

7.4.7 Task Seven

Task seven was as follows: “You were asked to write an assignment about the effects of social network websites (e.g. Twitter, Facebook) on society. Please find two articles from two different resources or journals about this topic”.

This task aims to show how participants try to find two articles from two different resources or journals on a particular topic. Participants took an average time of 220 seconds at Kuwait and 204 seconds at Salford to complete task seven. They followed the same seven steps as in task two.

Five participants at Kuwait were not successful due to the following reasons:

a) They chose the wrong option to search for articles, such as the e-journal option, which is only for searching journals, not articles; in other cases, they chose the catalogue option, which is only for printed resources, and most of these resources are books.
b) They did not know which database contained the topic they were looking for.
c) They did not find an option to search for articles.

Only one participant at each university did not complete task seven because they ran out of time, as they encountered difficulty in identifying which database they needed to choose to find the other article (Kuwait) and in identifying which result they needed to choose to find the other article (Salford). Only one participant at Kuwait explored the options and selected different options, explored their interfaces and then left the task.

7.4.8 Task Eight

Task eight was as follows: “You were requested to write a research paper on a topic you may know a little about, which is the psychology of children. How would you find three different resources on that topic?”

This task aims to show how participants find different resources on a particular topic without indicating the type of resource they should use. Participants took an average time of 330

seconds at Kuwait and 242 seconds at Salford to complete task eight. They followed the same seven steps as in task two. Three participants at Kuwait did not complete the whole task because they ran out of time and because they did not know how to search for articles. Only one participant at Kuwait used the faculty libraries option to search on a specific library website.

7.5 Observations of All Tasks and the Participants' Comments

7.5.1 Both Universities

All participants began their search by scanning and exploring the interface options and then chose an option based on the task. For example, if they needed a journal article, they would look for a journal option to start. When executing a search, all of them explored the results in general and then carefully read the information (metadata) that comes with the results. The process was therefore highly dependent on the metadata, and participants did not select (click on) any result to examine it until they made sure that the metadata was not sufficient to make a decision. When verifying the results and reading through the information, it was observed that all participants looked for words similar to their query, although some results were relevant to what they needed. However, they ignored them, as those results did not include the keywords they had entered. The vast majority of them either did not scroll up and down the page; limited the search results (Salford); or even browsed the results pages after exploring the results and reading the information from the first page. Some of them believed that what they were searching for should be one of the first results. All participants who used an advanced search used it to search for a specific name or title.

In tasks two, three, six, seven and eight, if they did not find what they needed on the first attempt, nothing was displayed for them, there were no results relevant to their queries or they needed to complete other parts of the task (in tasks three, seven, and eight), all participants did one of the following:

a) Opened links if required (if the information was still insufficient), and then examined the information in that link (Salford), and if they did not find what they need in that link they,

b) Limited the results by scanning and exploring the results page and then chose one of the available limitation options (Salford), or they
c) Reformulated their queries and executed a search, or they
d) Changed the search option and then formulated their queries and executed a search.
e) Utilising these methods, they repeated three steps—i.e. *explore the results, read and verify the information of the results (metadata)* and *select (click on) the result to examine and verify them*—until they made the decision regarding whether to complete the task or leave it.

When formulating their query, some participants wrote them exactly as they read them and did not use keywords for searching. Some participants actually entered their queries with misspellings. Even though the system provides a spellchecker by showing a red line under the misspelled words, they continued to execute their search without noticing the spellcheck. Later on, they fixed their query when they found the misspellings. However, if they did not find relevant results; or when the system did not provide any results; or when they left the option they were searching in; or when the library system notified them (though the system does not fix some queries), they entered and sometimes did not fix all queries. The last point only occurred at Salford. At Kuwait, the system did not notify participants that they had typed the query with misspellings after executing the search, which made them think they entered the correct query spelling. Therefore, some of them left the task based on the wrong query. When they were searching for an author, the vast majority from both universities typed the author's full name.

Some participants have a negative opinion about the library website as they believe it is not good for searching information. Others did not like the slowness when searching and displaying the results. Participants pointed to Google and Google Scholar as good alternatives in case problems are encountered during searches in the library website.

7.5.2 Kuwait University

None of the participants noticed what the search option was based on in the catalogue option, so they entered their queries without noticing that the search is only by title. Most of them used the catalogue to search for everything, even though it is only for printed resources. The vast majority of them did not differentiate between the e-book options and chose the first

option to search for e-books. Some of them searched for articles using the e-journals option. Therefore, they thought that they could search for articles using the e-journals option, which is only for searching journal titles. When they went to the databases option, all of them scrolled up and down the page to see all of the available databases.

Accessing resources by using their username and password or even Athens was an obstacle for some participants to obtain what they needed when they were searching in the databases. In addition, identifying which database to choose to search was an obstacle for all of them. No one tried to refine the search results after exploring and reading the information contained in these results because the refine option was not sufficiently visible (see Figure 15 in Appendix 3).

They did not like to individually search in the databases' websites; furthermore, the unavailability of search boxes for e-books or articles made searching both difficult and time-consuming. When they searched by author name, all participants searched by author keyword, whether in the catalogue options for search or in the advanced search options. When they finished the first part of the task in tasks three, seven and eight, they either returned to the library homepage for the second part of the task or they changed the search option from the place where they finished the first part of the task. Furthermore, they did not like the method of individually searching on the websites of the databases or e-books options. Some of them only used the library website to search for books. Most participants received information about borrowing books and renewing them through librarians, not through the library website. Some of them did not know how to search for journals.

7.5.3 The University of Salford

When the participants finished the first part of the task in tasks three, seven and eight, it was observed none of the participants return to the library homepage for the second part of the task; rather, they continued their search or changed the search option from the place where they finished the first part of the task. The vast majority of them did not check the type of resource in the results page after executing a search, although this information is visible in the system when the results are displayed. Some of them were not familiar with advanced search and did not know how to use it effectively. They did not recognise what online access means, although it displays that this is a book and can be accessed online. Few of them encountered

difficulty to search by database as they did not know which database need to choose to search in, rather, they prefer to search in the library search tool then limited the search (e.g. by article, by conference proceedings).

Accessing resources by using their username and password made it difficult for some participants to obtain what they needed, especially when they were on campus. Regarding task four, some of them preferred to ask the library to find information rather than find it themselves.

7.6 Post-Task Questions

Some participants at both universities mentioned one positive feature in their libraries' websites, i.e. the option to choose a resource before beginning to search at both universities. Additionally, the options for limiting the search results are a positive feature at Salford. Several participants commented on this as follows:

'The feature is the ability to choose the resource to search in' (K3).

'It is good to be able to choose the database you want and search in a specific field of study' (K5).

'Being able to choose the type of resource above the search box is useful. Options on the left are useful for refinements as well; it is good to see the numbers on each' (S1).

In terms of negative features, at both universities participants declared that the library website is inaccurate in retrieving information as it depends on the keyword entered and is slows in terms of searching and displaying results as well as includes some incomprehensible terms. The participants commented on this limitation as follows:

'It is not good in retrieving information, especially using names. It is very accurate, and it wants me to enter the name as the system wants, not as I want' (K5).

'When I search for a topic, it does not give the topic exactly; it gives me a different topic or another topic close to the topic I searched for' (K2).

'Searching depends on the keywords; for example, when I typed 'You may know little about psychology on children', I didn't get anything. When I removed 'You may know little about' and just entered 'psychology of children', I got different results' (S3).

'It takes a very long time to get what you want' (S6).

'The name SOLAR it is incomprehensible' (S10).

'I did not understand some terms, such as catalogue' (K8).

At Kuwait, the participants mentioned the following negative features regarding the library's website:

- Not updated.
- Cannot be used from home.
- Difficult to find the way to start searching.
- Cannot search for all resources with one single search tool.
- Does not provide refinements and limitations for the results.
- No search box on the homepage.
- Lack of resources.
- Does not provide suggestions for searching.
- Difficult to identify and choose the option to search.
- Incomprehensible terms.

Several of the participants from Kuwait commented as follows:

'The homepage is not clear. I do not know where I should go to search; it gives me information about the library. Also, I cannot use it from home; everything cannot be accessed from home, so I must use it at the university or in the library to be able to access resources online' (K2).

'I do not know why I cannot search all resources in one place. This is very time-consuming as I need to search in every option to find what I want' (K7).

'There is no way to refine the search results or choose limitations. If I found the results in ten pages, I will not browse and search all of the pages, so I need the refinements to get what I want faster' (K3).

At Salford, the participants mentioned the following negative features.

- Two different interfaces.
- Redundancy in search options.
- Many clicks and links are required to arrive at the information.

- Lack of information (metadata) in the results.
- The number of options and information that existed on the interface was confusing.

Several of the participants from Salford commented as follows:

'There was a redundancy in the library interface; if they have everything here, why do they put in these options [e.g. find books, find articles]?' (S5).

'I searched for the journal from everything, and I did not find it, but when I searched for it in the list of e-journals, I got it. Why?' (S1).

'It takes several clicks and opens many links just to arrive at what I want. Regrettably, what I always do is go to Google. I type my query and then Google sends me to the library website link regarding what I want' (S8).

'The information that comes with each result is not sufficient to make sure if that is what I want or not' (S10).

'There are many things on one page; this is confusing' (S7).

In terms of the most difficult task, task eight seemed to be the most difficult for participants at both universities, as they did not have any prior information about the topic and did not know how to search for it or even use the right keywords. Additionally, the participants at Salford stated that the information included in the results (metadata) was not sufficient to identify if what had been identified from the search was relevant or not. The participants at Kuwait stated that finding three different resources requires more time. One of the participants from Salford commented as follows:

'It was confusing because I have no idea about the topic; the results did not include sufficient details to identify if it is relevant or not. When I search for something, for example, at the beginning of my studies, it will be different than if I search for it again three weeks later, because the lecturer will give us more information about that topic. The lecturer will also provide us with a reading list as well [for us to] read more about that topic, and so I will have more information about the topic. I will be able to use the correct keywords. I might know about some journal that specialised in that topic or some databases that my lecturer told me about' (S8).

Task four was difficult for all participants at Salford, as they did not know how to find it. Two participants commented on this task as follows:

'I have renewed books online before; the process may have changed since then' (S1).

'I usually renew books I borrowed online, but through an email with a link from the library regarding how to do that' (S2).

At Kuwait, the participants pointed out that all tasks requiring them to find articles were difficult for the following reasons:

- They were not familiar with new topics.
- Searches cannot be conducted in all databases from one single search tool.
- It is difficult to recognise which database or journal to choose to search in.
- There is no option to search by article.

Two participants from Kuwait commented on this as follows:

'Tasks three, seven, and eight were difficult because I do not know anything about these topics, and I do not know which database I need to choose' (K3).

'The difficult thing with the tasks is to find articles. I do not know how to find articles; it is complicated, as there is no obvious way to do that, no option for articles, and there are databases and e-journals, both of which have articles' (K10).

Furthermore, task five was difficult because of the lack of facilities in searching, and there is no help option to support the students while searching.

Task seven was also difficult because the topic is new and the library website is not updated or developed to provide new resources. As one participant noted, *'Task 7 was difficult because the topic is new and the website is old and has not been developed to match the progress in new information resources'* (K6).

Only one participant at Kuwait declared that the problem is with the library website, not with the tasks: *'There is no difficult task, the problem is with the library website; it is complicated*' (K8).

The participants at both universities provided completely different suggestions. Their suggestions revealed several issues and needs with respect to the library websites by comparing them with other features on the Internet, particularly Google.

At Kuwait, their suggestions were as follows:

- Provide the ability to search for all resources in one single search tool, and then offer specific searches.
- The library website should start directly with a search box, not with information about it.
- Avoid incomprehensible terms, such as ‘catalogue’ and ‘databases’, and replace them with terms like “books” and “articles”.
- Provide the ability to search by topic or by scientific discipline to be able to search for resources on the topic students are looking for.
- Provide other ways to learn how to use the library instead of providing a PDF file about how to use it, as this is time consuming to read; for example, training through short videos about how to use every option could be provided.
- The databases should be well-organised and briefly described by adding keywords so that it is easier to choose the best one for the topic students are looking for.
- The e-books options should be briefly described so that it is easier to choose the best option for the topic that students are looking for.
- There should be an option to search only for articles.
- Provide refinements to and limitations for the results to be able to find the information faster.
- There is a need to obtain articles that are not available on the library website, not via the librarians; the users should be able to do this by logging in and requesting an article that is not available in the library.
- Make searching easier by providing supportive services, such as suggestions, and by providing a help option, such as ‘Do you mean that?’
- Follow the Google search techniques to be able to search the resource format type. For example, type a query and then follow it with a PDF, an e-book or a printed book.

At Salford, their suggestions were as follows:

- There should only be one interface, not two different interfaces.
- The information that comes with the results should be sufficient to avoid several clicks and the opening of links to get more information.
- The results should be displayed the same way as Google Scholar to show the number of citations for each result.
- It is better to have fast downloads for the available online resources.
- Avoid sign-in within the university campus.

- It is better to avoid the name SOLAR because it is incomprehensible; just use the term “search”, and users can then use the library for that.

7.7 Summary

This chapter has analysed the data obtained from observations of the tasks that postgraduate students at both universities performed. The data provided a comprehensive picture of their use of the library websites, including what they use them for, how often they use them, and if not why and what they use as an alternative. Additionally, it outlined the steps they follow when they look for information and interact with the library websites; the positive and negative features about the library websites they used; the difficulties they encounter when performing the tasks; the most difficult tasks they encountered; other features they found on the Internet that need to be added to the library websites and their suggestions for the library websites. The next chapter will provide and discuss the findings that emerged from the data analysis of the interviews, focus groups and observations, including how these relate to the literature.

Chapter 8: Findings and Discussion

8.1 Introduction

The previous three chapters presented the results that were obtained from diverse users (librarians, academics and postgraduate students) of the academic library websites at two universities (Kuwait University and the University of Salford). These results were obtained using three different data collection techniques (interviews, focus groups and observations). This chapter presents and discusses the findings from the analysis of the participants' responses and how they related to previous studies in this area. This chapter is divided into three sections: the first—Section 8.2—discusses users' information needs and information-seeking behaviours, including the use or non-use of the library website, their purposes for using it, the predominant requirements for library resources and services, the strategies used to search for information and the locations of searches. The second—Section 8.3—discusses the steps used to search for the information and interact with the library web interface. The third—Section 8.4—discusses users' experiences and the difficulties they encountered while using the library website. Although some findings did not support those of previous studies, the insights were useful to the present research.

8.2 Information Needs and Information-Seeking Behaviours

In the present study, the aims of objectives two and three were to investigate and understand the information needs and information-seeking behaviours of different groups of users of two academic libraries' web interfaces. These included identifying their purposes for seeking information and using the library websites, as well as the reasons for and frequency of their use. The participants who disclosed that they did not use the library website (i.e. non-users) were asked to provide reasons for their non-use. Moreover, these objectives helped to identify the predominant requirements for the academic library's resources and services, the locations from which they conduct their searches and the methods (strategies) they use for searching. This section is divided into two subsections. The first discusses the findings related to information needs, which included the purpose of using the library's website and the resources and services that were used most frequently. The second subsection discusses

information-seeking behaviours, including the locations and methods (search strategies) used in the participants' searches.

8.2.1 Information Needs

8.2.1.1 Purpose of Seeking Information and Using the Library Website

The findings showed that all the participants who used the library websites did so based on their information needs. Moreover, the participants who used the library websites did so only rarely or did not use them at all; instead, they used alternative sources, thereby indicating similar information needs. With regard to the postgraduate students, their needs were diverse and were affected by their positions. The PhD students used the library websites to conduct their research, while the master's students used them to do assignments, write proposals, write dissertations, do projects, find resources from reading lists provided by their lecturers or search for information based on recommendations by their lecturers. These findings coincide with those of earlier studies, such as Al-Moumen (2009), Thani and Hashim (2011), Majid et al. (2012), Chaurasia and Chaurasia, (2012) and Naqvi (2012), who found that postgraduate students searched for information to meet research requirements, write academic assignments, complete course work and prepare for student presentations and class discussions, while academics searched for sources to help them conduct research, teach their students, gain new information and verify existing information. According to previous studies (Marouf and Anwar, 2010; Haines et al. 2010; Khan and Shafique, 2011), conducting research and preparing for classes were the aims of library website use, while use for the purpose of gaining new information and verifying existing information supports Weigts et al.'s (1993) argument that the information need concept occurred in three categories: the need for new information, the need to clarify the information that is already held and the need to corroborate information that is held.

The findings may be explained by the fact that the participants did not use the library websites until they had specific purposes for doing so. These findings are discussed in more detail in Section 8.3.

The findings showed that only a few participants used the library websites frequently, the majority used them only rarely and only a few used them sometimes. It was remarkable that at Kuwait University, the majority of postgraduate students never used the library website,

and the academics rarely or never used it. This is linked to the difficulties encountered when attempting to use the library website; this is discussed in depth in Section 8.4.

The findings showed that regular users of the library websites stated that they used them to find resources that were not available from other sources, such as Google, Google Scholar, databases and other websites, as well as to find books, because searching the library websites for other resources was a confusing and difficult process. These findings indicated that the library websites were used only to find what could not be located in other sources. A possible explanation might be the complexity of the design of the libraries and their usability. Furthermore, it might be difficult to conduct searches using the library websites, compared with Google or Google Scholar, the use of which does not require special expertise. These may be the factors which influenced the participants' decisions to use or not to use the library websites. However, their use of the library websites to find books and resources that were not available from other sources supports Sadeh's (2007c, p. 3) argument that 'numerous libraries hold special collections—physical and digital—that are not available elsewhere'.

The findings also showed that the postgraduate students used the library websites based on the recommendations of their lecturers or to find resources from reading lists that were required and recommended by their lecturers. A previous study by Al-Moumen et al. (2012) demonstrated that faculty members played a crucial role in encouraging postgraduate students to use the library to conduct their assignments and research. These findings were also supported by Yousef's (2010) study, which indicated that many faculty members frequently advised their students to go to the library and told them how to use its resources.

Conversely, the findings also revealed that the participants rarely or never used the library websites due to the ease of using and searching other sources, such as Google and Google Scholar. This finding aligns with the results of other studies, such as those conducted by Haglund and Olsson (2008), Vezzosi (2009), Liyana and Noorhidawati (2010), Haines et al. (2010), Drachen et al. (2011), Khan and Shafique (2011), Onifade et al. (2013) and Ganie and Rather (2014), all of which found that postgraduate students and academics used the Internet, especially Google, because it provided more facilities than any other library resource and was more user friendly than library websites. Haines et al.'s (2010) study found that none of the academics surveyed used library websites. This finding is also in line with Al-Moumen et al.'s (2012) study, which found that the difficulties encountered when using library websites inhibited participants' use of them. According to Anderson (2005, p. 35), 'Google allows the

user to pick his own terms and phrases and use them to interrogate the full text of documents on the open web'.

In addition, the ease of access to the resources to which the libraries subscribe within the universities, such as the Wi-Fi system, which allows access to these resources, was a reason to never or rarely use university libraries. This finding is supported by Ganie and Rather's (2014), who found that most postgraduate students accessed the university libraries' e-resources through search engines; this finding was linked to the problems they encountered when using university library websites to look for information. These problems included networking and the fact that it was time-consuming to provide a username and password. Moreover, this finding is consistent with Constable's (2008) study, which found that researchers preferred searching for information in their offices to working in libraries because of the accessibility to digital information—including email, library resources, Google and personal data sets—from their personal desktop computers. This finding also supported Sadeh's (2007a) argument that the open, direct channels that the Internet provides eliminate the need to go to libraries or search library websites because users are able to obtain online information, as well as physical items, through various Internet services.

The findings also revealed that there was a lack of new and specific resources on library websites (e.g. Arabic collections). In contrast, the availability of resources on Google and Google Scholar was a reason to rarely or never use library websites. This finding supported those of Al-Moumen et al.'s study (2012), which found that the lack of databases in Arabic collections has a negative influence on academics and postgraduate students use of the library. This finding is also in line with those of Awana (2008) and Khan et al. (2014), which showed that the lack of informational materials affected postgraduate students use of the library. According to Khan et al. (2014, p. 45), the 'lack of e-resources, inadequate collections, and insufficient physical facilities were identified as major issues in the effective use of library collections and services'. Moreover, this finding is consistent with Marouf and Anwar's (2010) study, which showed that the faculty's library use was extremely low and that was linked to the low quality of resources, especially in Arabic, and the limited access to international resources.

Moreover, the findings revealed that the postgraduate students pointed to the ease of obtaining resources from their workplaces, as well as from friends and relatives who were studying at other universities, which was a reason to rarely or never use library websites. This finding is similar to information that was mentioned in the earlier studies—that postgraduate

students turn to faculty advisors, classmates and other students, family, friends, professionals in the field and university library staff; they also turn to their own network of contacts beyond the local university when they need information (George et al., 2006; Vezzosi, 2009; Connaway and Dickey, 2010; Liyana and Noorhidawati, 2010; Drachen et al., 2011; Catalano, 2013). However, obtaining resources from their workplaces has not previously been described. This finding may be explained by the fact that each library gave a reasonable excuse in response to the questions about this issue. Each library is constrained by a specific budget and limited space for storing resources, which might constitute additional excuses.

The findings showed that the ease of obtaining citations for resources or articles on Google Scholar, which helped to identify related articles, was a factor that affected library use. This finding supports those of RIN (2006) that Google Scholar is primarily used to follow up references instead of searching for unknown publications. It is also similar to the findings of Wu and Chen's (2014) study, which showed that postgraduate students used Google Scholar to validate the quality and authority of certain documents according to the citation information found on that site.

8.2.1.2 The Most Frequently Needed Resources and Services

Regarding resources, the findings showed that most library users indicated that articles were the most frequently needed resources that were used, especially those in electronic format. However, the majority of users generally looked for all types of resources, based on their information needs and subject areas. For example, the users who were interested in law searched newspapers to find information about a famous crisis or crime, and the users who were interested in art and design looked for resources about a particular design or artist. This finding also showed that the postgraduate students at both universities looked for the information required to do their assignments, theses and dissertations related to their studies, without indicating the types of information they sought. At Kuwait University, some of the users searched for resources based only on the recommendations of their lecturers. This finding may be explained by the fact that the users searched for only the information that met their needs regardless of the type of resource. Thus, they usually used the library website to search for the information they needed; it was rarely for a particular resource. However, it can be concluded from this finding that it is almost impossible to identify the resources needed by the library users because their needs for resources and their purposes for seeking

information were diverse. All the studies in the relevant literature that investigated users' needs in regard to library resources showed that they searched for various types of resources. Moreover, they indicated that journal articles or electronic resources were the most preferred resources. *These findings suggest* that library website developers and decision-makers should consider the fact that library users most often search for information, not resources.

It was not surprising that articles, especially those in electronic format, were the most frequent resources needed by users. This finding coincides with those of RIN (2006), Hamade and Al-Yousef (2010), Marouf and Anwar (2010), and Drachen et al. (2011), which showed that journal articles were the most important and most preferred resource. In addition, this finding is consistent with Brown and Swan (2007), Ge (2010), Majid et al. (2012) and Onifade et al. (2013), who found that users valued resources that were in an electronic format, especially journals. In accordance with Ge (2010), electronic resources were preferred because they are easy to use, convenient and effective and because they save time and can be accessed anytime and anywhere.

Regarding the services, the findings revealed that, with the exception of the postgraduate students at Kuwait University, locating information was the most important service required by postgraduate students and academics, who always ask for the information they need and are unable to find, or have difficulties finding, on the libraries' websites. A possible explanation for this finding is that searching the library website is difficult, and users encounter obstacles when attempting to find information that is already available on the library website. Furthermore, this finding can be explained by the fact that the users have no adequate searching skills or lack information literacy, which causes these difficulties and compels them to ask the library staff for help. *This finding suggests* that libraries should consider providing effective online help to enable users to be in touch with the library staff in case they encounter problems when searching for information.

Moreover, the interlibrary loan was found to be a service that was required in particular by most academics but very few postgraduate students, while the findings from the interviews with the librarians indicated that this service was crucial for both academics and postgraduate students. This finding is in line with those of Haines et al. (2010), who found that researchers used the interlibrary loan service. This finding differs slightly from that of Vezzosi (2009), who found that document delivery (interlibrary loans) appears to be a crucial library service for all doctoral students. This is, in turn, slightly different from Onifade et al.'s (2013) finding that postgraduate students frequently use the document delivery service.

The findings from the interviews with the academics showed that the instructions and orientations (library induction) were used by most of them at both universities to train their students in how to use the library. However, the librarians at Salford did not indicate that this service was required by the academics. Furthermore, the findings from the interviews with the librarians at Kuwait University revealed that few academics and few postgraduate students use the reserve service; this is a reserve room in which postgraduate students can study, academics can teach their students and books can be reserved by students and academics. Nevertheless, none of the academics and postgraduate students at Kuwait indicated that they used this service, and it was found that only very few students at Salford used this service. However, none of the librarians at Salford indicated that this service was required by the postgraduate students. These findings seem similar to the results of a study conducted by Tuatara et al. (2010), who found that the majority of the participants indicated "not important" or "somewhat important" for every service listed in the survey they completed. These findings, in actual fact, indicated that library services are not frequently used by the users, hence, there might be some factors affected their use of the library services. Choy (2011) suggested a number of factors that affect the use of the library services include 1) convenience: users use the library services if they are convenient relative to other choices; 2) attention: library services must compete for attention amongst other services and options; 3) awareness: libraries should follow a comprehensive strategy to market their services and resources; and 4) perception: if users do not consider there to be much value in using library services, they might not use them, even though the services are free and convenient.

8.2.2 Information-Seeking Behaviours

8.2.2.1 Locations of Searches

The findings showed that none of the academics at either university search for information in the library; rather, they conduct searches from their offices and homes. This finding supports those of Constable (2008), who found that researchers preferred to search for information at their offices instead of at libraries. Although Al-Moumen's (2009) findings showed that 76.0% of academics searched from their offices and 38.0% from home, her findings also showed that 22% of them searched in physical libraries. However, the finding of the current study indicated that no academic who participated searched from the library. Constable's

(2008) findings explain that this is because of their ability to access digital information, including email, library resources, Google and personal data sets, from their personal desktops. Moreover, Al-Moumen's (2009) argued that faculty members (academics) have limited free time because of their teaching and research schedules.

The findings also revealed that the participants at Kuwait searched via the university's Wi-Fi regardless of whether they were in their offices, laboratory or elsewhere on campus. The resources to which the library subscribed could be accessed from these places, which encouraged them to avoid searching in the physical library. They avoided using the library and its website even though they knew that the resources they needed could be accessed on the library website because of the library's subscriptions to these resources. These findings could be related to the same explanation mentioned earlier regarding the use or non-use of the library. However, this finding has not been previously described.

It was found that the postgraduate students at both universities searched from home to save time because they worked and studied simultaneously. This finding indicates that working and studying at the same time plays a crucial role in their decisions not to visit the library to conduct research. This finding seems similar to those of a study conducted by Drachen et al. (2011), which found that PhD students conducted their searches from home in addition to other locations.

In addition, some postgraduate students at Kuwait conducted searches from their workplaces and used the resources provided by their employers. This finding is consistent with those of Drachen et al.'s (2011) study, which found that most students searched from locations, such as their workplaces, both at and outside of the university. In contrast to earlier findings, however, there was no evidence of the use of resources provided by the employer.

The findings disclosed that the PhD students at Salford searched from their offices at the university because they provided better study environments and enabled fast searching, and it was easy to access online resources. In addition, they could save resources on their computers, and they had easy access to friends for support and assistance. This finding seems similar to those of Drachen et al. (2011), who found that some PhD students searched from their university offices, which were also their places of work. In contrast to earlier findings, however, there was no evidence that they searched from their offices at the university for the reasons that were mentioned.

On the contrary, it was found that very few postgraduate students searched from the libraries because they were better study environments and it was easy to obtain assistance from the libraries' helpdesks. This finding was consistent with those of Ganie and Rather's (2014) study, which found that only 16.4% of the postgraduate students who participated in their study preferred using the university's central library. However, this finding did not support the results of Al-Moumen's (2009) research, which found that 53% of the postgraduate students who participated in the study conducted their searches at the library. Several possible explanations exist for this finding. These participants might have had no other environment that was conducive to studying, and they may have, therefore, tended towards searching from the library. Thus, if they had access to another location, they might not have conducted their searches at the library. The participants who did not conduct their searches at the library indicated that the environments that they had (e.g. offices and home) encouraged them not to go to the library. It is also possible that when they were away, these participants might have encountered problems with which they needed help and were unable to receive it from the library when they were at their homes, workplaces and so on. Consequently, they tended to conduct their searches at the library to access both immediate help and environment.

The above-mentioned findings indicate that the majority of the users did not use the library to search for resources. This supports Brown and Swan (2007), who noted that the number of researchers visiting libraries has declined since 2001, which is a trend that is expected to not only continue but to also accelerate. It is possible, therefore, that *academic libraries should consider providing* online help for users to assist them remotely, as most of the users who are searching for information are not inside or close to the library.

8.2.2.2 Methods (Strategies) for Searching

In the interviews and focus groups, the findings revealed a number of methods (strategies) that participants employ when searching for information.

It was found that all participants first looked for information on the Internet, particularly Google and Google Scholar. Even librarians did this when they encountered problems with their libraries' websites and were unable to find the information required by the user. This finding was not surprising, because it aligned with the findings of earlier studies, such as Haglund and Olsson (2008), who found that researchers generally used search engines and Google in particular. Al-Moumen (2009) found that 88% of postgraduate students and 77%

of academics begin their research using search engines. Drachen et al.'s (2011) findings showed that Google and Google Scholar were the main tools that students used for their research. Catalano's (2013) study also revealed that postgraduate students began their research using the Internet. This finding is particularly interesting because even though the librarians had other tools, such as the websites of other libraries through the interlibrary loan service, they also used the Internet, especially Google, as their first method when they did not find what they needed in their libraries. Possible explanations for this finding may be similar to those mentioned earlier regarding the use or non-use of the library (Section 8.2.1.1). The librarians might know that what the user needs is available on the Internet but he or she does not know how to find it because of his or her weak search skills or because he or she depends on the librarian to find the information. Moreover, it might be faster for the librarians to do this than to use alternatives methods (e.g. ask a colleague or use the interlibrary loan), as many resources can be found on the Internet; therefore, they save their time and their users' time by providing immediate help.

It was also found that most participants searched the Internet particularly through Google for databases, journals and websites that specialised in the subject areas they are looking for. This finding was consistent with those of Haines et al. (2010), who found that when they started a search, most participants used different sites, such as Google or websites that specialised in their subject areas. No evidence was detected that the postgraduate students used websites (e.g. databases or e-journal websites) that specialised in their subject areas.

The findings also showed that one method used to search for information was personal contacts, also referred to as cooperation, as some academics asked their colleagues and even their PhD students, research assistants and library staff for assistance, whereas the postgraduate participants asked their lecturers, friends or relatives for what they needed. Moreover, the librarians asked someone with more experience, such as a senior librarian, and they used particular websites or cooperating libraries for interlibrary loans (e.g. GCC libraries, British Library, SCONUL and the NHS website). This finding was categorised as cooperation because the participants used their personal networks or the sources that the library cooperates with. This finding is in line with those of previous observational studies, such as RIN (2006), George et al. (2006), Haglund and Olsson (2008), Vezzosi (2009), Al-Moumen (2009), Connaway and Dickey (2010) and Drachen et al. (2011), who found that information seekers do not depend only on themselves or the Internet. They also use their personal contacts (e.g. friends, supervisors, relatives, co-workers and colleagues). However,

George et al.'s (2006) findings indicated that postgraduate students used this step first when they started searching. A major criticism of this finding is that George et al. conducted their study in 2006. Since then, ICT has undergone considerable development, which has affected users' searching behaviours. However, in contrast to this finding, there was no evidence that academics ask their PhD students or research assistants to find information or that the librarians use the methods mentioned above.

It was found that very few participants used the library as a method for searching for information after using the Internet or contacting their personal contacts. This finding could be linked to the explanations that are provided and discussed in Section 8.2.1.1 regarding the use or non-use of the library.

The findings also revealed that, with the exception of the postgraduate students at Kuwait, the participants asked the library staff for assistance if they were unable to find what they needed on the library websites. This finding is consistent with those of George et al. (2006), who found that 40% of the postgraduate students who participated in their study turned to the university's library staff for help. Catalano's (2013) study showed that postgraduate students consulted librarians for help with their research. However, this finding differs from those of Haglund and Olsson (2008), who found that researchers never consult manuals or even contact university libraries for help if they do not know why their searches were unsuccessful. A possible explanation for not asking librarians for help might be that the researchers have difficulties contacting the libraries or depend on other tools that might provide better help than the university's librarians do.

It was found that all participants who asked libraries for help went to the physical libraries. Some academics sent their PhD students or research assistants to the libraries. This finding might be an indication of a problem with the libraries' websites; their help or contact services might need to be improved. Moreover, it was found that participants' queries were about information that they needed that did not exist on the library websites, information that could not be found, information that was available on the websites but could not be accessed, as well as requests for services (e.g. interlibrary loans). This finding clearly indicates that the participants encountered major problems when searching for information that was available on library websites; this might be due to difficulties with using library websites or to weaknesses in library systems' ability to locate information. The finding also indicated the difficulties in obtaining resources that are not available in the libraries or obtaining the services they need online through library websites, as they must do this by physically going

to the libraries. *This finding suggests that academic libraries should consider* providing more interactive services through their websites to enable users to obtain the information they need online.

Based on the observations, it was found that most users who use advanced searches do so to search for certain authors or books. *This finding suggests that academic libraries should consider presenting searches* according to types or advanced searches in ways that are more straightforward and have more visible interfaces. This would enable users to determine their search type before they begin to search in case they have particular names or titles that they want to find.

8.3 Steps Used to Search for Information and Interact with the Library's Web Interface

The main aim of the study was to identify how the users of academic libraries search for information and interact with the libraries' web interfaces. In addition, the first objective was to develop a model based on the combination of the ISB and HCI models, which were developed in different areas, to identify how they describe the steps that users follow to search for information and interact with the web interfaces. It also aimed to investigate whether the combined model could facilitate the understanding of how users search for information and interact with the web interfaces when they access academic library websites. The combined model enabled the identification of the steps that users follow when they search for information and interact with the web interfaces of academic libraries. This section presents and discusses the steps that users follow when performing the tasks, and it compares these with the model created based on the ISB and HCI fields. The difficulties that users encountered when following these steps are discussed in detail in Section 8.4. In this section, the data primarily collected from the observations are discussed. First, the model that was created based on the ISB and HCI will be provided in the next table (Table 8.1), and then the steps identified for further discussion and interpretation will be provided.

Table 8.1: The model based on the combination of the ISB and HCI models

No.	Step	What users think about in this step
1	**Commencement**	- Need information. - Lack information about the topic. - Look for known or identified information (e.g. items and resources) by browsing to search. - Form a goal to be accomplished and decide (intend) what to do next.
2	**Exploration**	- Browse and examine the items they received. - Explore to accomplish a task in different ways (e.g. based on their understanding of the field of work, by following footnotes and citations in an identified resource or by determining which source to search, in which field and what to search for). - Identify what to search for. - Browse to scan an interesting item. - Choose the system and collection to start searching. - They might be influenced by psychological factors.
3	**Decision making**	- Articulate the tasks formed and identified in the previous step. - They might be influenced by variables, such as experiences, expectations or demography, prior to searching. - Determine how to start their search by choosing a search system based on their experience with a particular system and their expectations from the previous step. - Formulate their search. - Start by searching for general information about the topic. - Check information about their interests to learn something before they select what they want by going to contents pages or lists of titles. - Select the items for retrieval by finding a button or an item to choose and click on. - Expand the information they have and then navigate other types by following links.
4	**Inference and interpretation**	- They are more confident in their ability to solve the problem. - Formulate their query and then execute the search to explore or ask for information that is already well known. - See what has happened (e.g. displayed or through feedback) by receiving information items in response to their search. - Review the results by viewing the data set size, layout, sequencing and contents to seek identified items. - Filter the information sources to differentiate or distinguish between the information presented, as well as to monitor the developments in a field by frequently following particular sources. - They might prefer some kinds of information more than others, and they may or may not be able to achieve their search goals successfully.
5	**Expression**	- They might obtain results by undertaking passive, active or ongoing searches. - View what the system presents to them. - Work through the resources to identify and examine what is of interest or relevant to their goals. - Scan, evaluate and interpret the results they obtained. - They might reformulate the query, focus on relevant results or narrow down their search results. - Extract relevant information they focused on, using skills such as reading, scanning, listening, classifying, copying and storing information.
6	**Conclusion**	- Observe and evaluate the results they gained, and ensure that they are correct and relevant to their goal to end their search. - Make sure that the information obtained is similar to what has been provided in the meta-information. - Find results (information). - Reflect, iterate, stop their search or reformulate their queries based on the information-seeking process itself.

In this study, what is surprising is that no differences were found at either university in regard to the steps that users took when they performed the tasks. The following seven steps were taken.

8.3.1 Step One: Scan and Explore the Interface Options

All the study participants (in the interviews [academics], focus groups and observations) were asked about the purpose of seeking information whether by using the university libraries' websites or other websites. All stated that they used the library websites or alternative websites based on the information they required. Their needs were diverse and were based on their positions and purposes. For instance, the PhD students used the library websites to conduct research; the master's degree students used them to do assignments, write proposals, write dissertations, complete projects, find the resources from reading lists provided by their lecturers or search for information based on the recommendations of their lecturers; and the academics searched for resources that helped them to conduct research, teach students, gain new information and verify existing information. Thus, the users did not begin to search for information on the library websites until they identified what needed to be achieved.

Based on the observation, the participants were given specific tasks and, therefore, knew what they were looking for. As their first step, all participants scanned and explored the interface options based on their tasks. For example, when they were asked to find a journal, they scanned and explored the interface options to find the appropriate option of locating the journal. When they were asked to find e-books, they scanned and explored the interface to find an option for e-books. This was repeated with the other tasks. Surprisingly, when the majority of the users (particularly in task four) did not find an option that was relevant to the task, they scrolled up and down the pages while scanning the library interface and exploring the options. They then went to each option, using the mouse pointer when they explored the library interface.

By comparing the first step in this study with the first step in the model, which was commencement, it can be concluded that identifying the required information, obtaining the initial information or even formulating the goal cannot be a step in looking for information on the library website, because it is used only when the users have identified the desired information. However, searching known items or browsing to search and scan an identified or

interesting item to begin a search mentioned by Belkin et al. (1995) the first and second steps in the model, can be slightly similar to the first step in this study. Users were scanning and exploring the options which could be identified or interesting items to begin their searches, as they knew what they are looking for based on the task. However, none of the users in this study browsed to find identified items as they were exploring the options available in the interface.

However, the first step in this study leads to some points mentioned in the second step of the combined model—that is, users intend to accomplish a task by exploring the ways to do that (Norman, 2002; Dix et al., 2004). It also supports the point made by Shneiderman et al. (1997): users identify where to search and begin exploring based on their understanding or knowledge of the task field mentioned by Marchionini (1995), as the users in this study scanned and explored the options to identify the best one to choose based on the task.

In the first step, the users in this study were not affected by any psychological factors, as Wilson (1999) mentioned. They were confident, and when they chose the wrong option, many of them simply changed it and chose another one without encountering any problems. In addition, the users in this study did not need to follow the footnotes and citations in an identified resource, as Ellis (2005) declared. In addition, they did not need to have an idea about the topic to be able to begin their searches, as Kuhlthau (2005) declared, as they were given particular tasks to perform. They also did not need to browse or examine the items they had, Sadeh (2010) mentioned, as they had specific tasks and knew what to do.

However, none of the models indicated what users do in the cases in which they are unable to find the option they need. This study ascertained that if users did not find what they needed, they went to each option, using the mouse pointer, when they explored the library interface. Hence, this finding was not detected.

8.3.2 Step Two: Choose an Option

This study found that, in the second step, the participants chose an option. This step was based on the previous step. After scanning and exploring the interface options, they chose the option that seemed the best, based on their assessment of the options on the interface. For example, on the University of Salford's library website, there was no option for journal; therefore, most users chose "find everything". On Kuwait University's library website, there

was no option for articles; therefore, most participants chose either the e-journal option or the database option, both of which contain articles. It was observed that some participants chose the wrong options because the organisation of the options was complex and because of the terminology used on the library website. (This point is discussed further in Section 8.4.)

Hence, the second step of this study further supported the third step in the model, as the users in this study decided by choosing the option they believed was most appropriate. This is further supported by some points mentioned in the third step in the model. In particular, Shneiderman et al. (1997) mentioned that users determine the ways in which to begin their searches. Similarly, Norman (2002) indicates that users execute actions, such as finding a button or an item to choose and click on, as was the case with the users of this study: when they chose the option, they selected (clicked on) it. This seems similar to Marchionini (1995), who states that users choose a search system based on their experiences with a particular system and their expectations from the previous step. The users in this study chose the option based on the previous step; however, they did not choose the system, as they were using the libraries' websites (systems). In addition, the second step of this study strongly supports Wilson's (1999) view that, in the third step, the users can be influenced by a number of intervening variables (e.g. availability of resources, accessibility and credibility). The users in this study were influenced by the availability of the options provided in the libraries' interfaces, as some of them chose the wrong option or did not know which one to choose to begin. Moreover, the second step of this study was similar to the point elaborated in the second step of the model mentioned by Hearst (1999): users choose the system and the collection to begin searching.

Thus, it can be concluded that steps one and two in this study indicated that the options provided in the website interfaces affected the users' behaviours and interactions.

8.3.3 Step Three: Formulate the Queries and Execute the Search

It was found that the third step that users performed was formulating the query and then executing the search. This step was also based on the previous step. The users did not formulate their queries to execute the search until they assumed that they chose the right option. When they failed in the first attempt because they entered a misspelled or insufficient

query, they either fixed or reformulated it and then executed a search, changed the search option before they executed a search or did not complete the task.

In this study, the third step was similar to the point mentioned in the third step of the model, particularly Hearst's (1999), in which users send the query to the system, it fails and they reformulate the query. Furthermore, this step is similar to the point mentioned in the fourth step of the model, particularly by Marchionini (1995), in which a query is formulated and a search executed. Nonetheless, Marchionini pointed out that users formulated their queries according to the system's vocabulary or by using strategies and tactics based on the rules and features allowed by the system's interface. A major criticism of Marchionini's third step concerns the system's vocabulary. How do the rules or features of the system interface control the users' strategies and tactics when they formulate their queries? These do not exist on the library websites. The users of the library websites can formulate their queries without barriers or prior rules requested by the library websites or their systems. They are free to formulate their queries, and even within the advanced search, they can search according to any option they need; so they can search by title, author, subject and so on. Users might be affected by their low knowledge of the topic when they formulate their queries or choose the keywords before executing their searches. According to one participant in this study,

'When I search for something, for example, at the beginning of my studies, it will be different than if I search for it again three weeks later, because the lecturer will give us more information about that topic. The lecturer will also provide us with a reading list as well [for us to] read more about that topic, and so I will have more information about the topic. I will be able to use the correct keywords. I might know about some journal that specialised in that topic or some databases that my lecturer told me about'.

This step is also similar to the fourth step of the model, particularly in Sadeh (2010): query and then explore (i.e. search for information outside their field), search (i.e. conduct an exploratory search) and ask for information (i.e. information that is already well known by the users). Sadeh declared that users can then later reformulate, focus or narrow down their search in one step. In this study, the exploration of the results by the participants was the fourth step.

However, none of the models indicated the possibility of users formulating wrong queries or highlighted the complexity of the system, which does not support users' mistakes and which

affects the search process. In addition, none of the models indicated the possibility of changing the option that the users chose to search in.

8.3.4 Step Four: Explore the Results

It was found that the participants explored the results in general to see what was displayed for them. If no results were displayed, they either reformulated their queries or selected another option. Some participants used the advanced search but only to look for a specific name or title if they did not find it in the results. A possible explanation for this is that the participants might have thought that what they were looking for would be visible. Another possible explanation is that the participants were accustomed to seeing the keywords they entered either highlighted or bolded in the results. If no relevant results were found while exploring the results, they tended to read and verify every result, which was their fifth step.

The fourth step is consistent with the fourth step in the model presented in Norman (2002), who pointed out that users perceive what happened (feedback). Similar to what was mentioned by Hearst (1999), users receive information items in response to their searches. This step is slightly similar to Sadeh (2010) in particular in that, after sending a query, users explore in three ways (purposes):

1. To search for information outside their field. This did not occur in this study because the participants searched for information determined by the observer.
2. To conduct an exploratory search. The participants in this study explored the results to find information similar to the query that they formulated.
3. To ask for information that was already well known by the users. This occurred in this study because the users searched for information based on the task.

8.3.5 Step Five: Read and Verify the Information (Metadata) of the Results

The findings showed that, after exploring the results, the participants tended to read and verify every result. In this step, the participants focused on each result and determined whether or not it was related to the query. It was noticed that they read and verified the results to look for words that were similar to those in their queries. Although some results

were relevant to the required information, they were ignored because they did not include one of the keywords that the participants entered. If this result included words that were similar to the query they entered, they carefully read the information (metadata record) that came with the result. If the metadata record was sufficient, they finished the task based on this information. Possible explanations for this step might be that the users were not information literate or were performing tasks that were not in their subject areas. In addition, the majority of the participants did not scroll up and down the page, limit the search results or browse the results after exploring them and reading the information (metadata record) on the first page. Some users believed that what they were searching for should be one of the first results (this point is discussed further in Section 8.4.2).

This step was similar to the fourth step in the model that was mentioned by Belkin et al. (1995), in which users learn information about an item or resource or they seek the identified item. It could also be similar to the fourth step in Shneiderman et al.'s (1997) study, in which the users review the results by examining the size, layout, sequencing and content of the data set. In addition, it is similar to Sadeh's (2010) fourth step: after formulating their query, users ask for information that is already well known to them, just as the users of this study were looking for information that was already well known to them based on the task.

Furthermore, the fifth step in this study supports several points mentioned in the fifth step in the model. Regarding the users in this study, when they ascertained that the result they examined is what they wanted, they completed the task. This is similar to Kuhlthau's (2005) position that users gather the information upon which they are focused. This is also similar to Belkin et al. (1995), who indicated that users identify relevant items through stimulated associations, which means that users choose the results that seem relevant to their tasks. This also supports the position of Marchionini (1995), who pointed out that users examine the results that are relevant to their goals and then extract relevant information, using skills such as reading or scanning. This is also similar to Sadeh (2010), who stated that users might focus on acceptable and relevant results. Similarly, Hearst (1999) declared that users scan, evaluate and interpret what they obtain from the results.

However, the finding of this step proved that metadata plays a crucial role when users read and verify the results, as they depend extensively on this information, and they do not select any result if the metadata is sufficient, as they make the decision to finish their tasks based on this information. This finding is consistent with those of other studies, such as Connaway and

Dickey (2010), who suggested that high-quality metadata has become more important in the discovery of appropriate resources.

8.3.6 Step Six: Select (Click on) the Result to Examine and Confirm It

The findings showed that the participants' sixth step is to select (click on) the result to examine and verify it. The participants did not take this step if the metadata were sufficient. The participants examined the results that they selected to confirm whether or not they contained the required information. The participants used the following sequence when selecting the results:

a) Opened links if required (if the information was still insufficient) and then examined the information in that link. If they did not find what they needed in that link, they
b) limited the results. A few of them did this by scanning and exploring the results page and then choosing one of the available limitation options, or they
c) reformulated their queries and executed a search or they
d) changed the search option and then formulated their queries and executed a search.
e) Utilising these methods, they repeated three steps—*explore the results*, *read and verify the information related to the results (metadata)* and *select (click on) the results to examine and verify them*—until they made the decision regarding whether to complete the task or leave it, which is step seven in this study and which will be discussed after this step.

The comparison of this step with the model showed that it was similar to the fourth and fifth steps, especially in regard to Ellis (2005), who pointed out that the users filtered the information sources to differentiate or distinguish them from the information presented. They then worked through the resources, selecting any material of interest. However, in this study, only few of the users were limited or filtered their search results at Salford. At Kuwait, none did this, because the refine option was not sufficiently visible. The sixth step could also be similar to that referred to by Sadeh (2010), which is the fifth step of the model: the users scan the results and then reformulate (if they did not find the required information), focus (on acceptable and relevant results) or narrow them down (if they find several results) to those that are most appropriate for the required information. This is also similar to Sadeh's (2010) third step: users might navigate other types of documents by following links, but the users in

this study followed the links for the results they selected to ensure that these results were what they needed and were not for anything else.

Regarding the fifth step in the model, Shneiderman et al. (1997) pointed out a similar step in which the users refined their searches by using the feedback received from the system and then clustering the results. In addition, this step is similar to the third step in Belkin et al.'s (1995) model, in which the users learned about items or resources and then selected the most useful ones for retrieval. The sixth step of this study was consistent with the fifth step in Marchionini's (1995) model, in which the users examined the results that were most closely related to their goals and then retrieved the relevant information. Moreover, in this study, the users encountered difficulties when they selected items to examine. Some results that were selected did not open, or they could not access them to decide whether or not the results were relevant, and this affected the searching process. This finding is similar to Wilson (1999). In the third step, Wilson found that the users were influenced by a number of intervening variables, such as the environment (e.g. availability of resources) and the characteristics of the sources (e.g. accessibility and credibility). The users in this study were affected by the accessibility of the results they needed. As they transferred to the websites for these results, they needed to enter their username, password or Athens, and because of restricted access, some of them encountered difficulties when attempting to access the resources they selected.

However, the sixth step of this study found that the visibility of the search options or limitation options affected the users' behaviours and interactions, particularly at Kuwait, as none of them observed the refine option. Hence, this finding suggests that the search options and limitation options should be more obvious so that users can observe and take advantage of them.

8.3.7 Step Seven: Make a Decision

The findings showed that users make decisions in two ways:

1. They finish the task because they have succeeded and obtained the required information or fail and choose not to continue,

Or

2. They repeat steps 2, 3, 4, 5 and 6 until they complete or do not complete the task.

These steps are similar to the final step in the ISB and HCI combined model. Nevertheless, this step is more similar to those in Marchionini (1995), who pointed out that users reflect, iterate and stop their search based on the information-seeking process. In addition, it seems similar to Hearst (1999), who declared that users either stop the search or reformulate the query.

To summarise, this study showed that users follow seven steps to search for information and interact with academic library web interfaces. These steps overlap as users can change, move and go from one step to another based on the difficulties they encounter and the options they have. Conversely, to a large extent, these steps support those identified in the combined model. However, there were some differences in the order and process of the steps in this study compared to the steps in the model. In addition, some findings had not been detected before and were identified above. Finally, the steps found in this study supported the significance of the ISB and HCI fields for academic library web interfaces and the synergy between the ISB and HCI models in identifying the steps that users take when searching for information and interacting with the interface is effective and efficient.

8.4 Experience and Difficulties

Objective four of this study aimed to investigate different groups of users' experiences and difficulties in using academic libraries' websites. It identified users' perceptions of and experiences with library websites, as well as how these websites were perceived, by comparing them with other, more familiar websites. This objective is helpful in revealing the difficulties and obstacles that users encountered when using library websites. This section explores the data collected from all the study participants.

The findings revealed that the study participants experienced several issues and encountered various difficulties when using the libraries' websites. The findings in this subsection are divided into several sections as follows.

8.4.1 Lack of Organisation

All the users indicated that information in all areas cannot be searched for using a single search tool because resources are scattered across different search options. This meant that

the users needed to search individual resources, which was a confusing, difficult and time-consuming process. All the users preferred to search for all the information using a single search tool. One explanation may be that users tend to use search engines, particularly Google, which enables them to search for all the possible information using a single search tool. This finding supports Sadeh's (2008) argument that people are interested in web search engines like Google because they provide access to multiple types of material—including videos, images, websites, online books, online articles and conference presentations—in one place. This finding also supports Prabha et al.'s (2007) suggestion that for libraries to remain relevant, their systems need to imitate Internet search engines. Features such as those that facilitate searches and combine all types of information (e.g. books, journals, articles and web pages) could improve users' search experiences and eliminate the need for users to understand complex library systems. This coincides with Ge's (2010) findings that, in library interfaces, unorganised content prevents the effective use of electronic resources, such as listing databases on different web pages. Moreover, this finding is in keeping with Khan and Shafique (2011), who found that one of the difficulties that academics encounter when searching for information in the library is that it is scattered among several sources. In reality, this finding is not new; rather, it has been ascertained that libraries cannot make it possible for users to search for all of their resources using a single search tool. This is an important issue for future research. A possible explanation is that libraries might face obstacles that prevent them from being able to do this. This is an issue which requires further investigation to identify why this is the case and to determine how to enable libraries to do this.

The findings of the observations showed that most users at Kuwait and few at Salford encountered difficulties in identifying the appropriate search databases. They did not know which databases were related to the topics that they were looking for; this was truer for users of the Kuwait library website. In this study, the library websites' databases offered descriptions of the content. However, the Kuwait library website databases do not describe the topics that they cover or provide keywords to help users to identify the database topics. The library website at Salford provides a description of the subjects covered but does not provide keywords. For example, at Kuwait, the ACM Digital Library database was described as follows:

'ACM Digital Library is a vast collection of citations and full text from ACM journal and newsletter articles and conference proceedings'.

At Salford, the database was described as follows:

'Full text of all ACM journals and conference proceedings from 1985–date. A few journals have earlier issues included. Bibliographic information, abstracts, reviews, and the full-text for articles published in ACM journals, magazines and conference proceedings, together with works published by affiliated organisations: Subjects: Audio and Video Technology; Computer Science; Environmental and Occupational Health/Management; Information Systems and Technology'.

This could explain why users, especially at Kuwait, encountered difficulties in identifying which databases covered their topics of interest. For users at Salford, a possible explanation might be that they did not notice the subjects that the database covers; rather, they merely wanted to search all the databases using a single search tool because performing searches using each database is time-consuming. Other possible explanations are that users lack search skills, have low information literacy or are unaware of the library services and what they provide. Some users do not use the library frequently or at all; hence, they do not know how the library presents its resources or how to use them to satisfy their information needs. In general, this finding supports Akselbo et al.'s (2006, p. 14) argument that 'the problem with the databases is that you cannot content yourself with just searching one place, like you can with Google. It is hard for the students to differentiate between the different databases'. *These findings have implications for academic library websites, suggesting that they should* consider providing brief information about each database, as well as keywords to enable their users to make the best use of the databases that are available to them.

The findings also revealed that unorganised content and information acted as obstacles for users when they were searching for information in the libraries' interfaces. The users were confused about how to begin their research. At Kuwait, the library website first provides information about the library (see Figure 1 in Appendix 3); therefore, the users do not know how to begin their searches. Furthermore, some librarians indicated that there is a separate website for each library (see Figure 5 in Appendix 3). Most users do not know that there is a website for each library in addition to the main library website. At Salford, some librarians mentioned that although the library website made information available, it did not prioritise the most important information. Furthermore, there are excessively large images on the site. Its structure is not well organised, and some postgraduate students mentioned that the search options are redundant (see Figures 1, 2, and 3 in Appendix 4). Some users in the observations wondered whether it was possible to search for all the information using a single search tool and why other options, such as books and articles, were made available and so on. *This*

finding suggests the necessity to organise the information in the interface by reducing that which is unnecessary, thereby improving users' ability to navigate the library website and making it easier for them to find the information they require. In addition, the findings suggest that it would be useful to create a unified website for all libraries' collections. In contrast to earlier findings, however, no evidence of these findings was detected.

One unanticipated finding was that few users in the observations were distressed by the number of interfaces at Salford's library. Two interfaces are used: the library website interface and the SOLAR interface (see Figures 1 and 24 in Appendix 4). They were familiar with the SOLAR interface because it had previously been used on library computers. However, upon visiting the library homepage, there are two interfaces: one for the library website and one for its system. Library resources can be found in SOLAR (the library system), while the library website interface can be used for everything, such as resources, services and general information that is excluded from the library system, and it also includes SOLAR as a choice for searching resources. *This finding, which has not previously been described in other studies, suggests the need to create a unified interface* for the library whether online or for use on library computers.

8.4.2 Lack of Findability

The findings revealed that all the users encountered several problems related to the findability of the libraries' systems. These difficulties are related to the systems' capabilities and characteristics. The systems

1. Failure to retrieve existing resources, leading to difficulties in finding these resources;
2. Failure to recognise the names of books, conferences and whole authors, as well as journal article titles or phrases that users have typed;
3. Failure to retrieve organised results as they are displayed randomly; and
4. Failure to retrieve accurate information.

The present findings seem consistent with those of other research that found that users still encounter challenges when searching for identified journal titles and specific terms in the interface (Denton and Coysh, 2011). Similarly, Kress et al. (2011) found that users failed to locate known items because they expected to use any of the pieces of information in the citation to search the system. In actuality, systems may fail to index all the information that is

contained in a citation. Hence, if this piece of information is not an indexed term, the search will fail. The findability of library systems should be improved to make it easier for the users to use diverse terms, whatever they are, and to find the relevant results.

One remarkable finding was that the majority of users (librarians, academics and postgraduate students) at Salford indicated that a number of options are hidden, that the headings are not specific and that there is a need to follow a number of clicks to arrive at the required information. All of these issues are time-consuming and make it difficult to find the relevant information during the search.

At Kuwait, the findings revealed that users had difficulties finding Arabic resources. This may indicate that the information was entered incorrectly. The Arabic language, including the alphabet, is completely different from English in terms of how it is written. In addition, some librarians indicated that system searches are only meant for printed resources and not for e-resources. Most users are unaware of this and often expect to be able to search for everything in the system. Moreover, the system does not identify the type of resource that is retrieved. As a result, users need to select (click on) and check every result to verify whether the result is a book, journal, conference proceeding or another form entirely. *It can, thus, be suggested that the library provides more information* about each search tool and its contents. Moreover, there is a need to clarify each type of resource that users search for by displaying small images to indicate whether it is a book or a reference and so on.

For the majority of the users in the observations, when they explored the results and read through the information, they were looking for words that were similar to their queries. Although some results were relevant to what they needed, they ignored them because they did not include the keywords they had entered. Some users wrote the whole task question exactly as it was written and did not use keywords in their search. This finding seems similar to Kress et al. (2011), who found that users failed to locate known items because they expected to use any of the pieces of information in the citation to search the system. In actuality, systems may fail to index all the information contained in a citation. Hence, if the piece of information is not an indexed term, the search will fail. One explanation for this behaviour may be that the topic that users were looking for was not in their areas of expertise; therefore, they may have lacked information literacy in regard to the search topic. Another possible explanation is that users may lack search strategies and searching skills. According to Urquhart and Rowley (2007), various micro factors affect users' behaviours when they are searching for information. The following are two of these factors:

- *Information literacy* refers to the capacities that users bring to their learning situations; these typically correspond with their previous work, training, education and life experience.
- *Search strategies* differ from information literacy because users may know what they want to do but lack adequate search techniques.

The majority of the users, particularly those at Kuwait, did not use the advanced search option. In keeping with this, Al-Moumen's (2009) findings showed that there are important factors that function as the essential determinants of students' information-seeking behaviours (e.g. information literacy) when postgraduate students use databases or the Boolean logic.

Based on the observations, it was found that some users believed that the first page of the results should include results that were relevant to their queries, and this caused the vast majority of them not to browse the results pages. This finding is in line with Tam et al. (2009), who found that users rarely used other features, such as advanced searches, or they limited their searches to specific branches. Based on their experiences with search engines, they expected the required information to be displayed at the top of the first page of the results. Moreover, this finding is in line with Majors (2012), who found that users generally scanned at least one page of search results and that very few of them moved beyond the first page. Although Majors' findings related to undergraduate students, it is consistent with this finding.

An interesting finding emerged in the observations which indicated that some users misspelled their queries when entering them. Even though the system provides a spellchecker that shows a red line under the words that are spelled incorrectly, the users continued executing searches without noticing the errors. At times, the users did not find relevant results, or the system did not provide any results. Some even left the search option that they were searching in. Alternatively, the library system notified some users of their errors. This only occurred at Salford, but the system also did not fix some of the queries they entered and sometimes did not fix any of the queries. Later, most users corrected their queries when they recognised their misspellings. At Kuwait, the system did not notify users when they had spelled queries incorrectly. This led them to assume that they had entered the correct spelling; therefore, some of them abandoned the task based on their erroneous queries. The users encountered this problem because the misspelling notification systems were not effective: they did not effectively notify users about their mistakes and did not provide suggestions

about the queries they entered. As a result, most users did not notice their errors and continued searching, changed the search options or left the task completely.

Examples of the ways in which library systems deal with wrong or misspelled queries in comparison with Google are illustrated in the following figures.

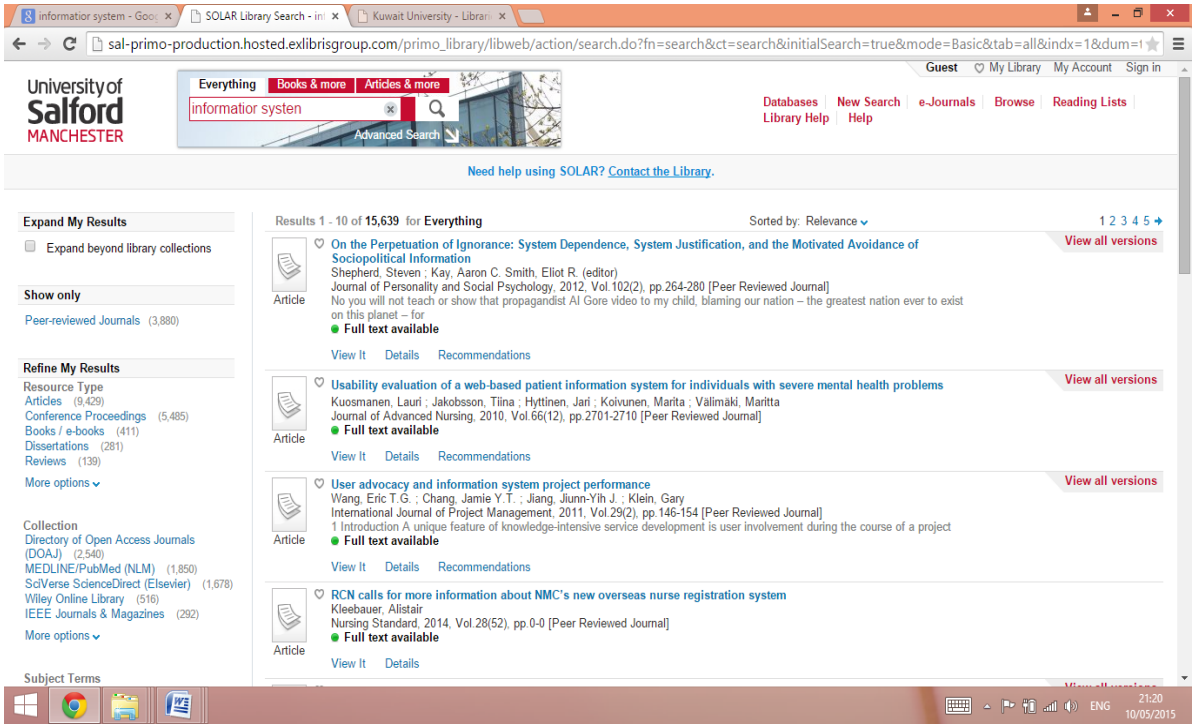


Figure 8.1: Salford library's interface when queries are spelled incorrectly

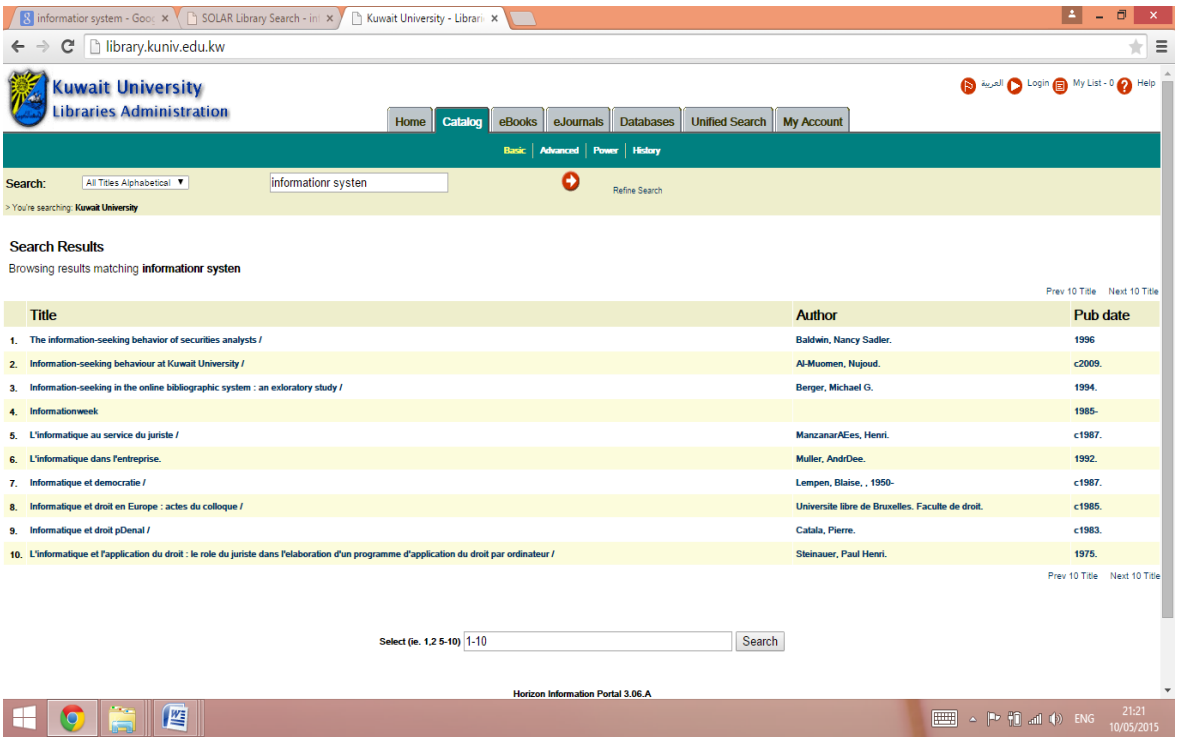


Figure 8.2: Kuwait library's interface when queries are spelled incorrectly

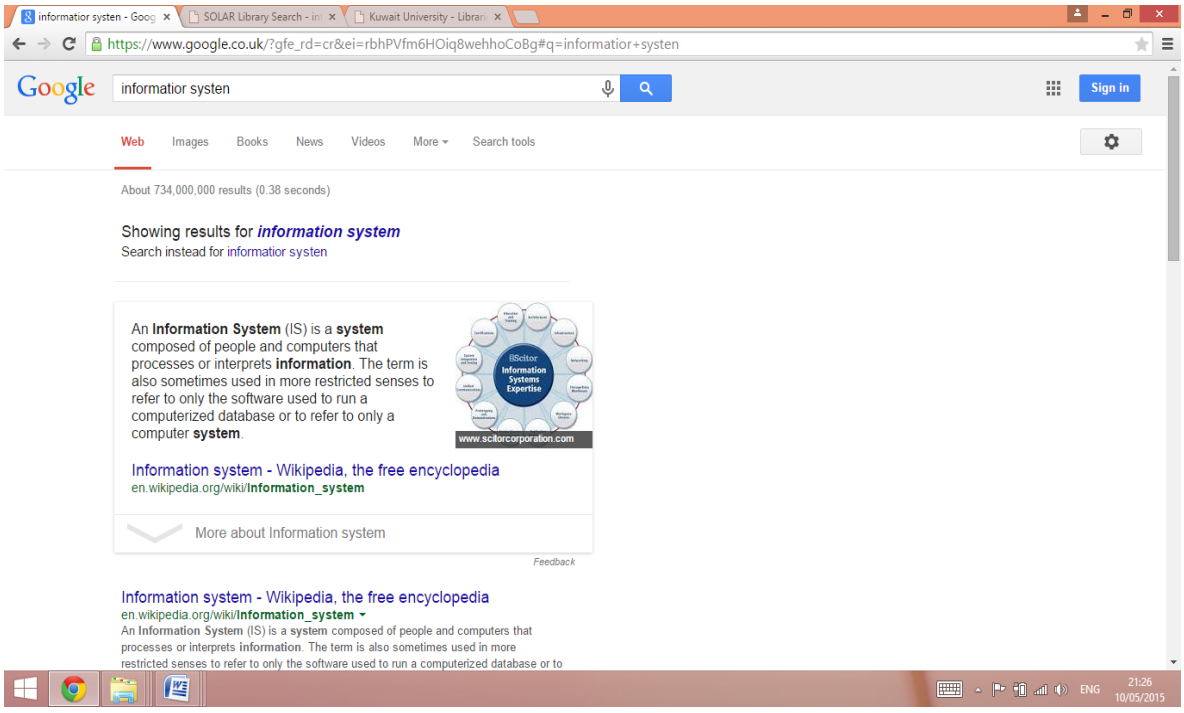


Figure 8.3: Google's interface when queries are spelled incorrectly

The previous three figures show how the Google, Salford library and Kuwait library systems deal with misspelled queries that the researcher entered (Informatior systen); the library

systems did not fix the wrong queries entered nor did they provide suggestions. In contrast, Google did this, and it was done in an obvious way. *We can infer from these findings that there is a need for academic libraries to focus on* this issue to enable users to find information without encountering obstacles.

8.4.3 Complex Terminology

The findings indicated that the use of incomprehensible terms on the libraries' websites were a major obstacle for users who were attempting to find information or determine the most appropriate search tools. The findings of the observations revealed that, when they were scanning and exploring the libraries' interface options to perform the tasks, all the users encountered difficulties identifying the options they needed to begin their searches. This could be due to the complexity of the terms that described the options on the Kuwait library website in particular. For example, for the Kuwait University searches, most users chose the wrong option—such as the e-journal option—to search for articles, although this option searches only journals, not articles. Alternatively, they chose the catalogue option, which searches only printed resources—predominantly books.

A possible explanation for this is that the Kuwait library website does not, in fact, provide an option to search for articles. This makes it difficult for users to identify where to search for articles because they have more than one choice. They can search for articles in the journals, but they need to select a particular journal and then search within it. Alternatively, they can search the databases, but again, they need to choose a particular database and search within it. This finding may help us to understand why some users at Kuwait either did not complete or failed the tasks that required them to find articles: they simply did not know how to search for articles on the library's website.

In addition, it was observed that the vast majority of the users in the observations, particularly in task four, scrolled up and down the page when they were scanning the library interfaces. They also explored the options and went to each option with the mouse pointer when exploring both the library interfaces and the interfaces of the options they had selected. Several possible explanations exist for this finding. The options to perform task four successfully were provided by the libraries' websites. At Kuwait, the option "Information Services" includes information about the task and how to perform it. At Salford, there is a

"Use the Library" option which includes information about the task and how to perform it. The users perhaps did not recognise the terms that the libraries presented. This assumption is supported by the fact that they were going to each option with the mouse pointer to locate information, and they conducted their searches randomly.

In the task concerning finding e-books, the findings indicated that the vast majority of users, particularly those at Salford, did not recognise what online access meant when they were searching through the results, even when the system displayed that the resources were books that could be accessed online. One explanation may be that they were looking for e-books without taking into consideration that books that are accessible online qualify as e-books. This may also be related to the difficulty of recognising the terminology related to online access words to compare with the e-book.

It was also found that some participants in the observations at both universities, in the interviews with the academics and in the focus groups at Salford indicated that they encountered difficulties regarding some terms that they did not understand (e.g. SOLAR, Shelve mark, Catalogue and Repository). These findings coincide with those observed in earlier studies, such as those conducted by Denton and Coysh (2011) and Majors (2012), who found that users encounter challenges and obstacles with some of the terms that are used in interfaces. Moreover, Kupersmith (2012) found that library website terminology is the main factor influencing the ability of library users to access resources successfully. However, using natural language to find a book or article, for instance, was an effective solution and helped users to make the correct choices. Furthermore, Singley (2014) found in her research, which reviewed usability studies, that library terms were problematic. Indeed, she described them as jargon. For example, terms such as "Catalogue", "COPAC", "LINK+" and "Engine Orange" are used to indicate the catalogue or discovery tool, while "Databases", "Periodical" or "Serial" indicate journals and databases.

8.4.4 Lack of Resources

The findings suggest that the vast majority of the libraries' users experience difficulties due to the lack of availability of some of the resources they need. This finding was discussed in Section 8.2.1.1, which covered the use or non-use of library websites. This was one of the reasons that users do not use the library website to search for information. However, this

finding correlates with the findings of other studies, such as that of Wilson (1999), who mentioned that information seekers might influence searches by interfering with variables, such as the characteristics of the sources (e.g. the availability of resources). Ge (2010) found that the lack of availability of some required information, particularly in the case of information in an electronic format, was an obstacle for users of electronic resources. Our finding also coincides with those of Chaurasia and Chaurasia (2012), who showed that 44.7% of the research scholars and postgraduate students in their study mentioned the limited availability of back issues. Moreover, Khan and Shafique (2011) found that one of the difficulties that academics encounter when searching for information in the library is the lack of availability of the required material. In addition, a recent study by Ganie and Rather (2014) found that when postgraduate students search for information through university websites, they encounter problems as a result of the low number of e-resources to which the libraries subscribe.

8.4.5 Lack of Access

The findings showed that many users, particularly at Kuwait, experienced difficulties accessing library websites due to technical glitches which rendered the sites out of service. At Salford, a few users also encountered difficulties when using the library. When conducting searches, the system would display a message stating that the page was unavailable without telling the users what to do next or providing suggestions or solutions to their queries. *Fixing these technical problems could encourage* users to use libraries from anywhere, as the libraries' websites should be accessible to all users at any time and from anyplace without them having to deal with technical problems.

Our findings also suggest that accessing e-resources from home or even within the university campus network via the username and password function, or even Athens, was an obstacle for numerous users. In addition, it was found that most users encounter difficulties with access resources even when they use the library websites. The users mentioned that this confuses them because they are able to access resources without using the library's website; they use the website as an intermediary platform to access these resources. This finding was mostly noticed in the observations when the users were performing the tasks in every step: they were transferred to the database or journal websites through the links provided by the library websites and then asked to enter either their username and password or Athens. This

finding seems similar to those of other researchers, who found that various macro factors affect users' behaviours when they are searching for information; these factors include availability and constraints to access. The ability to access networked resources from home is a major advance for students, and it could include the opportunity to access universities' licensed digital resources from home (Urquhart and Rowley, 2007). In addition, the source characteristics, such as the use of passwords for off-campus information retrieval, are considered significant factors that influence the ways in which users search for academic information (Al-Moumen, 2009). The lack of access, such as the unavailability of required sources or unsettled or hard-to-use Integrated Library System (ILS) systems are obstacles to accessing information when utilising electronic resources (Ge, 2010). Our finding may be similar to that of Ganie and Rather (2014), who found that postgraduate students encounter problems when searching for information on university websites, as accessing resources that need a username and password is time-consuming.

It is possible, therefore, that *in keeping with suggestions, Athens can be removed to facilitate* access to resources, thereby enabling users to sign in to their libraries' websites more easily and gain access to all the resources to which the libraries subscribe. *This should be done within the libraries' websites and should not involve sending users to other websites*. This will increase the functionality of library websites and encourage users to use them to obtain what they need immediately.

8.4.6 Complexity of Website and Searching Characteristics

The findings revealed a number of complexities in the characteristics of the libraries' websites and systems, which affected users' experiences and were obstacles for them when they were conducting searches. The findings indicated that all users experienced difficulties due to the system's slowness when searching, retrieving the information and displaying the results. *It can, thus, be suggested that the speed of library websites should be increased* to avoid these difficulties.

It was found that the library system's interface at Kuwait enabled three types of searches: basic, advanced and power. This was confusing for the users—mostly those in the observations—because they did not know which one they needed to choose to begin their search. It is possible that users are unaware of the diverse types of searches available; this

also indicates users' lack of search skills and strategies. *Hence, this finding suggests that one basic search option should be provided*, and then users can use the advanced or power searches later based on their information needs.

It was found in the interviews that, based on some librarians' viewpoints, the complexity of the library systems at both universities makes it difficult for users not due to their low searching skills. This makes it challenging for them to use or learn the system, as searching is difficult. Moreover, in the interviews, some librarians and academics, particularly at Salford, indicated that the library website and its system were not user-centric, as they are not designed to coincide with users' abilities, and the fact that they have been designed by technicians is evident. This finding further supports Sadeh's (2008, p. 10) argument that 'today's library systems are inherently librarian-centric; their design in terms of data structures and workflows is focused on library administration and hence severely limits the possibilities for the end-user interface'.

What is surprising is that none of the users in the observations at Kuwait noticed what the search option in the catalogue is based on; therefore, they entered their queries without noticing that the search is by title only. The problem here is that the library determined that the search tool should be by title only; *users should be able to do a general search at the beginning* and then choose later if they need to search for a title, author, subject and so on.

It is somewhat surprising that at the Kuwait University library, no search tools for e-books or articles are available, thereby making searching difficult and time-consuming. Unfortunately, the users of the Kuwait University library need to go to each option of the databases and e-journals if they need articles, or they need to go to each option for e-books to search for e-books. This led many users, particularly those in the observation, to leave the tasks or fail to complete them successfully. It can, *thus, be concluded that the unavailability of search tools for these resources is one of the significant factors* that affected their experiences regarding the library website, made searching difficult and led to their limited use of it.

The findings also showed that the services at the Kuwait University library are not effective or helpful. The library only provides information about these services; hence, users cannot interact with them and use them online. It is possible, therefore, that the academic library should provide all of its services online; this will increase its functionality and enable users to interact with the services without having to visit the library to seek help. Moreover, the users, mostly those in the observation at Kuwait, encountered an obstacle in that the system asks

users to provide a civil ID alongside a university ID when renewing the books they have borrowed. Most users do not in fact hold civil ID. It was, therefore, difficult for them to renew the books online, and this encouraged them to go to the library to have it done manually by the librarians. Thus, *the library websites should require only the university ID*; there are no logical reasons to request other forms of ID.

8.4.7 Google

The most interesting finding was that all the participants experienced the advantages of Google and Google Scholar and compared these with the abilities of the libraries' websites. All of them declared that the difficulties they experienced and encountered with the libraries' websites were not encountered when they used Google. As mentioned in Section 8.2.1, the vast majority of them use Google or Google Scholar as their first method to search for information. Most of them do not use Google and Google Scholar to seek initial information; rather, they use them for all the information they need. They also use Google to access specialised databases or journal websites related to their subject areas. Furthermore, many of them access the resources to which the library subscribes which cannot be accessed through Google; they access these via the universities' Wi-Fi and also by using Google. This finding is in line with those of a study conducted by Vezzosi (2009), who found that the Internet, especially Google, was the first and preferred point of access for all information sought by all doctoral students both in their everyday lives and when they were conducting academic research.

In addition, this finding is supported by the fact that the University of Salford library recently provided a link to Google on its blog (Salford SOLAR News); this can be seen as an admission that Google is the dominant search option for information seekers. The users were told the following: "We know that lots of you use Google to find information for your studies". They were then provided with information on how to search for academic work using Google Scholar, as illustrated in Figure 8.4.

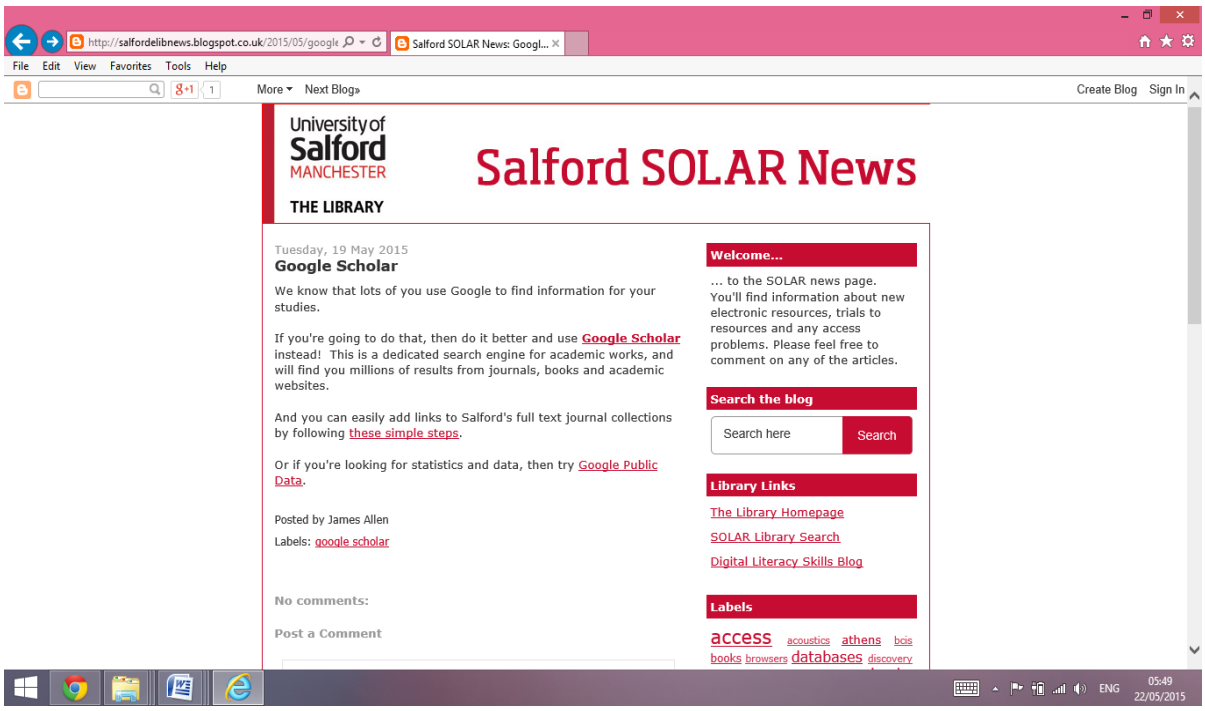


Figure 8.4: Salford SOLAR News' blog page

Conversely, the findings of this study do not support those of earlier studies, which found that searching via the Internet using either Google or Google Scholar is usually done to conduct initial searches—not deep searches—and to obtain general information (RIN, 2006; Haglund and Olsson, 2008; Liyana and Noorhidawati, 2010). Moreover, Wu and Chen (2014) found that postgraduate students use Google Scholar in the early stages of information seeking only if they have vague concepts of what they are looking for, and most of them mainly use it to retrieve full-text documents. In addition, Wu and Chen found that students believed that, compared with Google Scholar's search functions, the libraries' search functions are usually easy to understand with regard to what kind of search is being performed (e.g. author, title, subject and keyword search) and how the results are sorted. Furthermore, they liked the majority of databases that provided a variety of sorting functions that facilitate their efforts to refine their search results, such as help information (e.g. explanation of search functions) in databases that are far better than Google Scholar. In addition, the labels that appeared in Google Scholar's search results, such as related articles, cached or all five versions, confused them. The filtering of the large amounts of results retrieved from Google Scholar and the uncertainty regarding the quality of the documents were the major reasons they opted to use the library resources as their main sources instead.

There are, however, other possible explanations for this finding. The study results indicate that libraries fail to provide the advantages that Google provides, and several published studies have found that users prefer Google because of its advantages. Moreover, users' lack of searching skills, as well as their lack of information literacy, may be factors that make them prefer Google, as there is no need for search skills, strategies or experience when conducting searches using Google. The participants might not be aware that Google includes a vast amount of information that is not evaluated or accurate and is opinionated and biased. In addition, they might not be aware of the library's role and importance, which is providing high-quality published and reviewed information that has been chosen carefully by experts. According to Anderson (2005, p. 35), 'libraries are better than the Internet because they offer more focused and high quality content selected by knowledgeable professionals and because they offer expert help. Users need this help, most are not trained researchers, and they will miss valuable documents if they are not guided to well-selected sources and assisted in their searching'. Hence, *this finding implies the necessity for the academic library to imitate* Google's search features and techniques which have become dominant and which are preferred by almost everyone.

8.5 Summary

This chapter discussed the study findings that emerged from the data analysis and how these are related to those of previous studies. This study has identified the purposes for using the academic library websites, the reasons for their use and non-use, the predominant requirements for academic library resources and services and the locations and methods (strategies) used for searching. It also classified the steps that explain how the users search for information and interact with the academic libraries' web interfaces, and it discussed these steps with the model created based on the ISB and HCI fields, which showed several similarities and some differences which have been identified. Moreover, it identified users' perceptions of and experiences with library websites, as well as the difficulties and obstacles that users encounter when using library websites. The following chapter will provide guidelines for academic library websites, including insights into how their interfaces can best support users' information seeking, interactions, experiences and needs.

Chapter 9: Guidelines

9.1 Introduction

In this study, objective 5 was to develop guidelines for how academic library interfaces can best support the users' information seeking, interactions, experiences and needs. This chapter provides these guidelines based on the findings and the suggestions of the participants of this study which aim to increase the effectiveness and efficiency of the academic libraries' websites for their users.

9.2 Guidelines

12 guidelines have been proposed in this research. These guidelines are as follows:

9.2.1 Provide Sufficient Metadata

Users do not actually want the title of book or article, or the author's name when searching; instead, they are looking for information. Even if they have a specific title for a book or article, what they need are the contents of that resource. Thus, providing sufficient metadata will increase the effectiveness of that resource. It is better, for example, to clarify the type of each resource that users search for by displaying a small image indicating that it is a book or reference, or article. It would be better to provide the image of that resource rather than an image that indicates that it is a book. This will be helpful for users to identify if the resource is what they need. In addition, there should be a brief explanation for each resource, whether it is an article or a book, such as providing its abstract or its table of contents so that users can determine if the article or book is what they need. This will save them time as well as avoiding several clicks to open links to get more information. In order to do this, academic libraries can provide an option for the users when the results are displayed for them. For example, regarding books, it is a good practice to provide a table of contents of the book for which users are searching. This can be done by following the way that the Amazon website provides books and their table of contents, where users can click on the icon of the book and then the table of contents is displayed for them as shown in Figures 9.1 and 9.2.

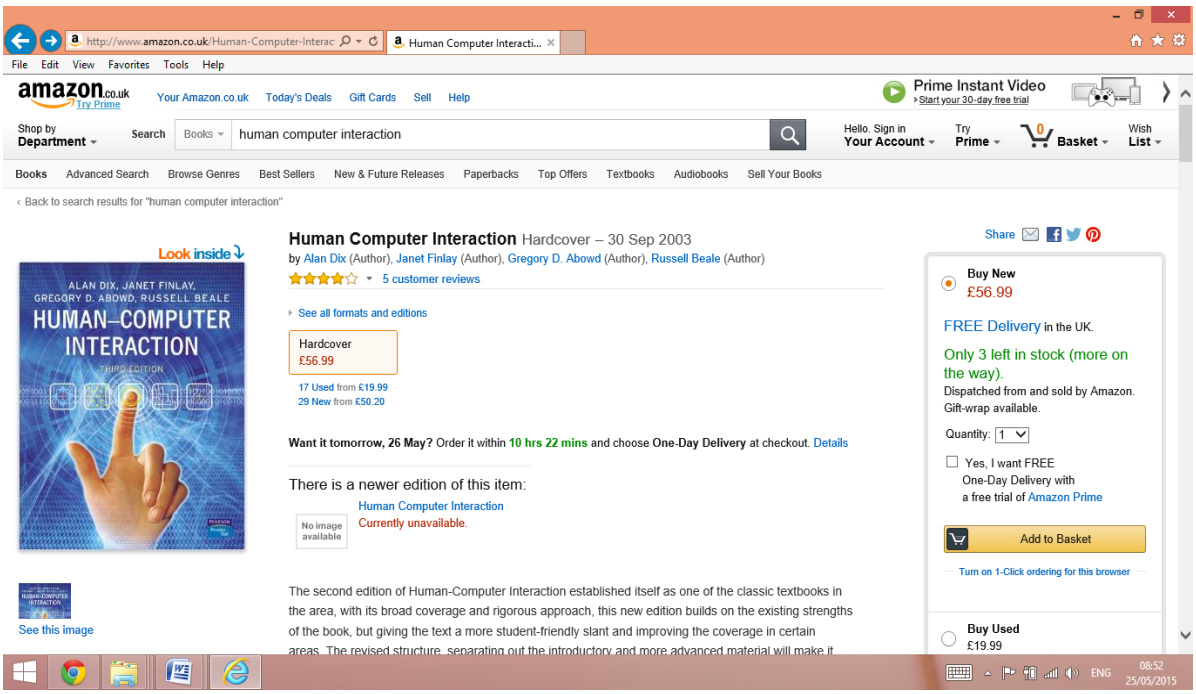


Figure 9.1: Image of the book on the Amazon website with an option to look inside

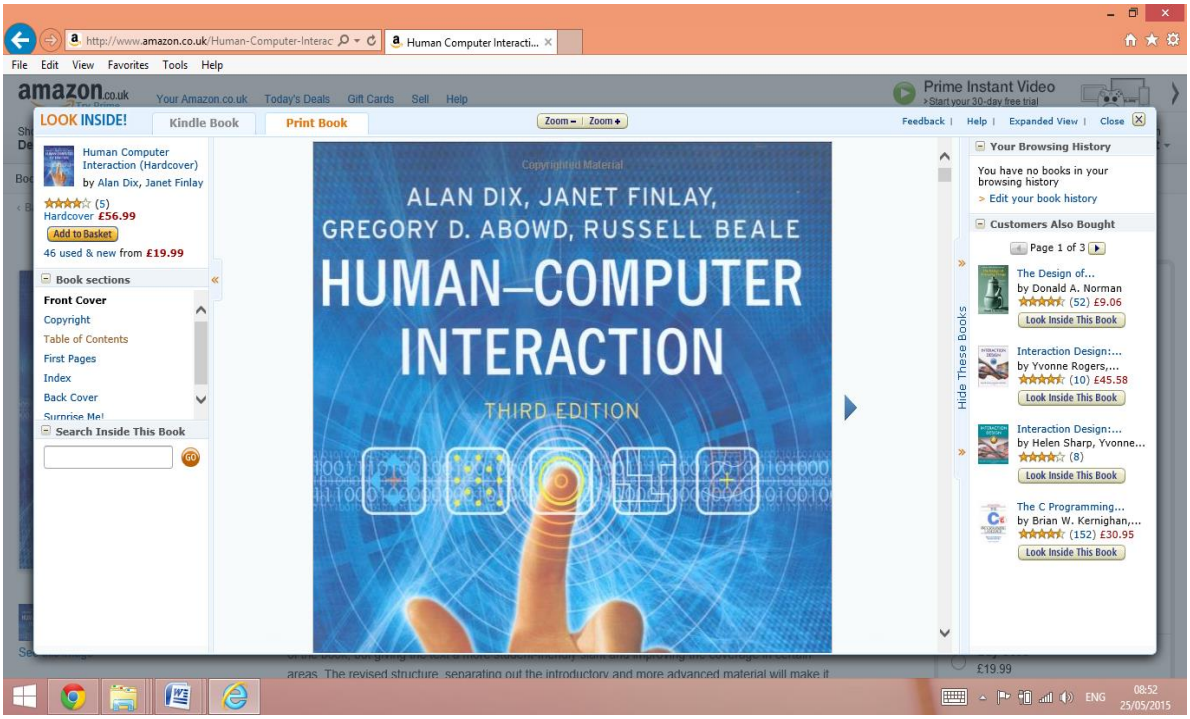


Figure 9.2: The way to display the book and its contents on the Amazon website

Regarding articles, there should be an option to preview more information about the article. This can be done by providing an option for the user to click on it to preview and read the

information (e.g. abstract) they need as shown in Figures 9.3 and 9.4 from the Emerald Insight database.

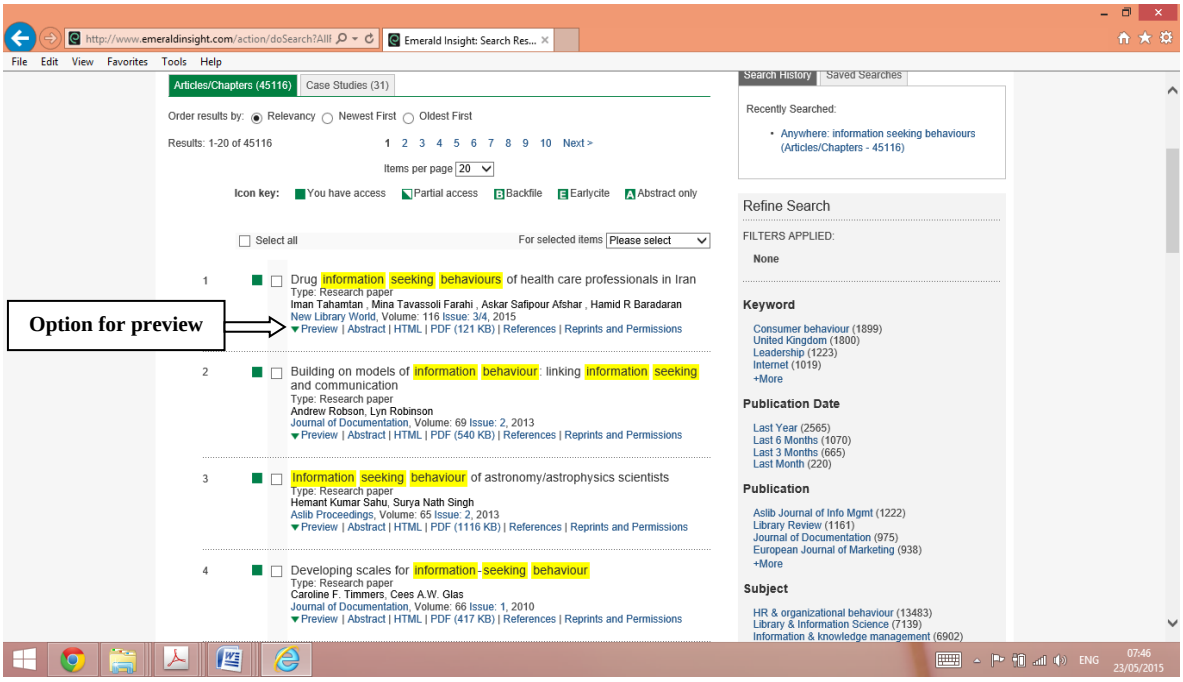


Figure 9.3: Option to preview more information about the article in the Emerald Insight Database

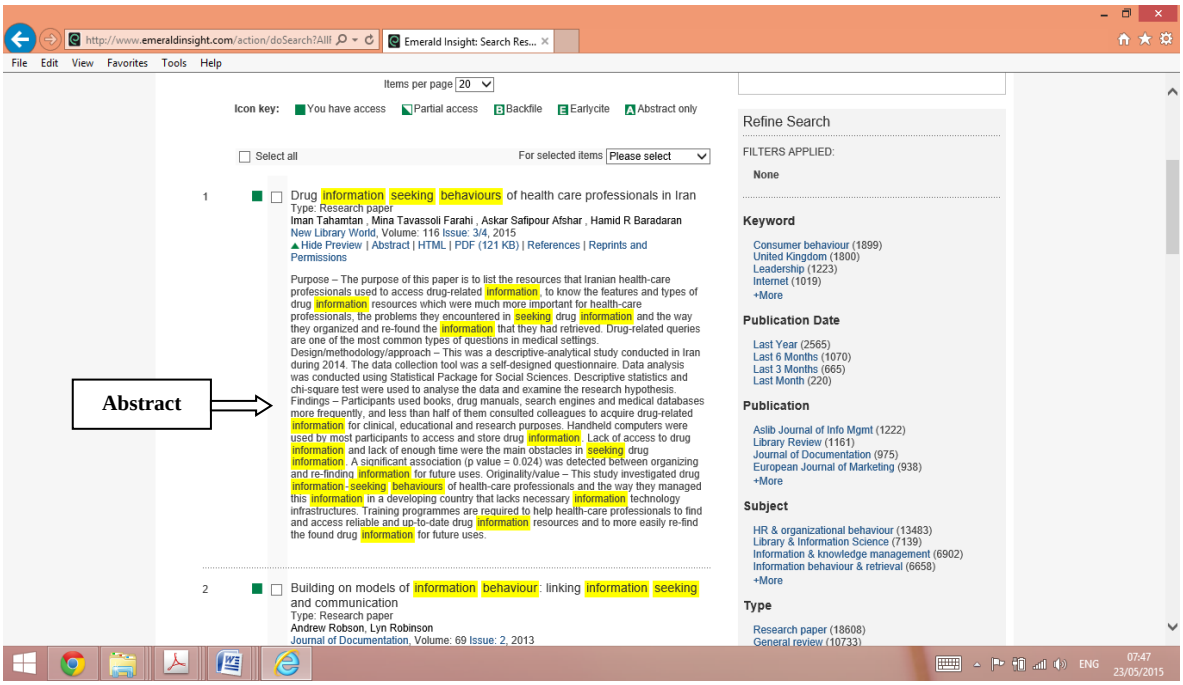


Figure 9.4: How the information (abstract) of the article is displayed in the Emerald Insight database

9.2.2 One Single Search Tool for all Library Resources and Services

Libraries still do not provide a single search tool for all of their resources, services or even their general information. All of their contents are scattered in different places and require the use of different search tools which confuses their users. Users of academic libraries prefer to search for everything they need using one search tool. In fact, users often have the expectation that they can search for everything in one place. Thus, providing a single search tool for all library resources, services and general information as well as with options to narrow the search for a particular resource such as theses. All of which will be useful for the libraries' websites to increase their effectiveness and to help users to find what they need easily, in a similar way to what they have experienced from a search engine (e.g. Google) which they use frequently. For example, users can type any query they have whether it is related to a resource or service or even any general information, and then they retrieve what they need based on their query. In addition, they can start by an option that related to a particular resource, for example users can start by theses option and then they are only searching for theses.

9.2.3 Increase the Findability of Searching

Unfortunately, the ability of academic libraries' systems still inefficient to find information, as they still fail to retrieve existing resources, full names of books, conferences, authors, journal article titles, or phrases that users have typed. Moreover, there is a failure to retrieve organised results as they are displayed randomly and list inaccurate information. The libraries' systems should able to recognise all users' queries as users do not prefer to search by using an advanced search. Many of them are not skilful in searching and they are used to search engine (e.g. Google) techniques which accept and recognise all types of queries without needing good searching skills. Moreover, users prefer not to use limitations (refinements) or browse the results pages to find information.

9.2.4 Avoid Incomprehensible Terms

This study and previous studies proved that the terms used in the academic libraries' websites are not easy to understand. Users do not understand the terms periodical, e-journal, or database – all of which provide articles. In addition, they do not understand terms such as

catalogue, SOLAR, shelf mark, or repository. All of these terms should be replaced with other terms that are easier and close to the users' natural language rather than technician or library language.

9.2.5 More Supportive Services for Searching

Libraries should consider making searching easier for users by providing supportive services that help users during searching such as auto-correction for the incorrect queries they entered and provide suggestions such as "Do you mean…?". The queries that users entered should be highlighted or bolded to be easier for users to notice when retrieving their results. Moreover, users have been influenced by Google Scholar which provides the number of citations for each result; consequently, libraries should consider offering that service for their users. It will be very helpful for users if the library provides online assistance in case users encounter difficulty finding what they need. For example, libraries can do this by following what the Microsoft Store's website does for helping customers. When users try to find what they need by scrolling the page up or down, or click on the wrong option frequently, an online assistant pop ups for them, as shown in Figure 9.5.

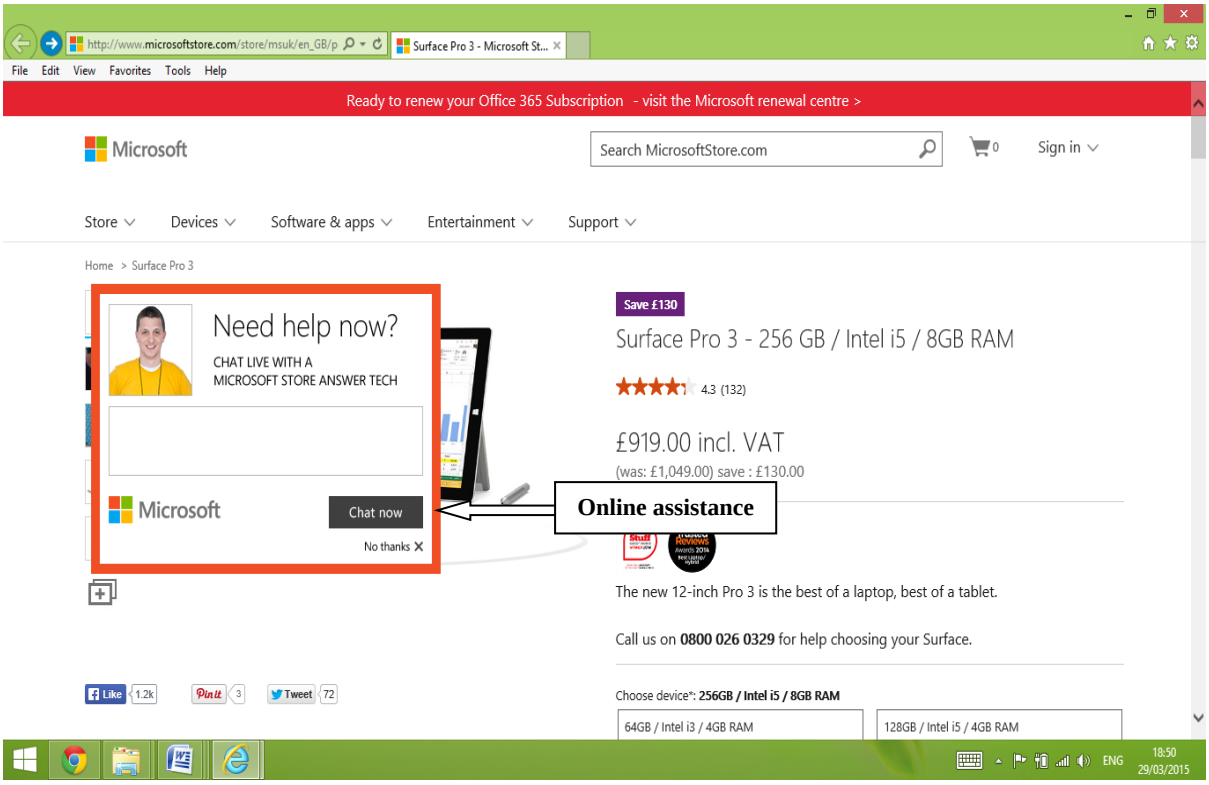


Figure 9.5: Online assistance on the Microsoft Store's website

In addition, in case the users did not find the resource they needed on the library's website because it is not available, it would be useful for the library to provide suggestions for how to request that resource. Then users could request it by clicking on that suggestion to fill out an online form and submit the form; then the library would notify them when the resource becomes available and is ready to be picked up from the library. If it is an online resource, the library could send a copy of the resource to the users. This would help the library to provide all resources that users need and it is a good solution to the difficulty that users have experienced and encountered when using libraries' websites which is lack of resources.

Furthermore, libraries should consider providing the option of searching by resource type. The users enter the type of resource they want to use and when they do their keyword search they only get back results that are found in that type of resource. For example, the user types, "information systems book". The user in this case has requested from the system that he or she needs only the books regarding that query. The system in this case should only retrieve the books. Moreover, it would be very useful if the libraries provided a search by topic, which is where users can search for all resources on the topic for which they are looking.

9.2.6 Organised Information on the Library Homepage

Libraries should consider reducing the amount of information on their homepages by removing any repetition in the information or all unnecessary information to avoid confusing users. Libraries also should consider avoiding large images that market the library. It is helpful to provide information about using the library or about what services the library can to provide to its users; however, libraries should take into consideration that users visit the library website mainly to search for information. Thus, organising information on the library homepage will make it easier for users to find how to look for information, which will increase the efficiency of navigating the library's website.

9.2.7 A Unified Interface

In this study, it was found that the Salford library provides two interfaces, one for its system (SOLAR), which is also used by the library's computers, and one for the library's website. Also, in Kuwait it was found that there is a website for each library at Kuwait University. More than one interface for the library negatively affects the users' expectations and then confuses them. There should be a unified interface for the library whether online or used by the library's computers.

9.2.8 Drop down Menus

One remarkable finding from this study is that if users did not find what they needed in the interface, they would go to each option by using the mouse pointer. Also, users encountered difficulties with a number of options that were hidden and where the headings were not specific enough. There was also a need to click a number of times to arrive at the required information. All of this causes difficulty in finding how to obtain information and is time consuming. In fact, it is quite difficult for libraries to present all of their resources and services on their homepage. Hence, drop down menus can be a good solution to help users to find what they need quickly and to improve the navigation of the library's website.

9.2.9 Easy and Instant Access to Resources

Users of the libraries are suffering due to the constraints in the libraries' websites when users need to access e-resources. The system requests their username and password or Athens even within the university campus network. In addition, many e-resources cannot be opened within the libraries' websites as users need to follow links to arrive at the resources on the resource supplier's website, which can be done by going to the supplier website directly without using library website. Users actually use the library's website as an intermediary to access these resources as they need to save their time and avoid following links which are confusing. Libraries should consider removing the Athens to access resources, since users struggle with Athens and it is sometimes difficult for them to remember it or how it works. Therefore, libraries should consider allowing their users to sign in using their university username and

password on the library's website to be able to access all resources to which the libraries subscribe. This should all be done within the library's website, rather than sending the users to other websites. This will increase the functionality of the library's website and encourage users to use it to obtain what they need immediately. This also can be done by providing easy access to full texts and fast downloads for available online resources.

9.2.10 Avoid Technical Problems

Libraries should consider avoiding any glitches or technical problem in their websites such as unavailable pages, slow retrieval and display of results, websites out of service, or options that are not working. These all affect users' experiences with libraries' websites.

9.2.11 Provide Useful Information about Databases

Libraries subscribe to many databases and some of these databases must be used individually as users cannot search for all of them in the library system. In this case, users must choose the database option and then search for the database that covers the topic for which they are looking. Most users do not know which database specialised in the topic for which they are looking. They generally do not care about the database name; they only need the databases that will help them find the information they are seeking. Therefore, the database must be briefly described. The descriptions must include the following:

- Brief information about the database.
- Topics that the database covers.
- Main keywords about the topics that the database covers.

9.2.12 Increase the Functionality of Services Online

In academic libraries' websites, library services are presented only to provide information about these services; hence, users cannot interact with the services and use them online. The academic library should consider providing all of its services online which will increase their

functionality so users can interact with them without having to come to the library and ask for help to obtain what they need. It must be kept in mind that most of them are using the library's website remotely. For example, users can request a resource that is not available in the library or they can reserve a room by logging in and using their username and password.

9.3 Summary

This chapter has presented several guidelines that are useful for academic libraries to support their users' information-seeking behaviours, interaction, experiences and needs. In addition, they might be useful to increase the effectiveness and efficiency of the academic libraries' websites. These guidelines are as follows:

- Provide Sufficient Metadata.
- One Single Search Tool for all Library Resources and Services.
- Increase the Findability of Searching.
- Avoid Incomprehensible Terms.
- More Supportive Services for Searching
- Organised Information on the Library Homepage
- A Unified Interface
- Drop down Menus
- Easy and Instant Access to Resources
- Avoid Technical Problems.
- Provide Useful Information about Databases.
- Increase the Functionality of Services Online.

To sum up, problems are inevitable even on the best websites but decreasing the number of these problems is possible. The next chapter will present the conclusions of the study.

Chapter 10: Conclusions

10.1 Introduction

This chapter draws conclusions by evaluating the overall research, and then it presents the main findings. In addition, it outlines the contributions to knowledge, identifies the limitations of the study and provides suggestions for further research.

10.2 Evaluation of the Research

This research aims to address the following question: "How do the users of academic libraries search for information and interact with the libraries' web interfaces?" This aim is based on the identification of the steps that users follow when they search for information and interact with the web interfaces of academic libraries.

In addition, in researching this question, a number of objectives were adopted, including the development of a model that combines ISB with HCI models to investigate and facilitate the understanding of how users search for information and interact with the web interfaces of academic libraries. Moreover, the research investigated the information needs, information-seeking behaviours, difficulties and experiences of different groups of users of the academic library websites at two universities (Kuwait University and the University of Salford).

These objectives included the identification of the following:

- The purpose for seeking information, the use of the library websites, the reasons for using them, the frequency of use and the reasons for non-use;
- The predominant requirements for the academic libraries' resources and services;
- The users' locations and the search methods (strategies) they used; and
- The difficulties and obstacles that the users experienced and encountered when using the library websites.

To achieve the research aims and objectives, the researcher provided background information about the ISB and HCI fields and their significance for this study. It investigated a number of ISB and HCI models, and accordingly, a unified model was created to determine whether it could help to enable a better understanding of how users search for information and interact with the web interfaces of academic library websites. The research also included a review and

investigation of the literature regarding user studies related to postgraduate students and academics, especially pertaining to their purposes for seeking information, their reasons for using or not using academic libraries, the predominant requirements for library resources and services, the methods (strategies) used to search for information, the locations in which the searches were conducted, the users' experiences and the difficulties that the users encountered when using academic libraries' websites. Finally, the research developed guidelines geared towards improving the academic libraries' interfaces to facilitate users' information seeking and interactions, improve their experiences and meet their needs.

Methodologically, the researcher made the decision to apply an interpretive paradigm which supported his belief that the present situation is subjective, dependent on individuals and requires an in-depth analysis to understand the phenomena outlined. In addition, the research strategy entailed the use of multiple case studies, which provided additional insight into the issues while showing different perspectives on the problem and process of the research.

The researcher also employed an inductive approach based on qualitative data methods, including interviews, focus groups and observations. The qualitative method was selected due to the basic philosophical assumption that individuals' behaviours, interactions and experiences play a crucial role in this research. The interviews—semi-structured interviews in particular—were used because they are a valuable method of determining the stories behind the participants' experiences. According to Seidman (1991, p. 4), the semi-structured interview 'provides access to the context of people's behaviour and thereby provides a way for researchers to understand the meaning of that behaviour'. Focus groups were used because they allow for the expression of a broad range of views, enable insights to emerge and can motivate participants to reveal issues that they may not have acknowledged in a one-to-one interview.

It is also important to observe what people do rather than simply what they say they do; therefore, in qualitative research, observation is a key tool for collecting data. Observation is invaluable for recognising how users access the libraries' interfaces. Cooper et al. (2007) pointed out that most people are unable to assess their own behaviours, particularly when they are removed from the contexts of their activities. The think-aloud technique was used alongside observations to identify what participants were thinking; relying on what was seen was helpful in regard to attaining additional information about participants' actions and thoughts.

The participants in this study were postgraduate students, academics and library staff. Postgraduate students were chosen because they have the most diverse needs related to their scholarly activities (e.g. assignments, dissertations and theses). Academics were chosen because of their frequent use of library websites to conduct research or prepare lectures for their students (e.g. articles, books and proceedings). The library staff members were chosen based on the expectation that they would provide invaluable data because they normally use the library system (website) to guide users in finding and accessing information. The library staff is also keenly aware of the resources and services that the users have at their disposal.

Content analysis was used to analyse the interview and focus group data. Content analysis is used, particularly in library and information science, to reveal or model people's information-related behaviours and thoughts (Zhang and Wildemuth, 2009). In addition, task analysis was used alongside content analysis and observations; this combination was helpful in analysing how participants perform their tasks.

10.3 Main Findings

This research produced rich empirical data from the interviews, focus groups and observations. These data were analysed to identify the purpose of seeking information, the reasons for the use or non-use of the library, the predominant library resources and services, the methods (strategies) and locations of users' searches, the steps used to search for information and interact with the academic libraries' web interfaces and the difficulties that the users encountered and experienced when using the academic library websites compared with other websites.

10.3.1 Purpose of Seeking Information and Using the Library Websites

The findings showed that all the participants who used the library websites did so based on their information needs. Moreover, the participants who used the library websites only rarely or never used them, choosing instead to use alternative sources, thereby indicating similar information needs. The postgraduate students' needs were diverse and were affected by their positions. The doctoral students used library websites to conduct research. The master's degree students used them to do assignments, write proposals, write dissertations, do projects,

find resources from the reading lists provided by their lecturers and/or search for information based on the recommendations of their lecturers. The academics searched for sources to help them conduct research, teach their students, gain new information and verify existing information.

The findings showed that only a limited number of participants used the library websites frequently. The majority used it only rarely, and only a few used it sometimes. One remarkable finding is that, at Kuwait University, the majority of the postgraduate students never used the library websites, and the academics rarely or never used them.

The findings revealed that those who use the library frequently or sometimes do so to

- Find resources that are not available from other sources, such as Google, Google Scholar, databases and other websites;
- Find books because searching the library website for other resources is a confusing and difficult process; and
- Find the resources from reading lists that are required and recommended by lecturers for postgraduate students.

The following reasons relate to the participants who rarely or never use the library websites:

- Ease of use and the ease of searching other sources, such as Google, Google Scholar and other websites.
- Ease of access to the resources to which the library subscribes within the university, such as via the Wi-Fi system.
- Lack of resources, whether new or specific, on the library website (e.g. Arabic collections) in contrast to the availability of resources on Google and Google Scholar.
- Ease of obtaining resources from their workplaces, friends and relatives.
- Ease of obtaining citations of resources or articles on Google Scholar, which helps to identify related articles.

These findings indicated that even the users who used the library websites frequently or sometimes were forced to do so when they encountered difficulties accessing resources outside of the libraries, or their decisions were based on the recommendations of their lecturers. It can be assumed, therefore, that the library websites' various difficulties and complexities discourage users from using them.

10.3.2 The Most Frequently Needed Resources and Services

The findings showed that most participants preferred articles—especially those in an electronic format—which were the most frequently used resources. Nevertheless, the majority generally searched for all types of resources based on their information needs and subject areas. This can be explained by the fact that they search for only the information that meets their needs, regardless of the type of resource.

The findings revealed that, with the exception of the postgraduate students at Kuwait University, locating information was the most important service required by postgraduate students and academics, who always ask for the information they need and are unable to find, or have difficulties finding, on the libraries' websites. Moreover, the interlibrary loan was found to be the service that was required, in particular, by most academics and only very few postgraduate students. The interviews with the academics revealed that most of them relied on the instructions and orientations (library inductions) at both universities to train their students on how to use the library.

10.3.3 Locations of Searches

The findings revealed that all the academics conducted searches from their offices and homes, while the postgraduate students searched from different places:

- They searched from home to save time because they worked and studied simultaneously.
- The PhD students searched from their university offices because they provided a better study environment and enabled fast searching and easy access to online resources. In addition, this enabled them to save the resources on their computers, and they had easy access to friends for support and help.
- Very few searched from the libraries to obtain a better study environment, and it was also easy for them to obtain help from the libraries' helpdesks.
- The postgraduate students at Kuwait searched from any locations at the university using Wi-Fi, regardless of whether they were in their offices, laboratories or elsewhere on campus, to access the resources to which the library subscribed.
- Some of the postgraduate students at Kuwait searched from their workplaces and used the resources provided by their employers.

10.3.4 Methods (Strategies) for Searching

One significant finding is that all the participants first looked for information on the Internet, particularly Google and Google Scholar. Even the librarians did this when they encountered problems with their libraries' websites or could not find the information required by the users. They also searched the Internet, particularly Google, to access databases, journals and websites that specialised in the subject areas in which they were interested. This means that they used Google as the main tool for searching for all the required information.

Personal contacts emerged as a method of searching information, as some academics asked their colleagues, PhD students, research assistants and the library staff, whereas the postgraduate participants asked their lecturers, friends or relatives about what they needed. The librarians asked someone with more experience, such as a senior librarian, and they used particular websites or cooperating libraries to make interlibrary loans (e.g. GCC libraries, British Library, SCONUL and the NHS website).

It was found that very few participants used the libraries as a method for searching for information after using the Internet or getting in touch with their personal contacts. The findings also revealed that, with the exception of the postgraduate students at Kuwait, the participants asked the library staff for assistance if they were unable to find what they needed on the library websites. All the participants who asked the library staff for assistance went to the physical libraries. It was found that some academics sent their PhD students or research assistants to the libraries. Moreover, it was found that their queries were about requests for services (e.g. interlibrary loan), required information that did not exist on the library websites and information that could not be found or was available on the websites but could not be accessed.

10.3.5 Steps Used to Search for Information and Interact with the Libraries' Web Interfaces

The users of the academic libraries follow seven steps when searching for information and interacting with the web interfaces:

- Step 1: Scan and explore the interface options,
- Step 2: Choose an option,

- Step 3: Formulate the query and execute the search,
- Step 4: Explore the results,
- Step 5: Read and verify the information (metadata) related to the results,
- Step 6: Select (click on) the result to examine and confirm it,
- Step 7: Make a decision.

In summary, the seven steps that the users follow when searching for information and interacting with the academic libraries' web interfaces overlap, as the users can change, move and go from one step to another based on the difficulties they encounter and the options they have. These steps support the significance of the ISB and HCI fields for academic library web interfaces and the synergy between the ISB and HCI models in identifying the steps that users take when searching for information and interacting with library website interfaces is effective and efficient.

10.3.6 Experiences and Difficulties

The findings revealed that the study participants experienced several issues and encountered numerous difficulties when using the libraries' websites. The findings are divided into several categories as follows.

10.3.6.1 Lack of Organisation

The resources are scattered across different search options; the fact that information about all topics cannot be located using a single search tool was a major obstacle for the users. This meant that they needed to search individual resources, which was a confusing, difficult and time-consuming process.

The identification of which databases to search emerged as a difficulty that the users experienced. The findings of the observations revealed that most of the users at Kuwait and a few at Salford did not know which databases related to the information they were looking for.

The findings also revealed that unorganised content and information from the libraries' interfaces acted as obstacles when users were looking for information. The users were confused regarding how to begin their research. Furthermore, the interviews with the

librarians revealed that there is a separate website for each library; however, most users do not know that there is a website for each library in addition to the main library website. At Salford, the interviews with the librarians revealed that although the library website makes information available, it does not prioritise the most important information. Furthermore, there are excessively large images on the site. Its structure is not well organised, and some postgraduate students encounter difficulties with the search options, which are redundant. Some users in the observations wondered why other options, such as books and articles, were available if there was a method of searching for all the information using a single search tool.

One unanticipated finding was that few users in the observations were distressed by the number of interfaces at Salford library. The library uses two interfaces: the library website interface and the SOLAR (library system) interface. However, the fact that upon visiting the library's homepage, there are two interfaces (one for the library website and one for its system) was confusing for them.

10.3.6.2 Lack of Findability

The findings revealed that all the users encountered several problems with the findability of the libraries' systems. These difficulties related to the systems' capabilities and characteristics. The problems are as follows:

- Failure to retrieve existing resources, leading to difficulties in finding these resources.
- Failure to recognise the names of books, conferences and whole authors, as well as journal article titles or phrases that the users have entered.
- Failure to retrieve organised results, as these are displayed randomly.
- Failure to retrieve accurate information.

One remarkable issue was noticed by the majority of the users (librarians, academics and postgraduate students) at Salford, who indicated that a number of options on the library's website are hidden, the headings are not specific and there is a need to follow a number of clicks to arrive at the required information.

The findings revealed that the users at Kuwait had difficulties finding Arabic resources. The system failed to retrieve some Arabic resources. In addition, in the interviews, some librarians indicated that the searches that the system conducts are meant for printed resources only, not for e-resources. However, most of the users are not aware of this fact; rather, they

often expect to be able to search for all the information in the system. Moreover, the system does not identify the type of resource that is retrieved. As a result, the users need to select (click on) and check every result to the type of each resources.

In the observations, it was found that some users believed that the first page that comes up after the search should include relevant results to their queries. This caused the vast majority of users not to browse the results pages.

Another interesting finding which emerged in the observations indicated that some users misspelled their queries when entering them. Even though the system provides a spellchecker feature that puts a red line under words that are spelled incorrectly, the users continued to execute searches without noticing their errors. Alternatively, the library system notified some users of their errors, but this occurred only at Salford. Moreover, sometimes the system does not correct all or even some of the queries they enter. At Kuwait, the system does not notify users when they have spelled a query incorrectly; consequently, the users assume that they have entered the correct spelling.

10.3.6.3 Complex Terminology

The incomprehensible terms used on the libraries' websites were found to be a major obstacle for the users who were attempting to find information or determine the most appropriate search tools to use. The observations revealed that when the users were scanning and exploring the libraries' interface options, they all encountered difficulties in identifying the options they needed to begin their searches. It was also found that some participants in the observations at both universities, the interviews with the academics and the focus groups at Salford indicated that they encountered difficulty with terms that they did not understand (e.g. SOLAR, Shelve mark, Catalogue and Repository). In addition, in the observation, particularly at Salford, the findings indicated that the vast majority of users did not recognise what online access meant when they were searching through results to find e-books, even when the system indicated that the resources were books that could be accessed online.

10.3.6.4 Lack of Resources

The lack of availability of some resources, whether new or specific (e.g. Arabic), was a difficulty for the vast majority of the users and was one of the reasons they chose not to use the libraries' websites.

10.3.6.5 Lack of Access

The findings revealed that many users, particularly at Kuwait, experienced difficulties accessing the libraries' websites due to technical glitches that put the sites out of service. Similarly, at Salford, a few users encountered difficulties when using the library. When conducting searches, the system would display a message stating that the page was unavailable without indicating to the users what they should do next or providing suggestions or solutions to their queries.

One significant finding that emerged from the analysis is that accessing e-resources from home or even within the university campus network via the username and password function, or even Athens, was an obstacle for many users. In addition, it was found that most users encounter difficulties with accessing resources even when they use the library website. Most users indicated that they are able to access resources without using the libraries' websites; they actually use these websites as an intermediary platform to access these resources. This finding was mostly noticed in the observations: when users were performing the tasks in every step, they were transferred to the database or journal websites through the links provided by the library websites, and they were then asked to enter either their usernames and passwords or Athens.

10.3.6.6 Complexity of Website and Searching Characteristics

Surprisingly, all the users experienced difficulties due to the system's slowness regarding searching, retrieving information and displaying the results.

Another significant finding emerged from the interviews: based on the viewpoints of some of the librarians at both universities, the complexity of the library system makes it difficult for users not due to their low searching skills.

In addition, some librarians and academics, particularly at Salford, indicated in the interviews that the library websites and their systems are not user-centric, as they are not designed to coincide with users' abilities; rather, the fact that they have been designed by technicians is evident.

It is somewhat surprising that at the Kuwait University library, no search tools for e-books or articles are available, thereby making searching difficult and time-consuming.

At the Kuwait University library, a number of significant findings emerged:

- The library system interface provides three types of searches: basic, advanced and power. This is confusing for the users, especially those in the observations, because they do not know which one they need to choose to begin their searches.
- The catalogue option is set to start searching by title; however, none of the users in the observations notice this; they enter their queries without noticing that the search is by title only.
- The services are not effective or helpful. The library only provides information about these services; hence, the users are unable to use and interact with the services online.
- The system asks users to provide a civil ID alongside a university ID number when they are renewing the books they have borrowed. Most users do not, in fact, hold civil IDs, which makes it difficult for them to renew their books online. This obstacle encourages them to go to the library to renew their books manually through the librarians.

10.3.6.7 Google

One significant finding that emerged is that all the participants experienced the advantages of Google and Google Scholar and compared these with the abilities of the libraries' websites. They all declared that the difficulties they experienced and encountered with the libraries' websites are not encountered when they use Google. The vast majority of them use Google or Google Scholar as their first method to search for information, and most of them use them not to seek initial information but to seek all the information they need. They also use Google to access databases or journal websites that specialise in their subject areas. Furthermore, many of them access the resources to which the library subscribes which cannot be accessed through Google; they access these via the universities' Wi-Fi and also by using Google.

10.4 Contributions to Knowledge

The findings of this thesis provide a number of contributions to the body of information-science knowledge, particularly regarding the websites of academic libraries:

- This study is the first to provide a unified model based on the ISB and HCI models.
- This study is the first to identify the steps that academic library users take when they search for information and interact with the web interfaces at two universities in two different countries (i.e. Kuwait University and the University of Salford).
- The study provides valuable data on diverse areas, because no previous study has investigated different users from two diverse case study universities to determine their needs for information (including the purpose for seeking information and the reasons for using or not using the library), their information-seeking behaviours (including the location from which the searches are conducted and the methods [strategies] employed to seek information) and the difficulties and obstacles they experienced and encountered in using the academic library website, all of which relate to usability.
- The research presents guidelines for how academic library websites can best support users in their search for information, as well as facilitate their interactions, improve their experiences and meet their needs. Thus, the proposed guidelines could be useful for the websites of other academic libraries around the world, especially because they have been developed based on the findings of investigations conducted at two universities in two different countries (i.e. Kuwait and the United Kingdom).

10.5 Limitations of the Study and Suggestions for Further Research

Based on the findings of this study, suggestions for further research are proposed to identify related areas that can serve academic library websites appropriately.

- This study was limited to postgraduate students and academics. Future research should consider other users of academic library websites, particularly undergraduate students, as they constitute the largest population in universities.
- The steps that were identified in this study were limited to postgraduate students. Future research should consider a larger number of users or different users to increase the efficiency of the steps used to search for information and interact with web interfaces.

- There is a need to examine the steps identified in this study in light of its relevance to non-academic library websites.
- The findings of this study proved that users prefer to search for everything using a single search tool. However, the libraries do not provide this. Hence, future research should include further investigation to identify why they are unable to do so or how they might be able to.
- This study proved that library systems are still inefficient with regard to finding or retrieving information. Future studies should examine the abilities of academic library systems to find information and should provide solutions for improving their findability.
- This study found complexities in the library websites and their systems' search characteristics. Academic libraries should consider evaluating the usability of their websites and systems.
- There is a need to identify the words or terms—whether in English or Arabic—that the users of academic library websites can understand easily.
- Future research should examine the effectiveness of the study's guidelines and recommendations.
- Google and Google Scholar have a substantial influence on users' behaviours; there is a need to investigate the possibility of using their features in academic libraries.
- It would be useful for future research to investigate the possibility of cooperation between libraries and Google or Amazon to provide effective services and resources.

10.7 Conclusions

This research has presented detailed findings about academic library websites and how their users search for information and interact with their web interfaces. It examined users' needs, information-seeking behaviours and experiences, as well as the difficulties they encountered with the academic library websites at two universities. Although this research is limited to the websites of the academic libraries at two universities in Kuwait and the United Kingdom, the findings might provide insights into the situations that exist on several academic library websites around the world. Furthermore, guidelines were developed to address how academic library interfaces can best support users' information seeking and interactions, improve their experiences and meet their needs. The participants in this study were postgraduate students, academics and librarians. By considering the difficulties and obstacles that these users experienced, this study outlines ways in which to increase the efficiency of the web interfaces

of academic libraries to support their users' efforts to search for and locate information without having to follow complex procedures. Hence, the research findings could be generalised through applying a similar research design and strategy to the web interfaces of other academic libraries.

Appendices

Appendix 1: Kuwait University and its Libraries

Brief Information

Kuwait University was established in October 1966 and was the first public research university in the State of Kuwait. The university was officially opened on 27 November 1966, and included the College of Science, the College of Arts, the College of Education and the College of Women. In April 1967, two more colleges were established: the College of Law and Sharia and the College of Commerce, Economy and Political Science. In August 1995, Kuwait University founded the College of Business Administration, thereby replacing the College of Commerce, Economy and Political Science, and this was subsequently divided into the Faculty of Science and Faculty of Arts and Education in October 1971. Almost two years later, in July 1973, the College of Medicine opened its doors, followed by the establishment of the College of Petroleum Engineering in December 1974 and the College of Higher Studies on 16 August 1977.

In May 1980, the Faculty of Education separated from the Faculty of Arts, while the Faculty of Sharia and Islamic Studies, which had separated from the Faculty of Law and Sharia, was established in October 1981. On 13 January 1982, Kuwait University founded the Medical Science Centre and on 22 June of the same year, it established the Faculty of Medical Sciences and Nursing. The name of this faculty changed to the Faculty of Allied Medical Science on 16 May 2004. In February 1996, the university launched the Faculty of Pharmacy, followed by the Faculty of Dentistry on 28 May. In 1998, the Faculty of Social Science was established.

On the 23rd of June 2011, the university board approved the development of the College of Women to provide practical programmes in modern specialisation to meet the requirements of Kuwait's development plans and to supply the needs of the employment market. As a continuum of its constant development of academic programmes, Kuwait University expanded to include the field of higher studies for the academic year 2000/2001 by offering PhD programmes.

On 4 May 2004, a decision was passed to build a new university campus in the Al-Shidadiya area. The new campus included different colleges and scientific centres, and all the other facilities required to meet demand. Today, the University of Kuwait comprises 16 colleges, including the College of Architecture, which is divided into two departments: the Department

of Architecture (from the College of Petroleum Engineering) and the Department of Design (from the College of Women).

Nevertheless, Kuwait University is a governmental institution affiliated with the Ministry of Education and the Ministry of Higher Education, and operates under the supervision of the board of the university, which is chaired by his Excellence the Minister of Higher Education.

There are 1,450 prominent qualified university teaching staff members at Kuwait University who provide high-quality education and undertake valuable research. The university also offers scholarships. There are currently over 35,000 students enrolled at the university, each of whom is given a high standard of education and earns qualifications that help them develop their skills and abilities. The Kuwait University administrative staff includes almost 4,000 male and female employees who are trained on a regular bases in order to develop and maintain their performance levels.

Kuwait University consists of 16 scientific and humanitarian colleges, in addition to centres of work and service, namely:

- the College of Arts,
- the College of Science,
- the College of Medicine,
- the College of Petroleum Engineering,
- the College of Applied Medical Science,
- the College of Education,
- the College of Sharea'a and Islamic Studies,
- the College of Business Administration,
- the College of Pharmacy,
- the College of Dentistry,
- the College of Social Science,
- the College of Women,
- the College of Architectural Engineering,
- the College of Computer Science and Engineering, and
- the College of Graduate Studies.

Libraries

The Kuwait University Libraries Administration (KULA) is the administrative and technical board supervising all the affairs of the university's libraries. It is also one of the main pillars of academic and research activities at Kuwait University. The Libraries Administration includes the technical centres that carry out acquisitions and the cataloguing of different information resources. The Libraries Administration also provides information services for the colleges of Kuwait University.

The mission of the libraries of Kuwait University is to provide suitable information and information services in order to meet the current and future needs of Kuwaiti society, as well as to support educational and research programmes that serve the community.

The Libraries Administration at Kuwait University places special interest on the development of information resources, both print and non-print, in order to build integrated, powerful and appropriate collections that serve the requirements of the university's academic and research programmes. These collections are constantly updated through cooperation and coordination with the scientific faculty members within the departments of the university.

The collections of Kuwait University's libraries include almost 268,000 titles and over 393,000 folders of books, reference papers, academic theses, and Arabic and non-Arabic reports covering different branches of knowledge. The university libraries subscribe to 73 Arabic and non-Arabic databases, 1,643 print scientific Arabic and non-Arabic journals, and 783 non-print scientific Arabic and non-Arabic journals. The libraries also offer 2,000 audiovisual materials, more than 1,200 original manuscripts and over 16,600 comic manuscripts. The Libraries Administration includes international classification systems, including the Library of Congress classification system and the Dewey Decimal Classification system.

The university has eight college libraries, with each library serving a particular college:

- Arts Library/Women,
- College for Women Library,
- Education Library,
- Engineering and Petroleum Library,
- Jaber Al-Ahmed Central Library: this library serves the College of Social Sciences, the College of Business Administration and the College of Arts,

- Science Library,
- Sharea'a and Islamic Studies Library, and
- Law Library.

The College of Medicine library operates independently and is not under the supervision of KULA.

Library System

Originally, the Libraries Administration used the Horizon System, which was provided by Dynix Inc.; however, when Dynix was acquired by Sirsi, the new company became SirsiDynix and developed the Symphony system. The Libraries Administration still using Dynix, however; it is now moving to the Symphony system based on the declaration of KULA's manager.

Symphony Integrated Library System

Symphony designed by SirsiDynix, is a software system created to manage library information. According to Breeding (2013), SirsiDynix is ranked one of the largest company in the library management software industry, second in terms of the number of libraries it serves and nearly the third largest in size by the number of staff it employs. SirsiDynix has a strong structure and incorporates open technology. It conforms to international library and information industry criteria, and provides the library community with a diligent list of capabilities and advantages, such as the development of open-tiered structures (n-tier), the hosting of programming options (SaaS), and user experience portals, searching solutions, comprehensive integrated library management and productivity rate solutions. Libraries rely on this software for the management of an integrated library system comprising more than a single operating environment, such as the libraries at Kuwait University.

Appendix 2: The University of Salford and its Libraries

Brief Information

The University of Salford's history stems from the 19th century when the Manchester Ship Canal was built. This canal provided a channel to supply the Salford textile industry by giving Manchester direct access to the sea. This development raised employment until the second half of the 20th century when the old industries started to decline. Consequently, the demands for new industrial skills increased, and this led to the creation of the Pendleton Mechanics Institute in 1850 and the Salford Working Men's College in 1858. In 1896, these institutes combined to form the Royal Technical Institute, which was officially opened by the Duke and Duchess of York.

The institute was subsequently renamed the Royal Technical College in 1921, and almost four decades later, in 1958, divided into two separated organisations: the Royal College of Advanced Technology and the break-away Peel Park Technical College. In 1961, the latter college developed into the Peel Park Technical Institute, before changing to become the Salford College of Technology in 1970 and finally, University College Salford in 1992. The Royal College of Advanced Technology was converted into the University of Salford in 1967. Finally, exactly one century following the creation of the Royal Technical Institute, the University of Salford and University College Salford joined together to become one institute. Today, the University of Salford consists of four colleges with each college including two or three schools as follows:

<u>College of Arts and Social Sciences:</u>

- School of Arts and Media.
- School of Humanities, Languages and Social Sciences.

<u>College of Business and Law:</u>

- Salford Business School.
- Salford Law School.

<u>College of Health and Social Care:</u>

- School of Health Sciences.

- School of Nursing, Midwifery and Social Work.

College of Science and Technology:

- School of the Built Environment.
- School of Computing, Science and Engineering.
- School of Environment and Life Sciences.

Libraries

The University of Salford has four libraries:

- Adelphi library,
- Allerton library,
- Clifford Whitworth library, and
- MediaCity library.

Users can access a wide variety of resource collections for their learning and research. The libraries provide a resource discovery tool, SOLAR, through which users can access all resources from a single interface. The libraries house a massive number of resources, including over 600,000 books, 35,000 e-journals and 400,000 e-books, together with a number of special collections and more than 600,000 library items.

The libraries also provide over 700 PCs as well as a system that tells users where the available PCs are. Furthermore, there are over 240 laptops that can be borrowed from the libraries.

Library System

The university library recently changed their integrated library system and moved from the Talis library system to the ExLibris Alma library system for all its libraries. The software company, the ExLibris Group, is based in Israel and has offices and distributors in various countries around the world. ExLibris was ranked the largest company in the industry based on the number of libraries served, the number of personnel employed and estimated revenue (Breeding, 2013).

ExLibris Alma Integrated Library System

ExLibris Alma was developed by the ExLibris Group and designed mainly for academic libraries and research. The system was used first in July 2012 by Boston College, which became the first library to put ExLibris Alma into production (Breeding, 2013). The ExLibris Group has claimed that ExLibris Alma is the next-generation library services framework. ExLibris Alma has been developed in order to consolidate, optimise and extend the variety of library services.

Appendix 3: Kuwait University Library Website

It was decided to display the images of the libraries' websites that the participants (Librarians, Academics and Postgraduate Students) were asked about by the researcher, by providing images for the whole website pages. It will be useful to display the images of these libraries websites, this could be helpful to increase and support the level of reliability and validity of the research. These images were display to determine how each library provides its services and resources, and how these websites built. However, these images will make the participants' answers regarding their websites more obvious and easy to understand. Finally, these websites are subject to change or improve after the times have been captured. The next Appendix presents University of Salford Library Website.

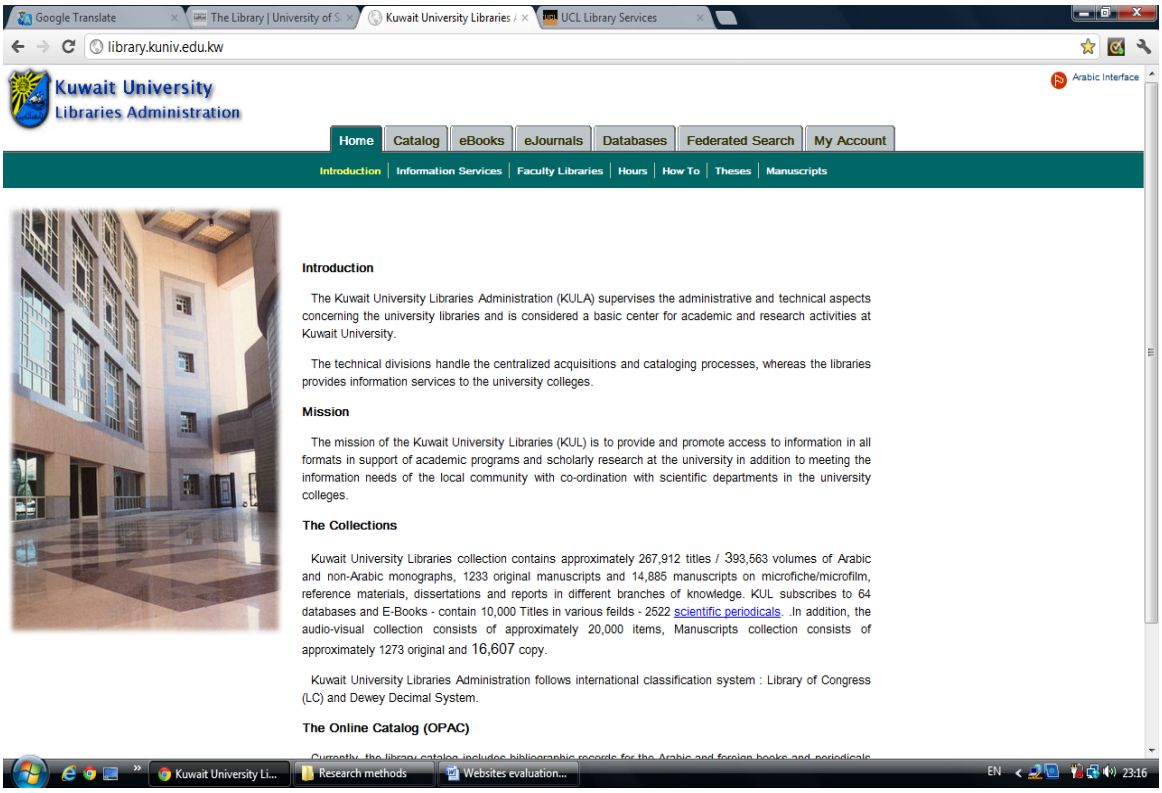


Figure 1: The Library interface, part (1)

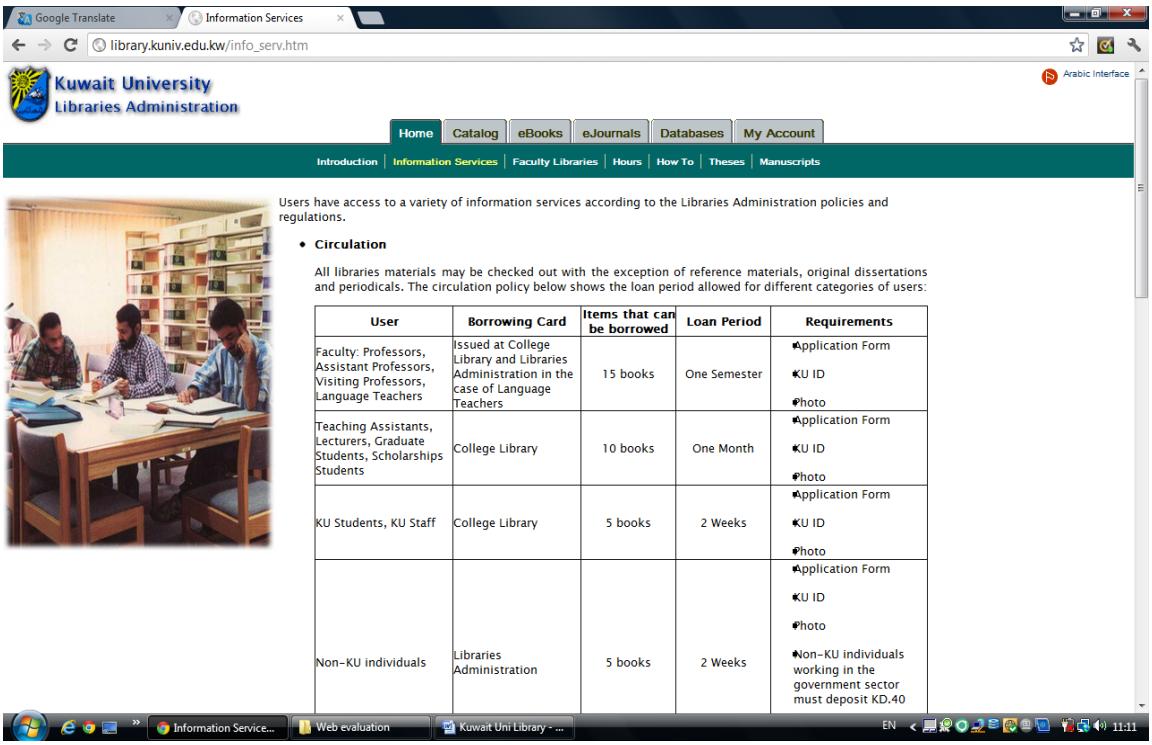


Figure 2: Information (Library) services page, part (1).

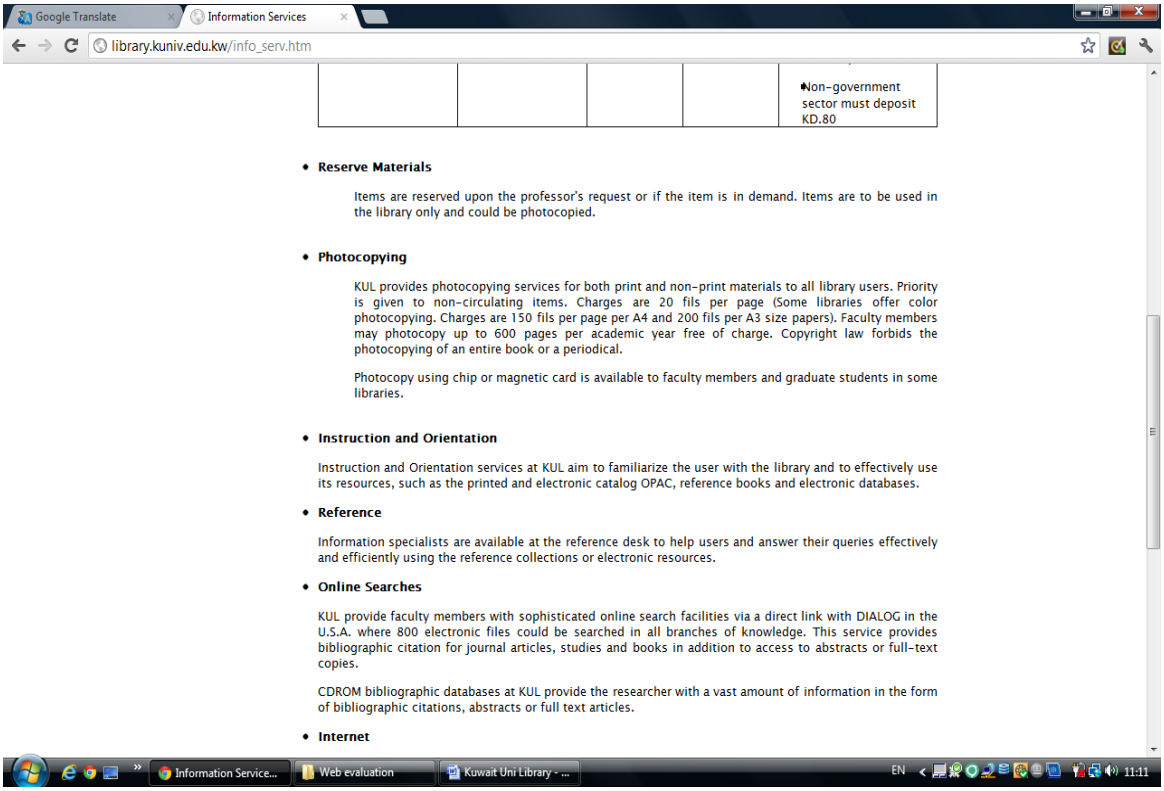


Figure 3: Information (Library) services page, part (2).

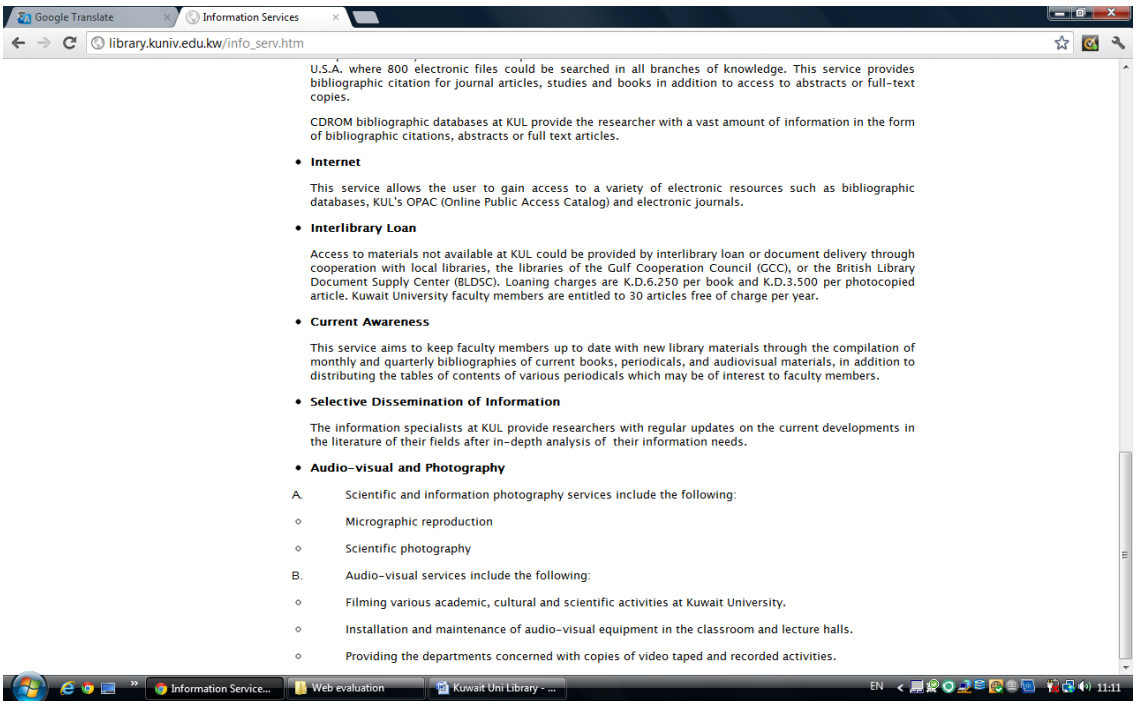


Figure 4: Information (Library) services page, part (3).

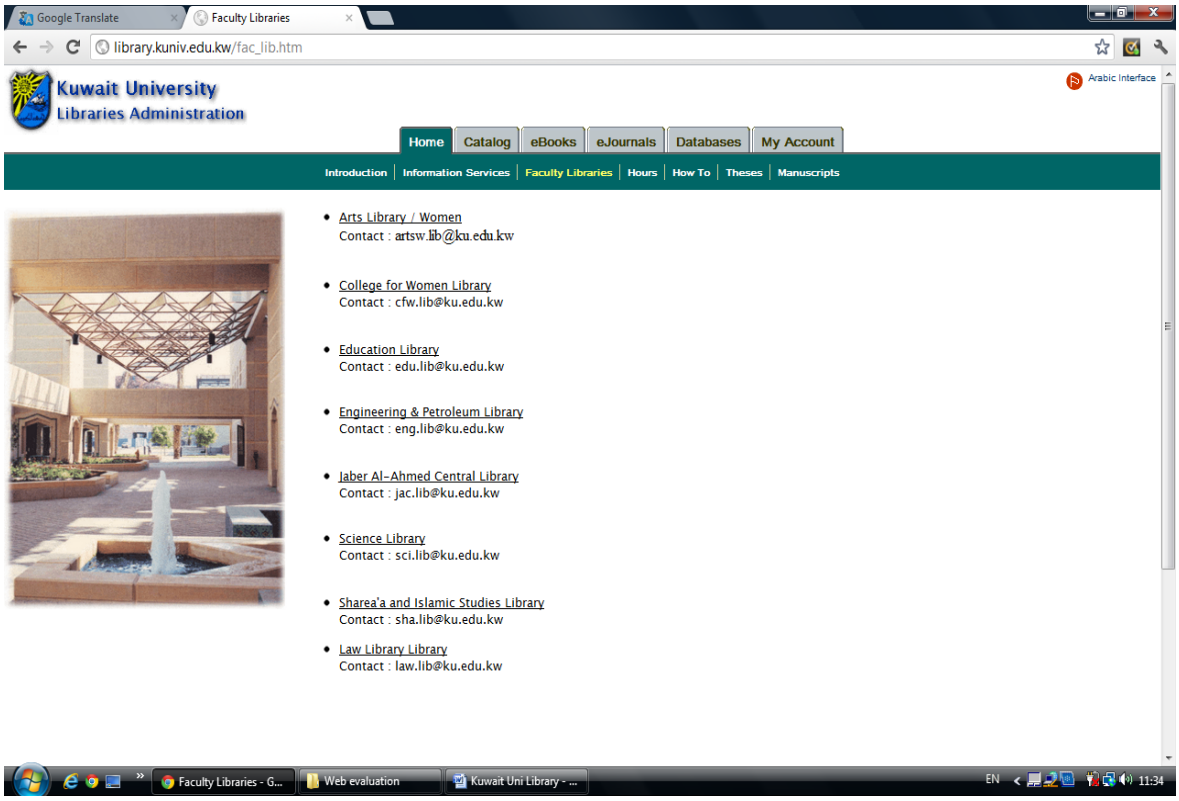


Figure 5: Faculty libraries page

Figure 6: Jaber Al-Ahmad Library Website interface

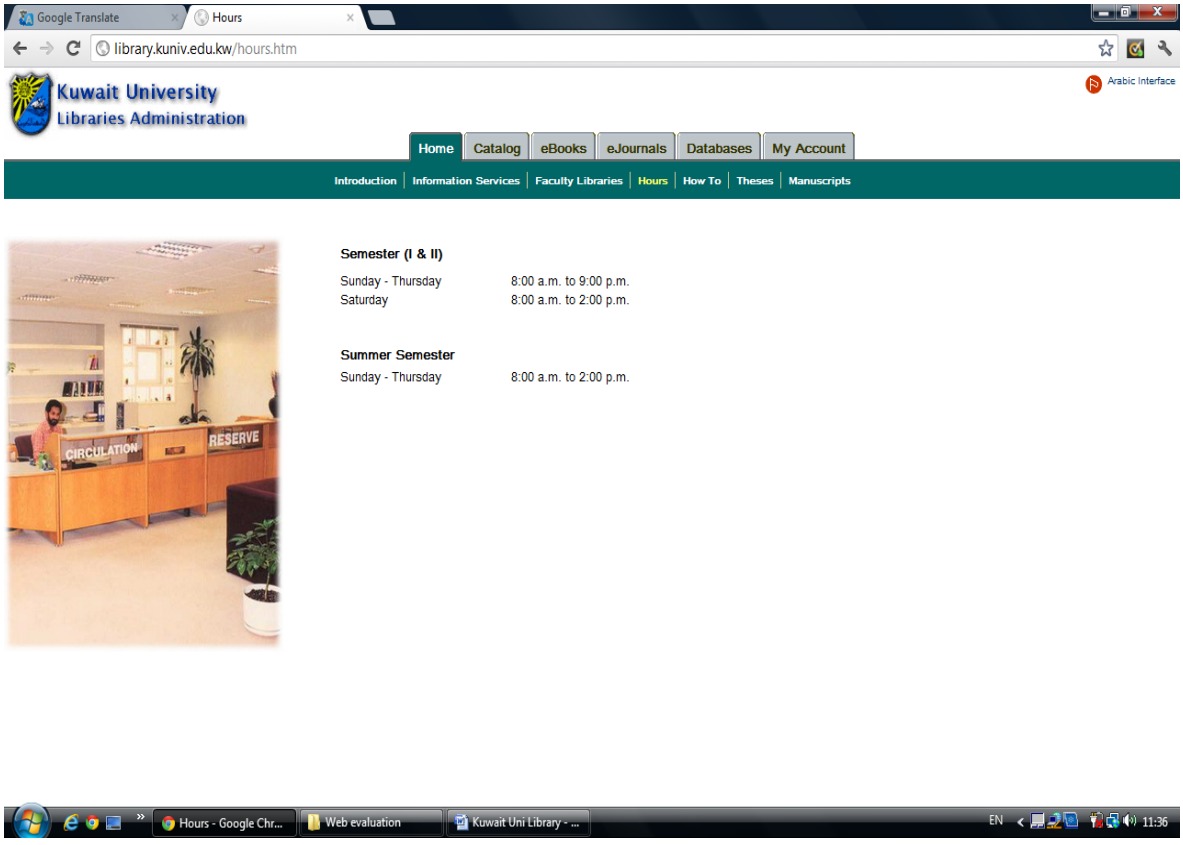


Figure 7: Library opening hours page

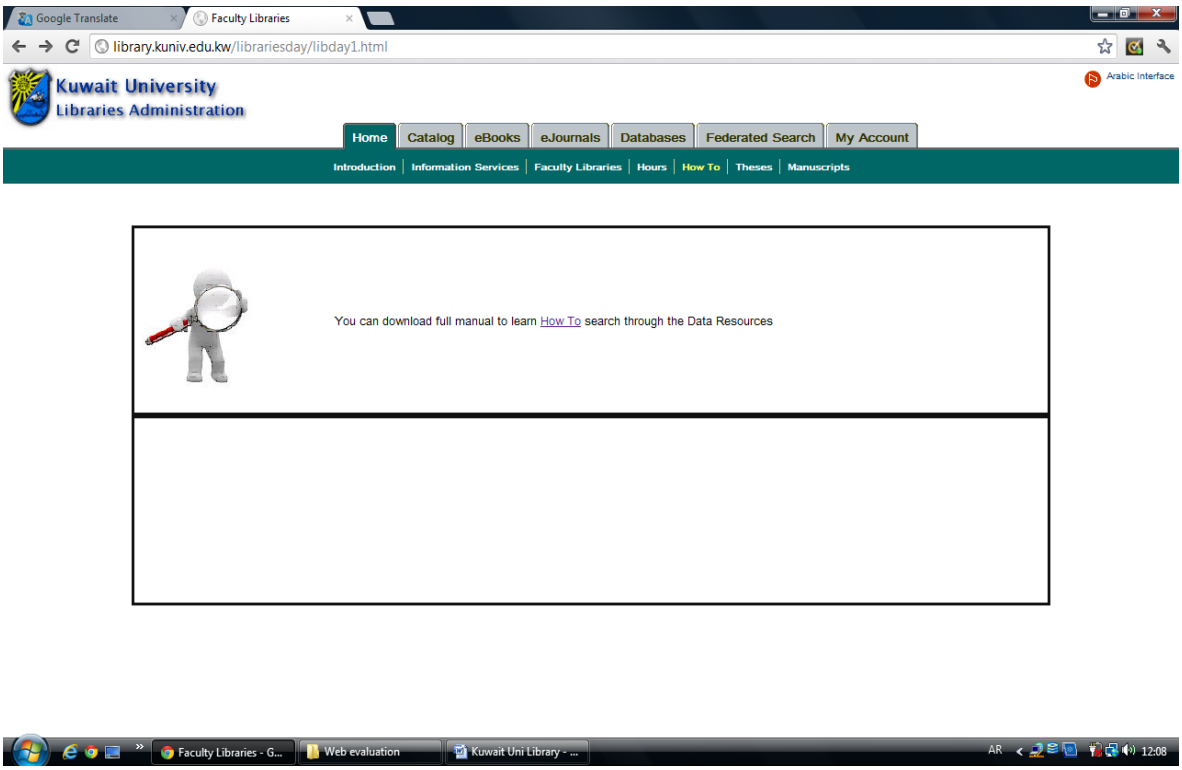


Figure 8: How to page, part (1).

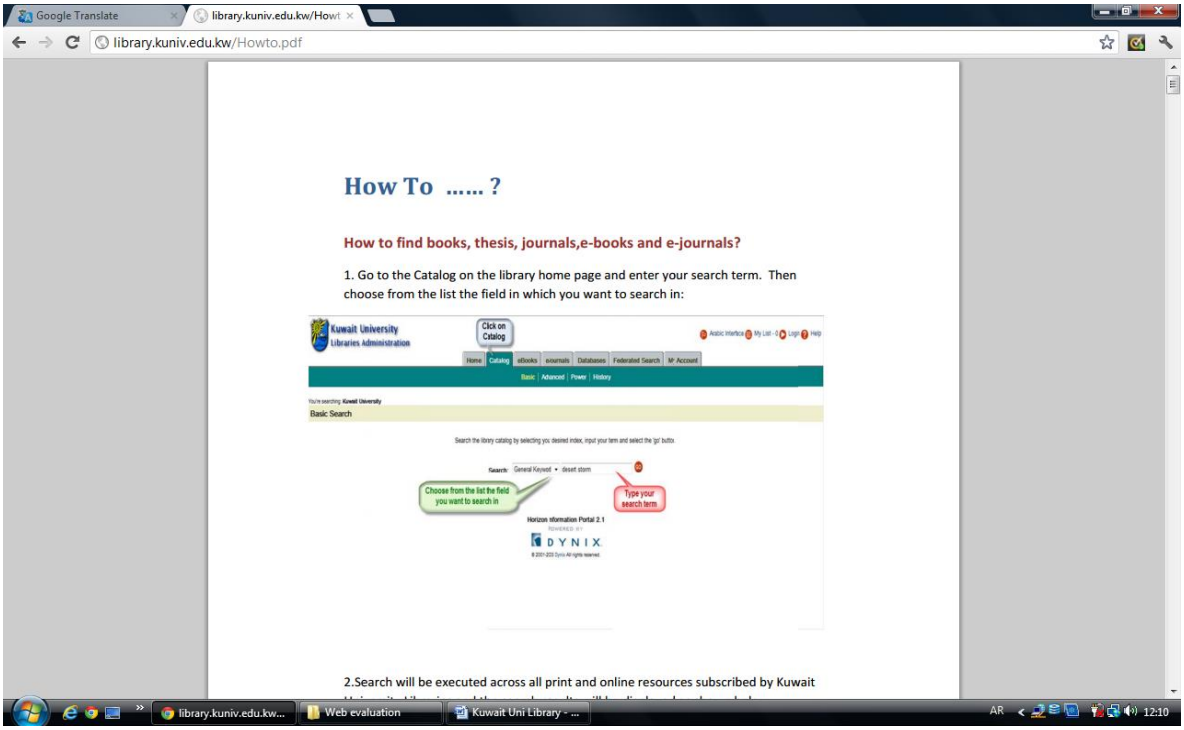


Figure 9: How to PDF page, part (2).

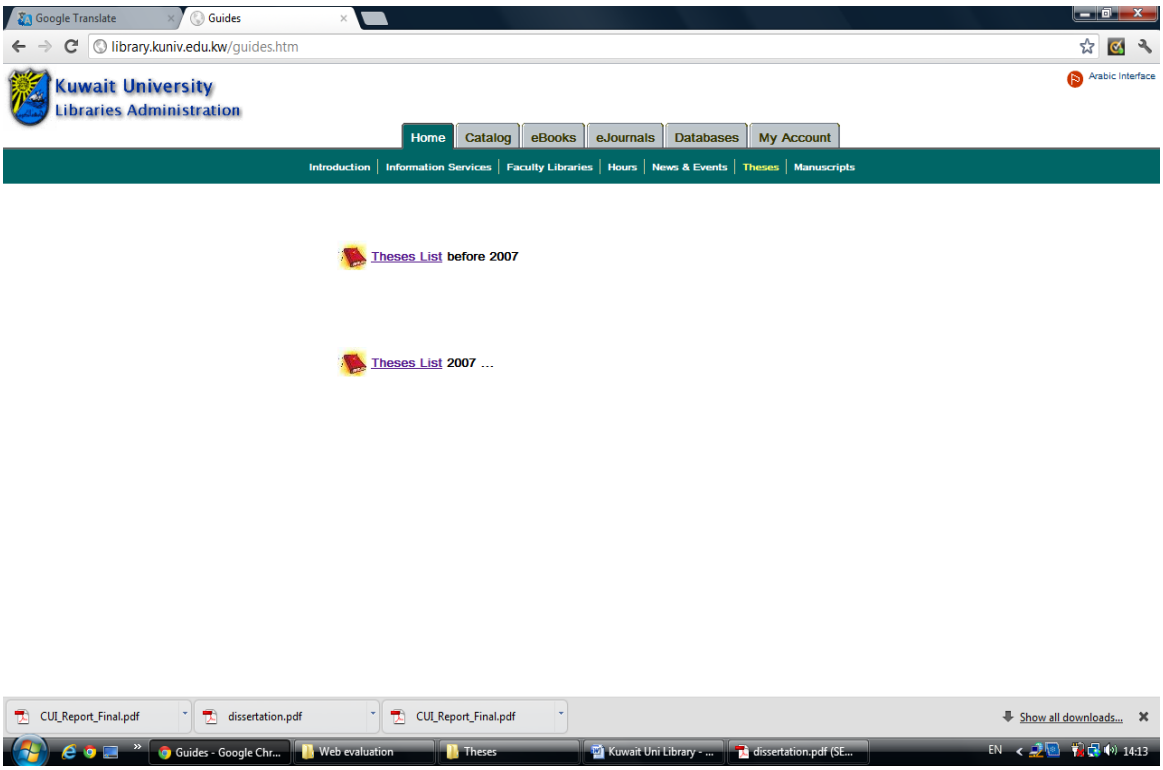


Figure 10: Theses page

Figure 11: Manuscripts page

Figure 12: The Library Arabic interface, part (1)

Figure 13: The Library Arabic interface, part (2)

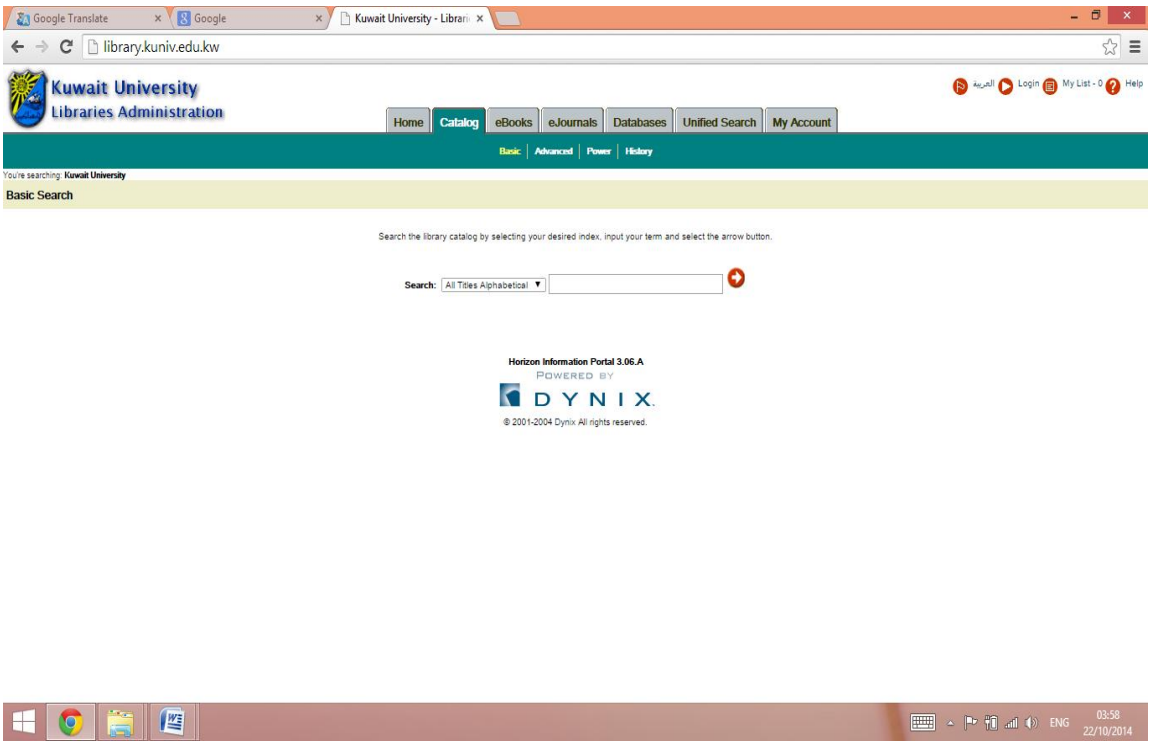


Figure 14: Catalogue page

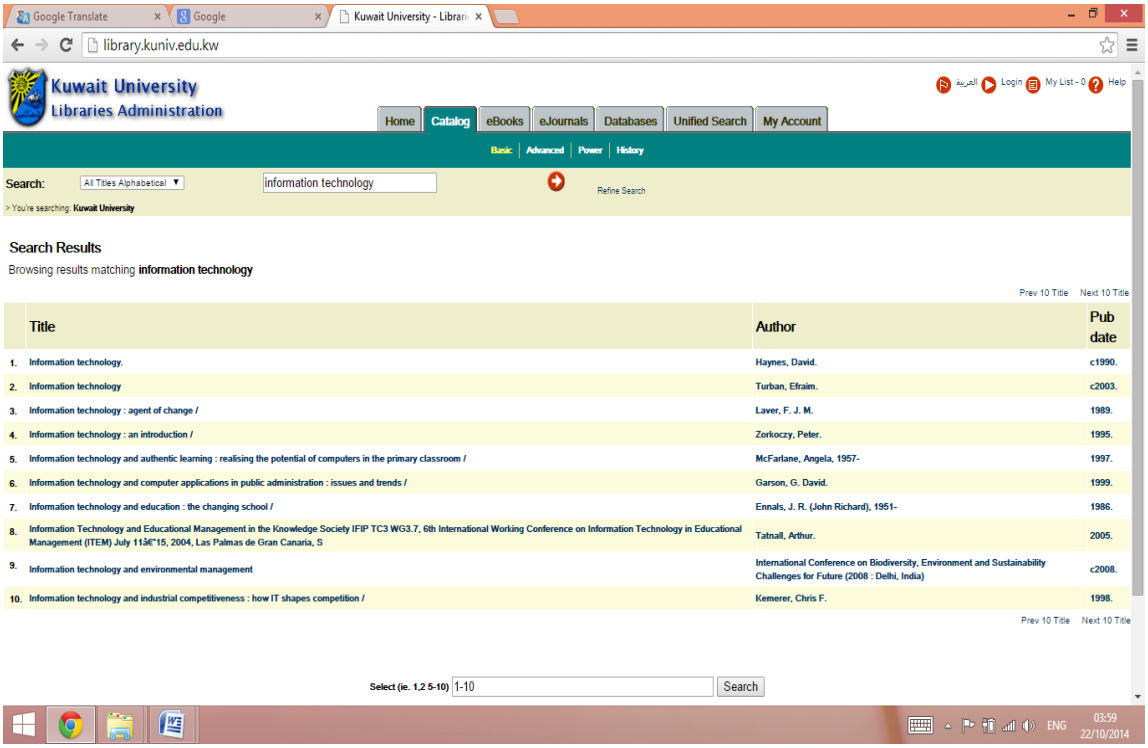


Figure 15: The way display results by basic search

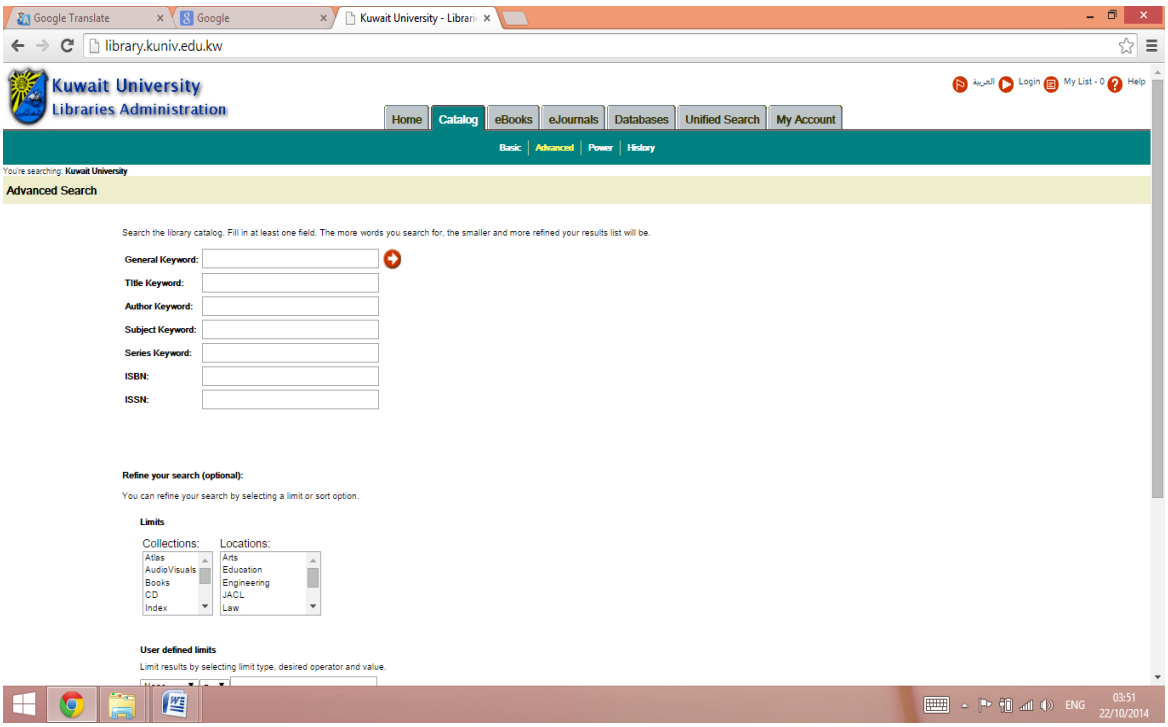


Figure 16: Advanced search page

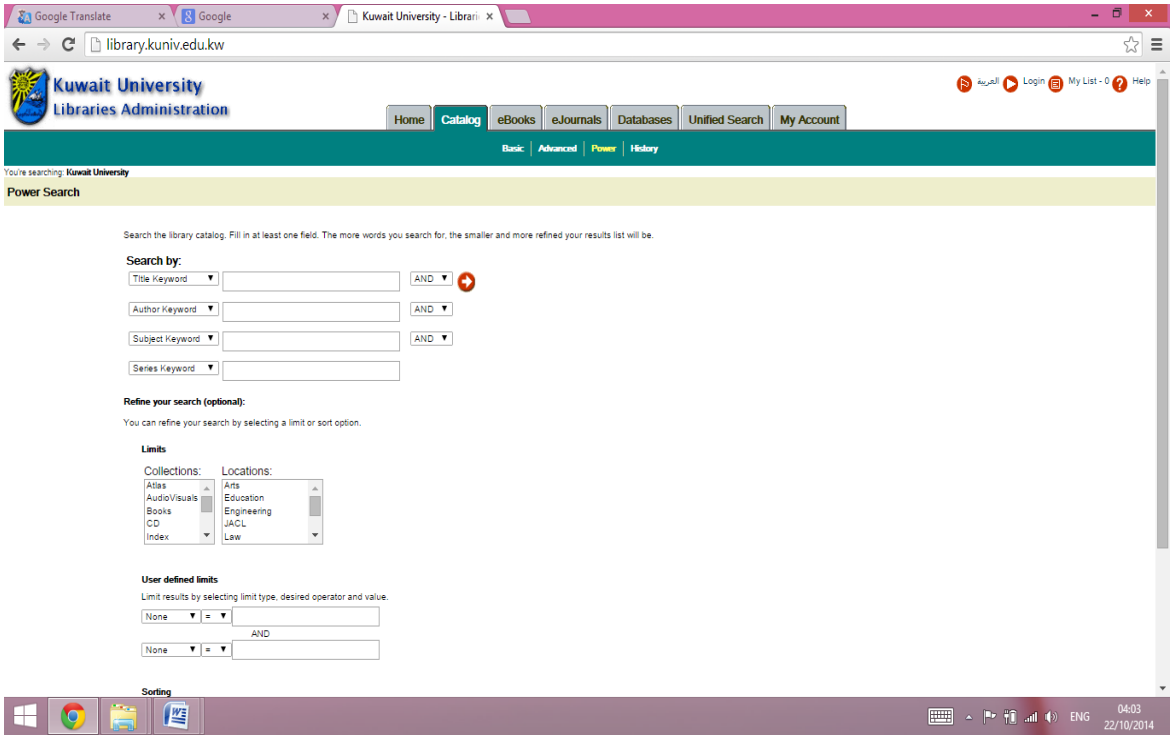


Figure 17: Power search page

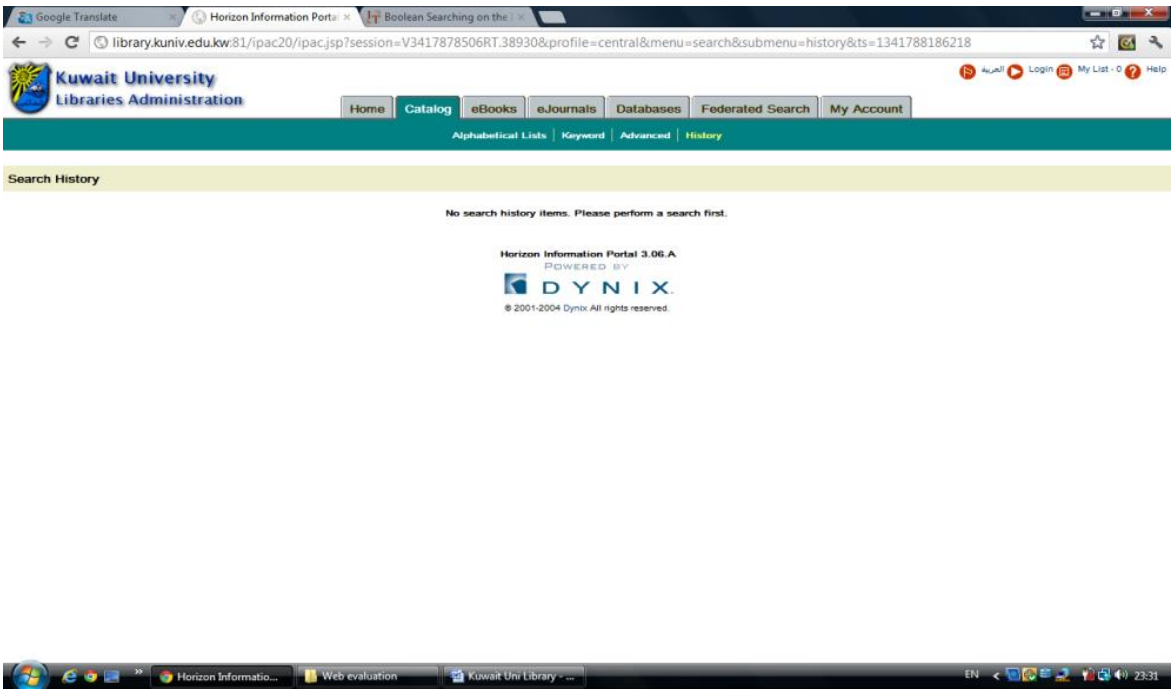


Figure 18: History page

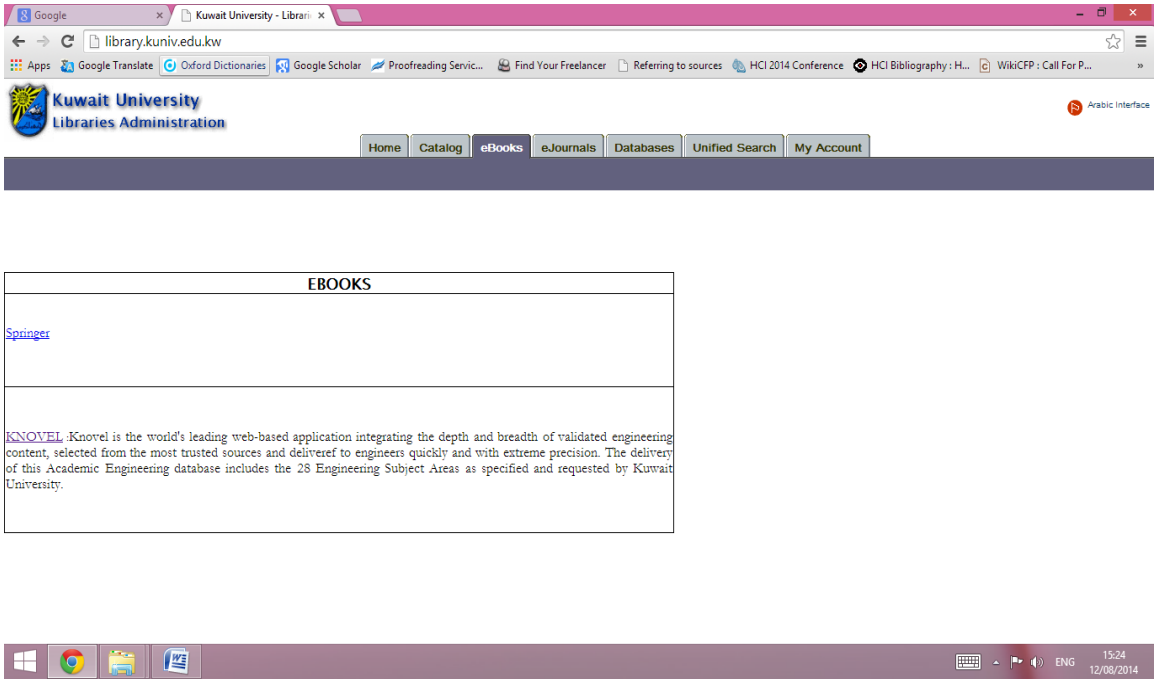


Figure 19: E-Books page

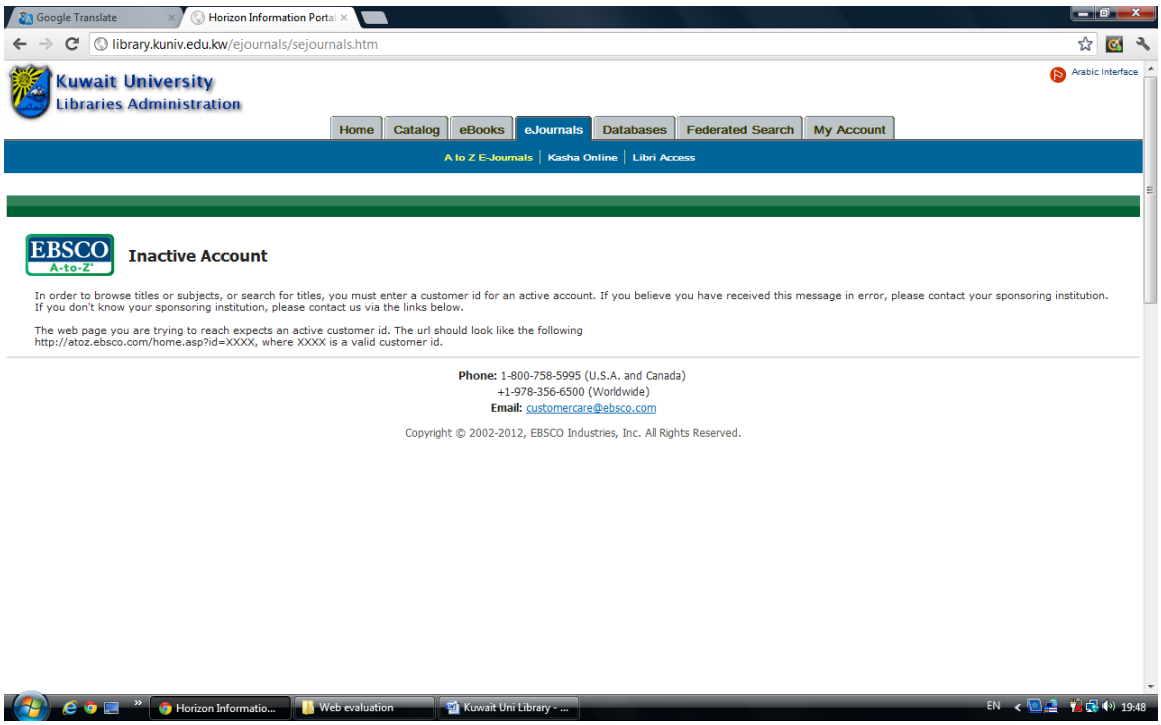


Figure 20: E-Journals page

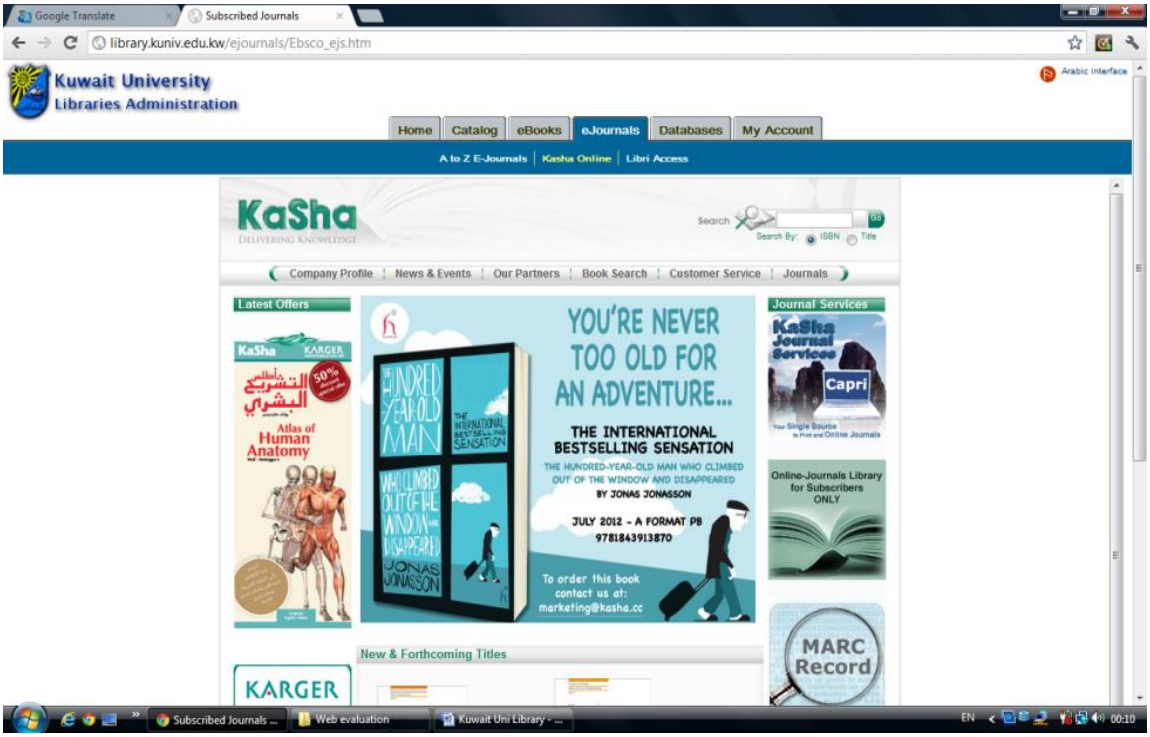


Figure 21: Kasha page

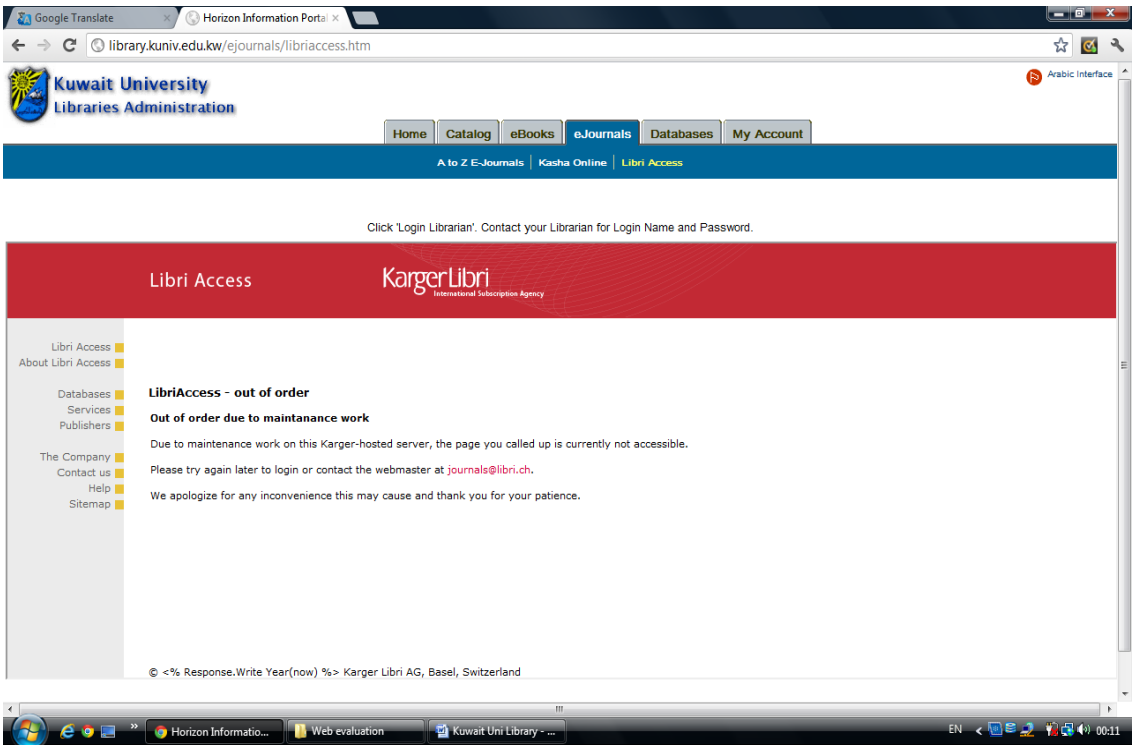


Figure 22: Libri access page

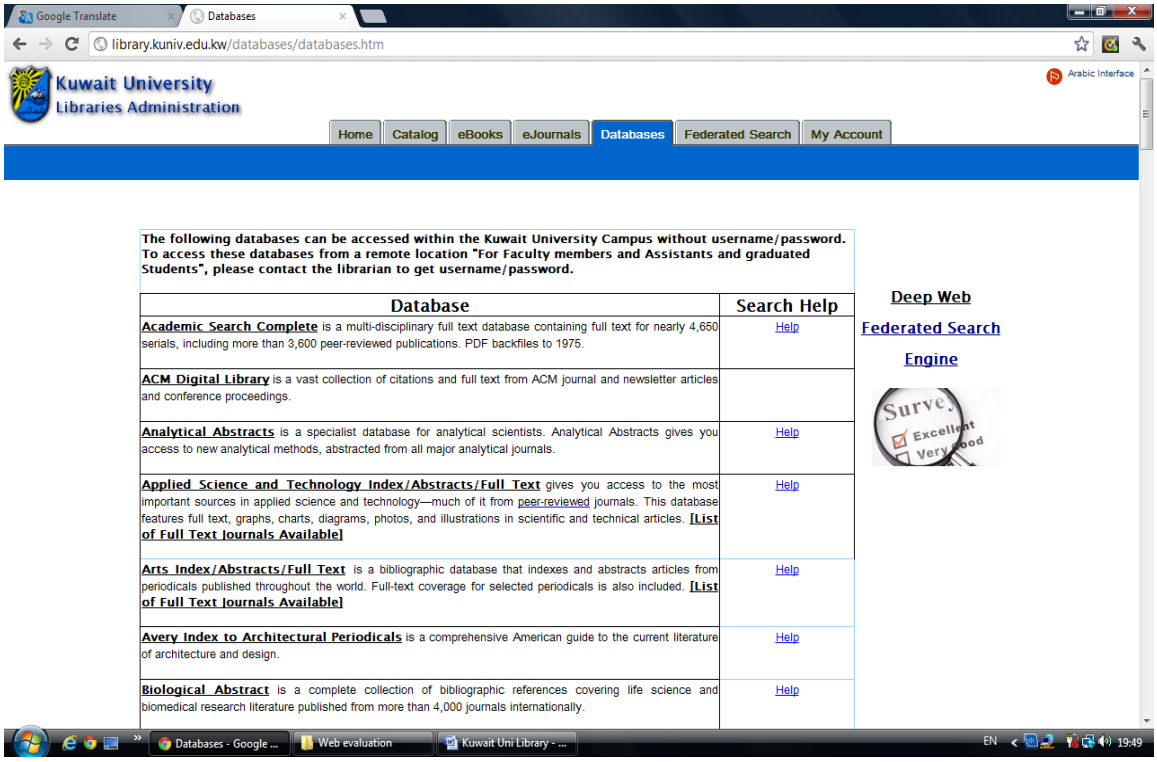
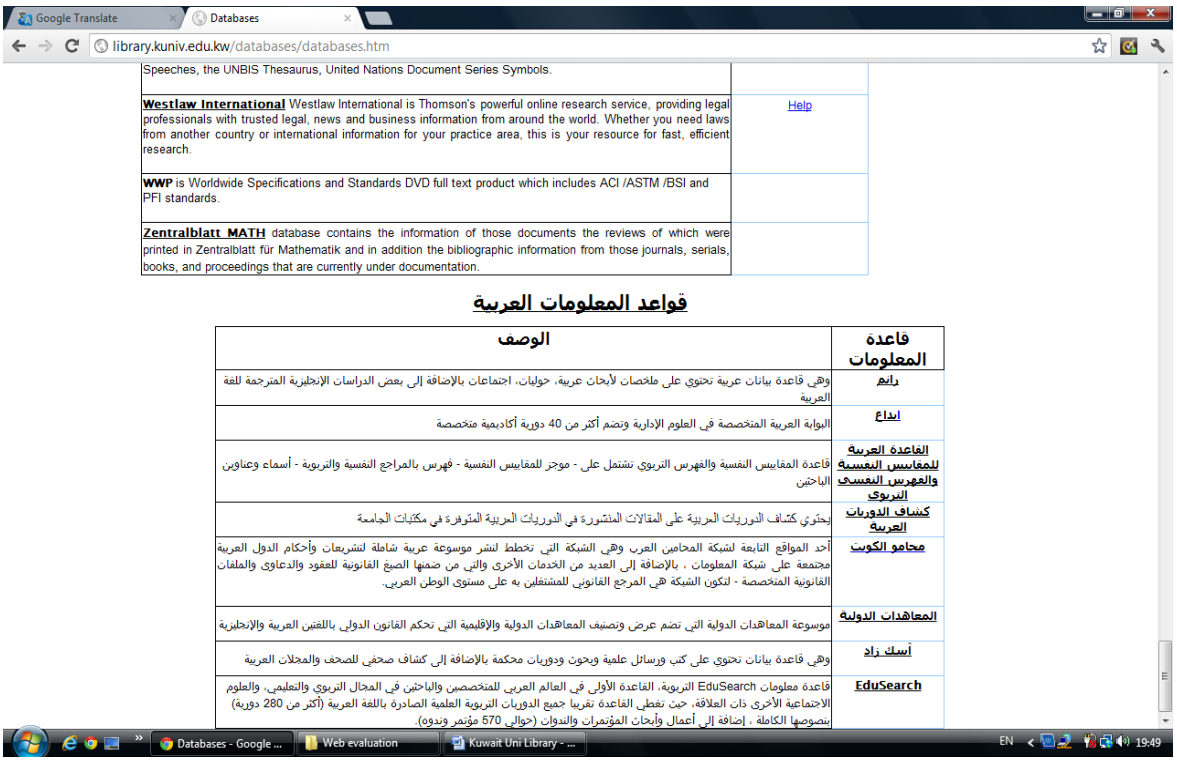


Figure 23: Databases page, part (1).



Speeches, the UNBIS Thesaurus, United Nations Document Series Symbols.	
Westlaw International Westlaw International is Thomson's powerful online research service, providing legal professionals with trusted legal, news and business information from around the world. Whether you need laws from another country or international information for your practice area, this is your resource for fast, efficient research.	Help
WWP is Worldwide Specifications and Standards DVD full text product which includes ACI /ASTM /BSI and PFI standards.	
Zentralblatt MATH database contains the information of those documents the reviews of which were printed in Zentralblatt für Mathematik and in addition the bibliographic information from those journals, serials, books, and proceedings that are currently under documentation.	

قواعد المعلومات العربية

قاعدة المعلومات	الوصف
رائم	وهي قاعدة بيانات عربية تحتوي على ملخصات لأبحاث عربية، حوليات، اجتماعات بالإضافة إلى بعض الدراسات الإنجليزية المترجمة للغة العربية
ابداع	البوابة العربية المتخصصة في العلوم الإدارية وتضم أكثر من 40 دورية أكاديمية متخصصة
القاعدة العربية للمقاييس النفسية والفهرس النفسي التربوي	قاعدة المقاييس النفسية والفهرس التربوي تشتمل على - موجز للمقاييس النفسية - فهرس بالمراجع النفسية والتربوية - أسماء وعناوين الباحثين
كشاف الدوريات العربية	يحتوي كشاف الدوريات العربية على المقالات المنشورة في الدوريات العربية المتوفرة في مكتبات الجامعة
محامو الكويت	أحد المواقع التابعة لشبكة المحامين العرب وهي الشبكة التي تخطط لنشر موسوعة عربية شاملة لتشريعات وأحكام الدول العربية مجتمعة على شبكة المعلومات ، بالإضافة إلى العديد من الخدمات الأخرى والتي من ضمنها الصيغ القانونية للعقود والدعاوى والملفات القانونية المتخصصة - لتكون الشبكة هي المرجع القانوني للمشتغلين به على مستوى الوطن العربي.
المعاهدات الدولية	موسوعة المعاهدات الدولية التي تضم عرض وتصنيف المعاهدات الدولية والإقليمية التي تحكم القانون الدولي باللغتين العربية والإنجليزية
أسك زاد	وهي قاعدة بيانات تحتوي على كتب ورسائل علمية وبحوث ودوريات محكمة بالإضافة إلى كشاف صحفي للصحف والمجلات العربية
EduSearch	قاعدة معلومات EduSearch التربوية، القاعدة الأولى في العالم العربي للمتخصصين والباحثين في المجال التربوي والتعليمي، والعلوم الاجتماعية الأخرى ذات العلاقة، حيث تغطي القاعدة تقريبا جميع الدوريات التربوية العلمية الصادرة باللغة العربية (أكثر من 280 دورية) بنصوصها الكاملة ، إضافة إلى أعمال وأبحاث المؤتمرات والندوات (حوالي 570 مؤتمر وندوة).

Figure 24: Databases page (Arabic databases), part (2).

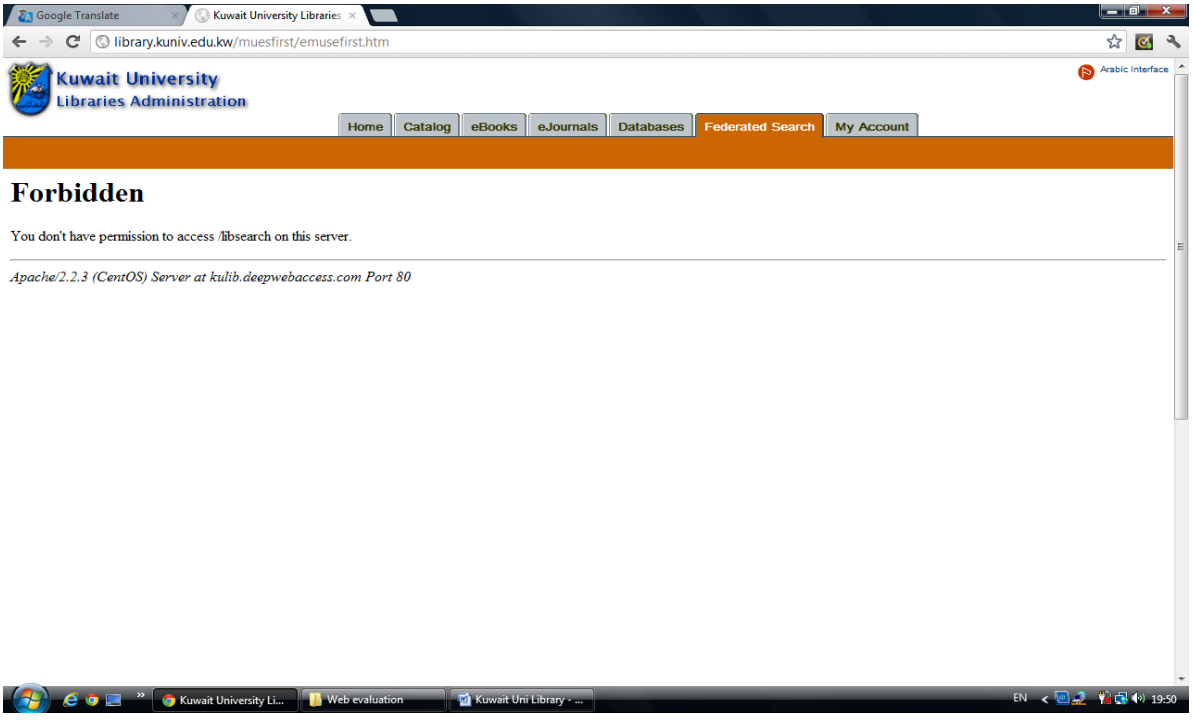


Figure 25: Federated search page

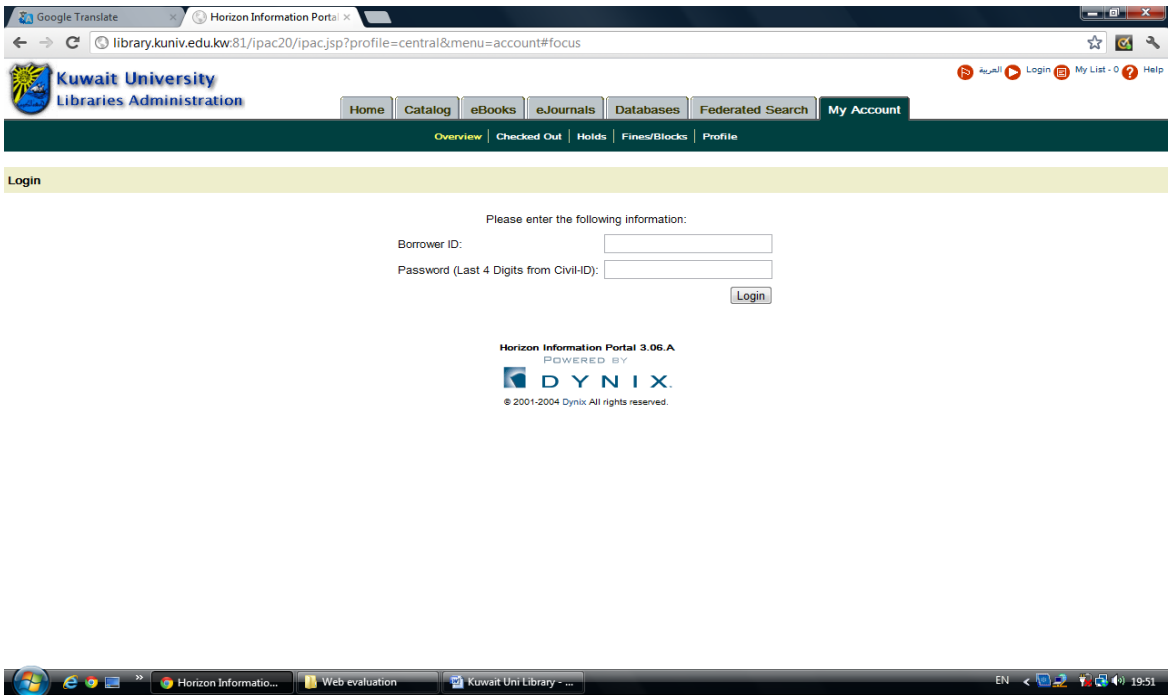


Figure 26: My account page

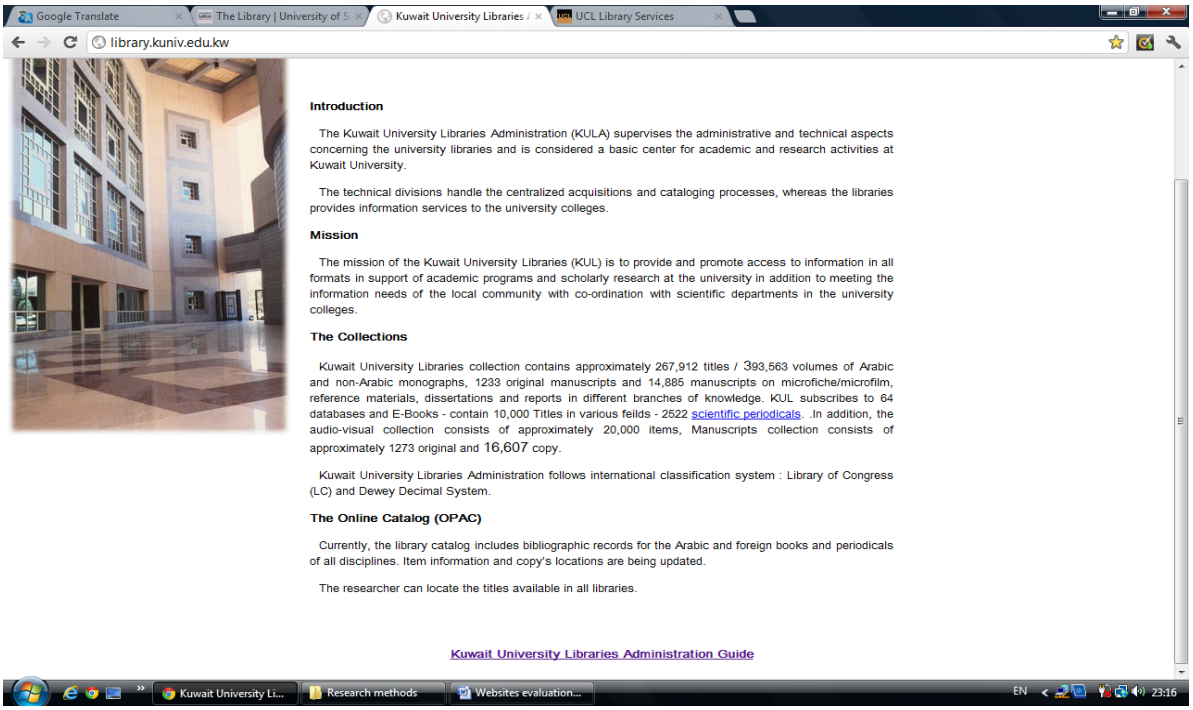


Figure 27: The Library interface part (B).

Figure 28: Library administration guide page (PDF)

Appendix 4: University of Salford Library Website

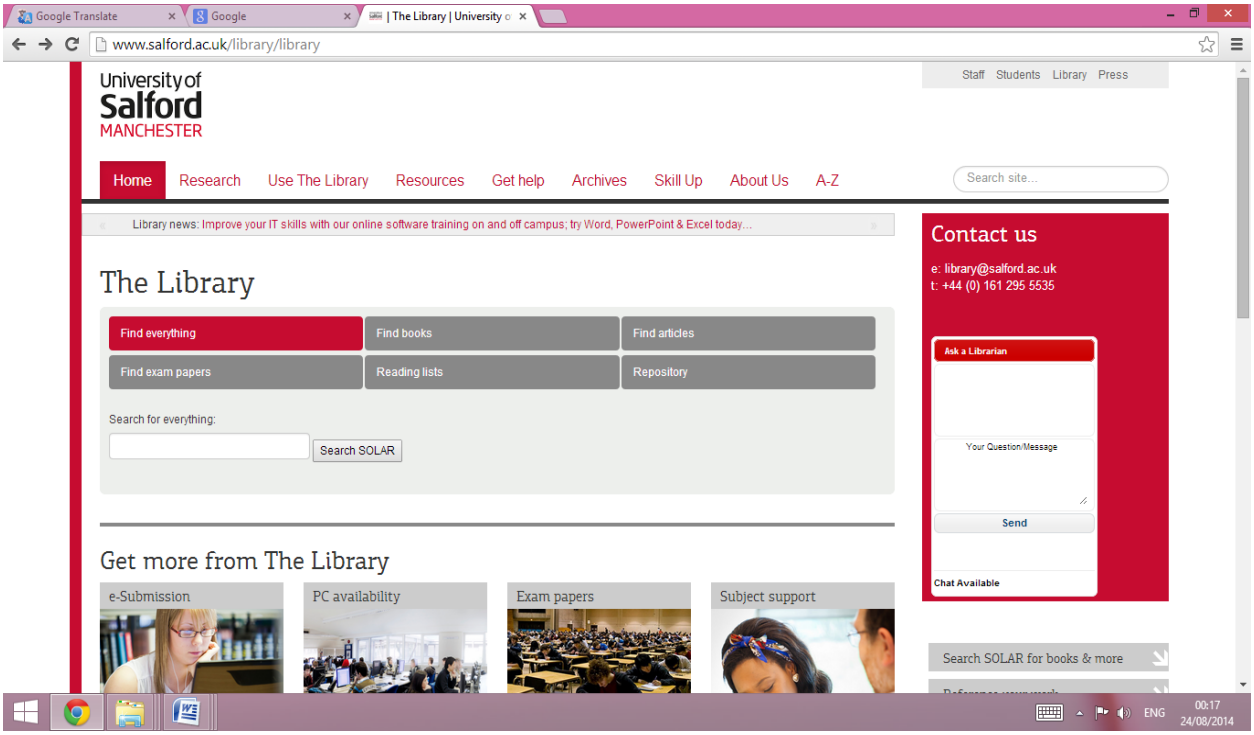


Figure 1: The library interface page (Part 1)

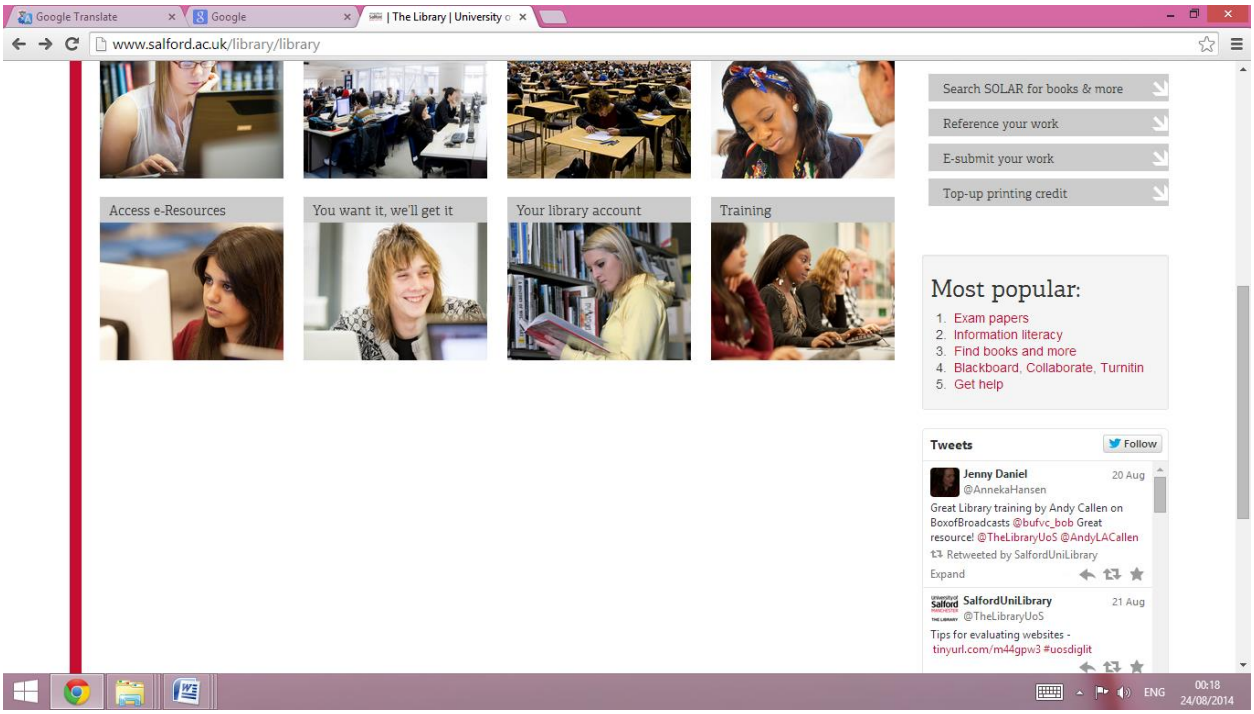


Figure 2: The library interface page (Part 2)

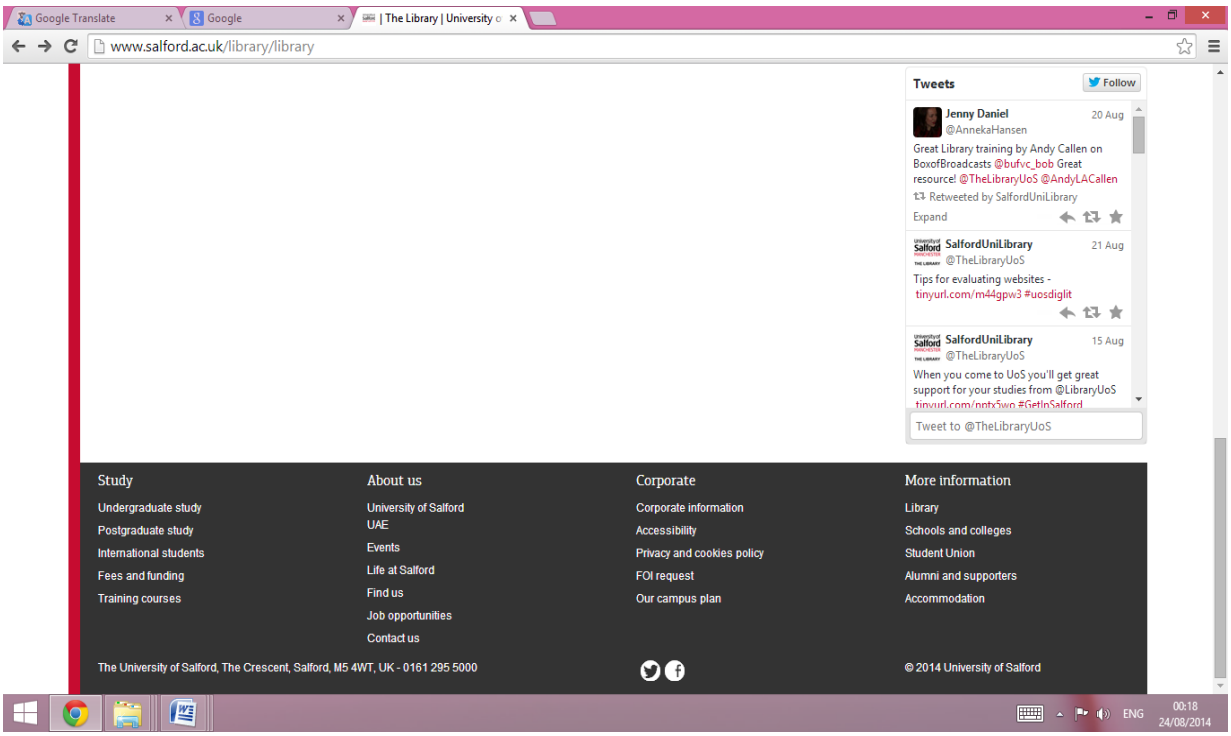


Figure 3: The library interface page (Part 3)

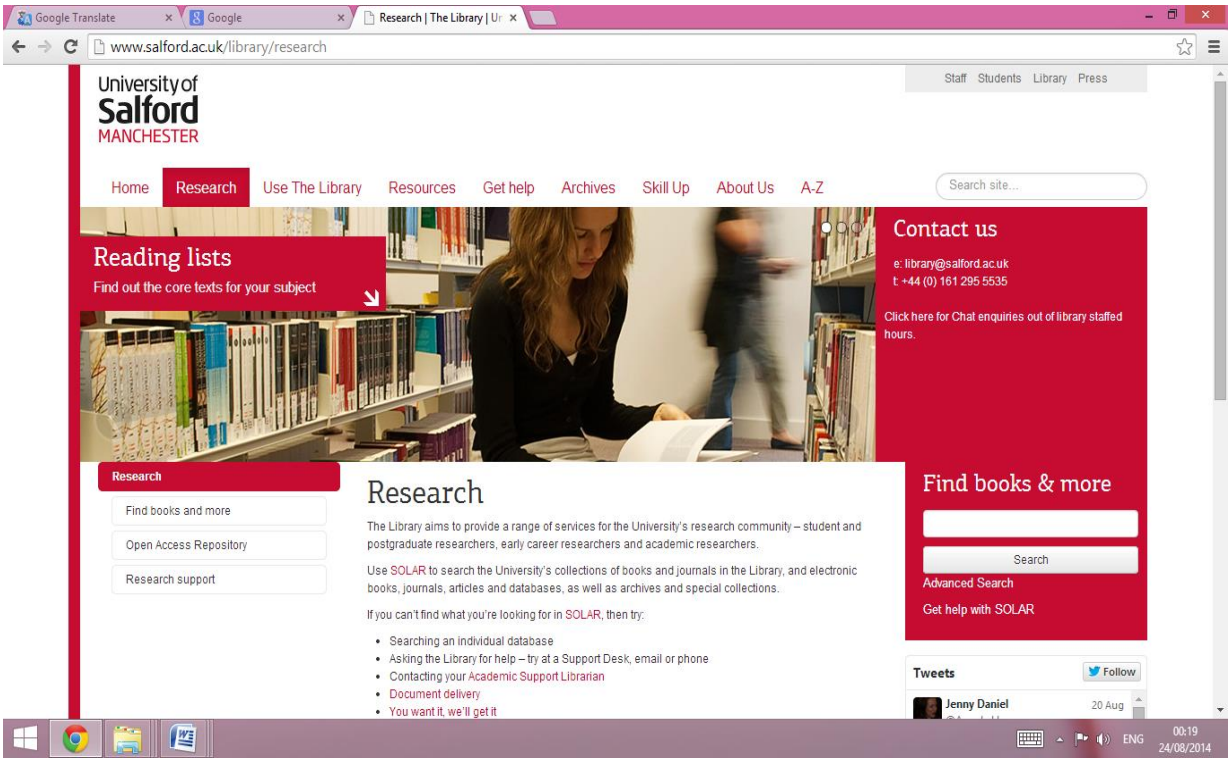


Figure 4: The research page (Part 1)

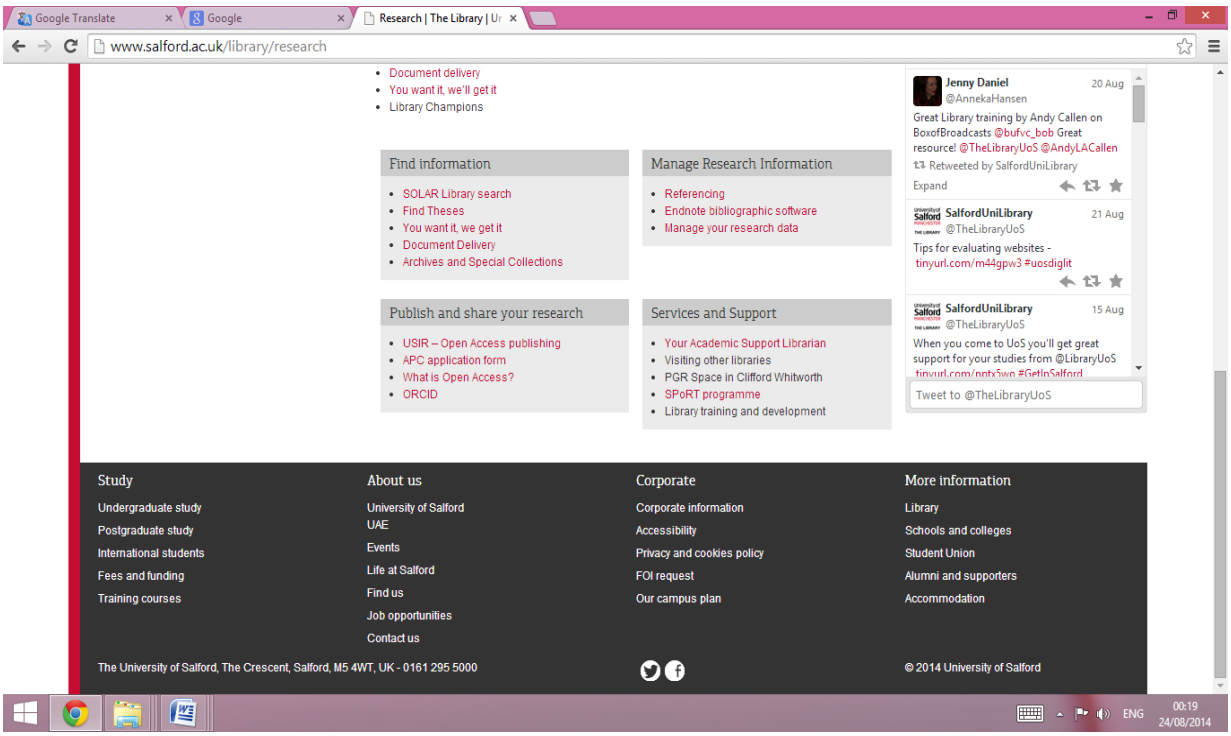


Figure 5: The research page (Part 2)

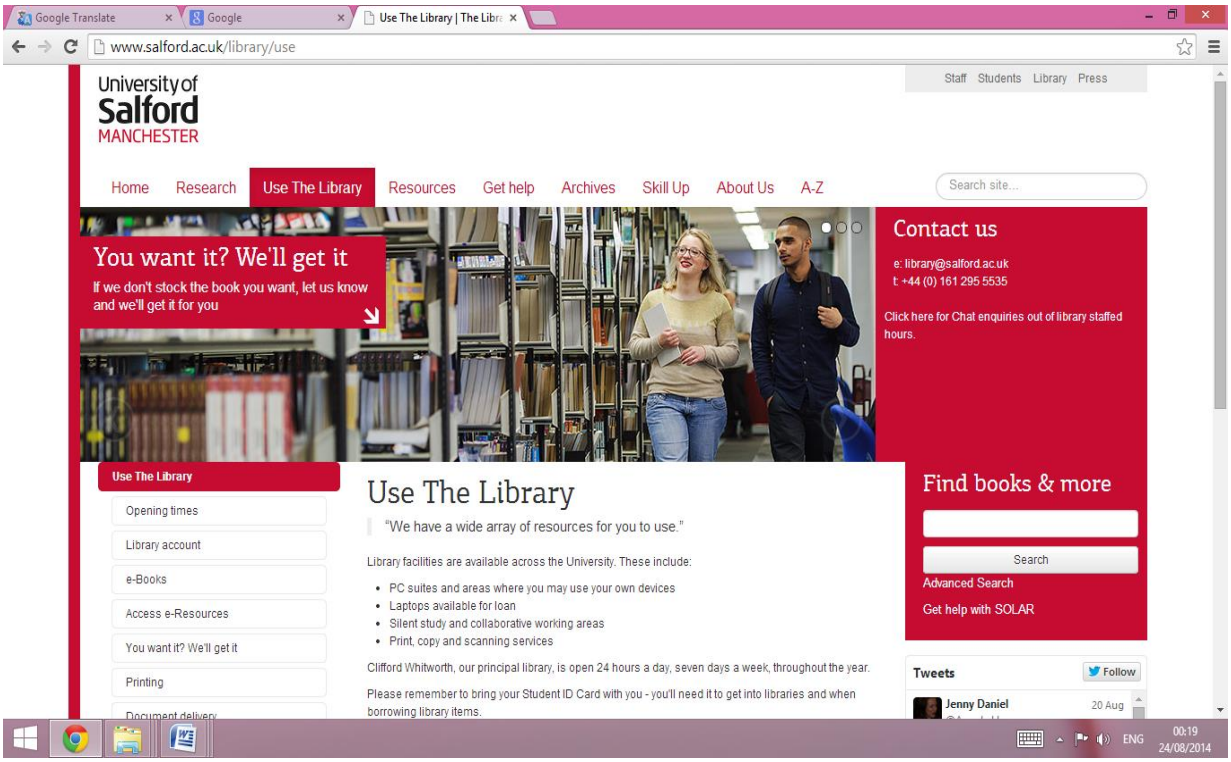


Figure 6: Use the library page (Part 1)

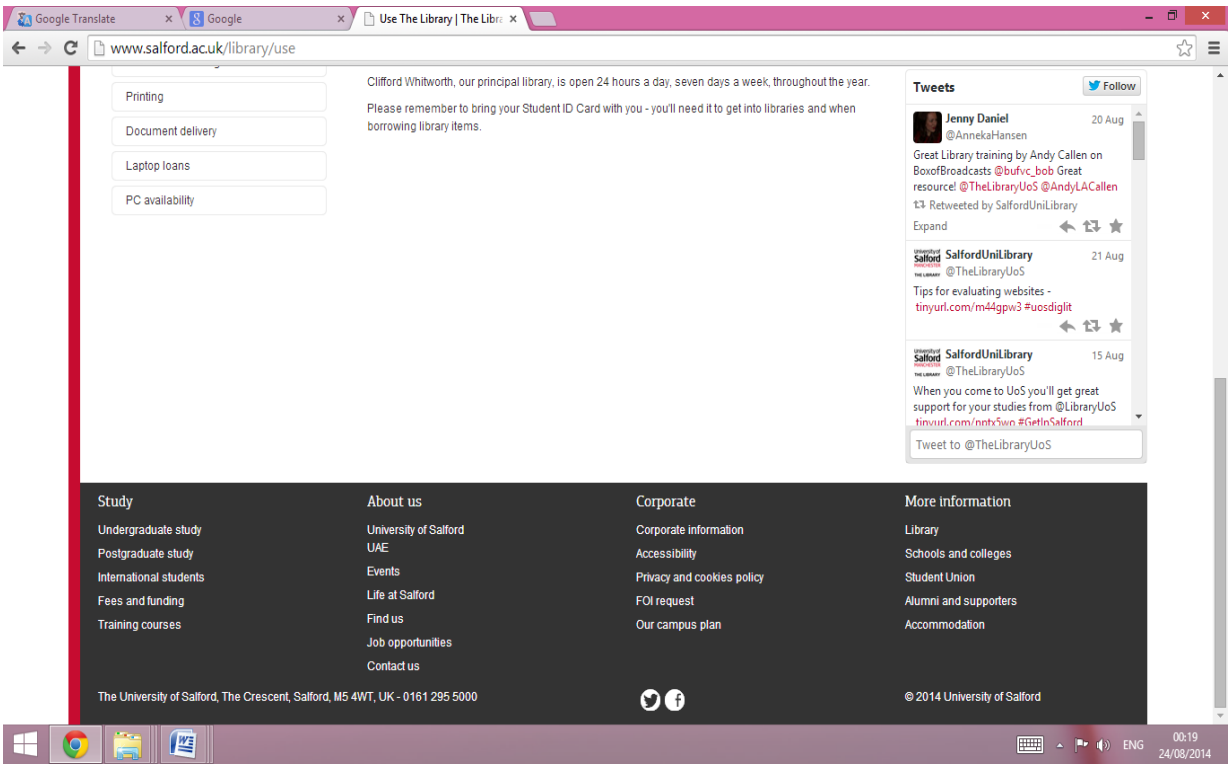


Figure 7: Use the library page (Part 2)

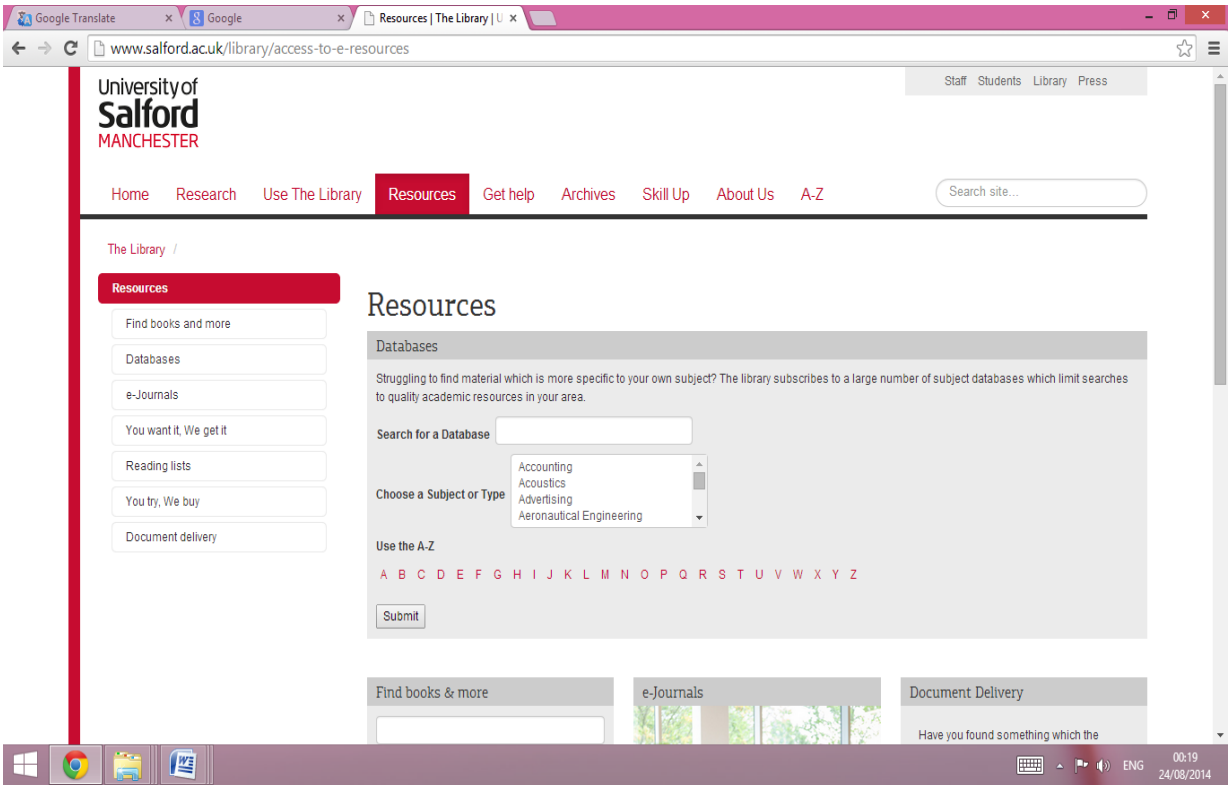


Figure 8: Resources page (Part 1)

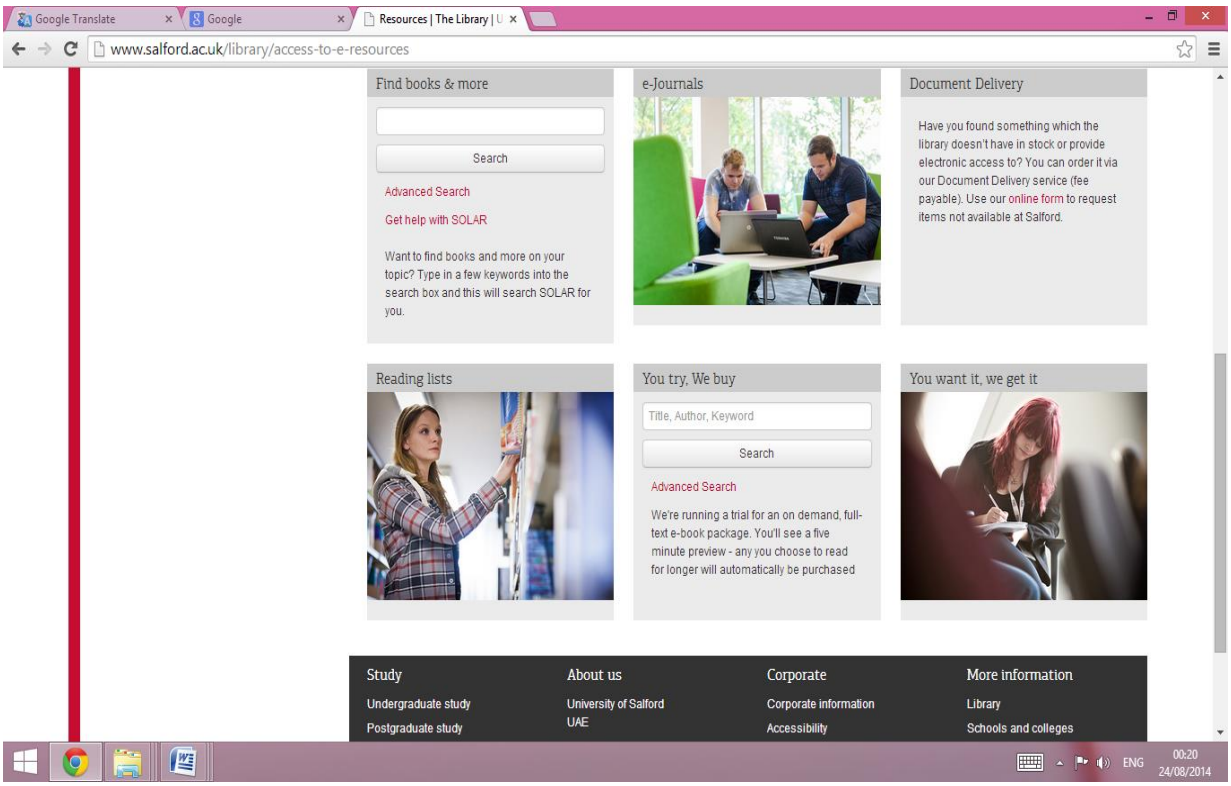


Figure 9: Resources page (Part 2)

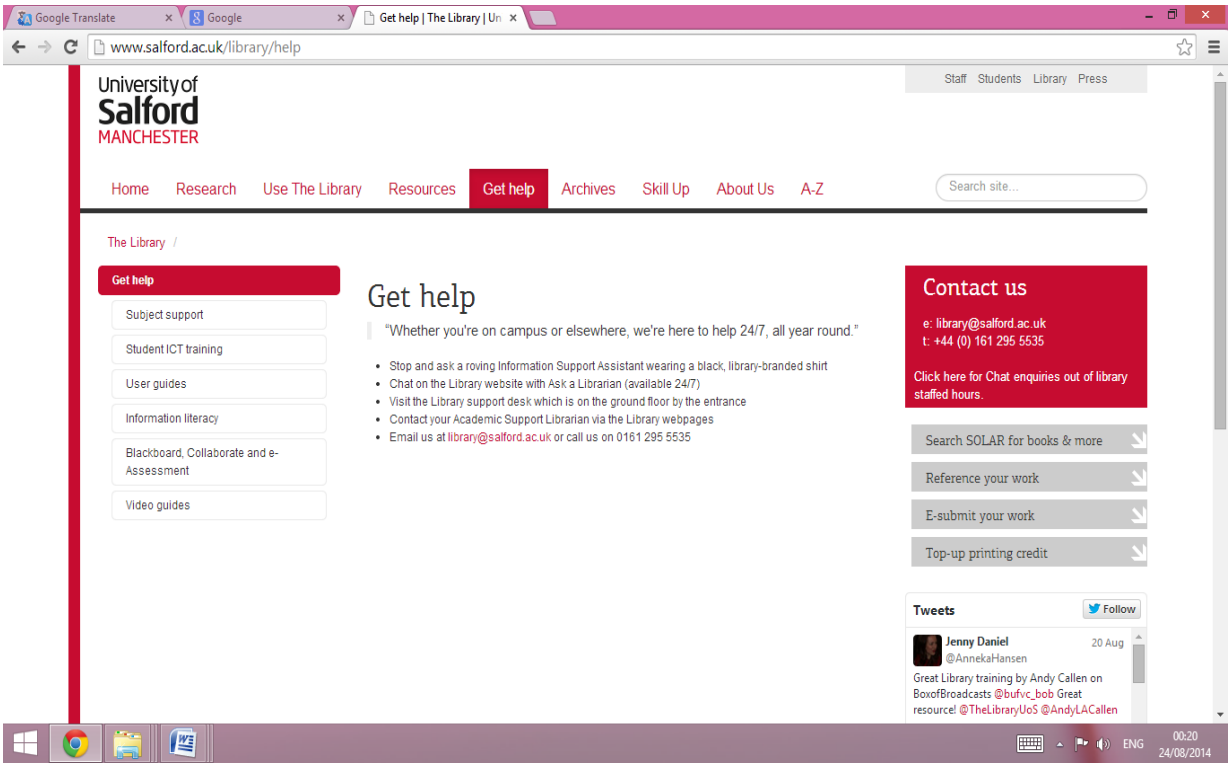


Figure 10: Get help page (Part 1)

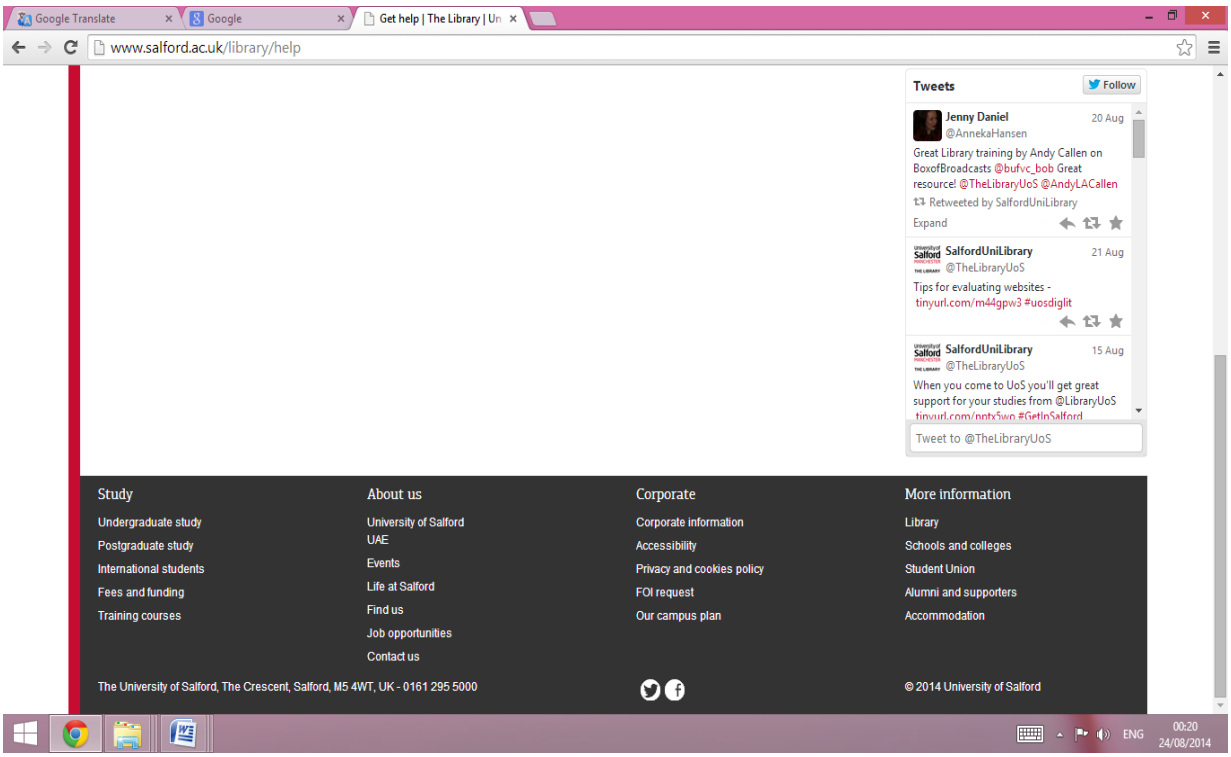


Figure 11: Get help page (Part 2)

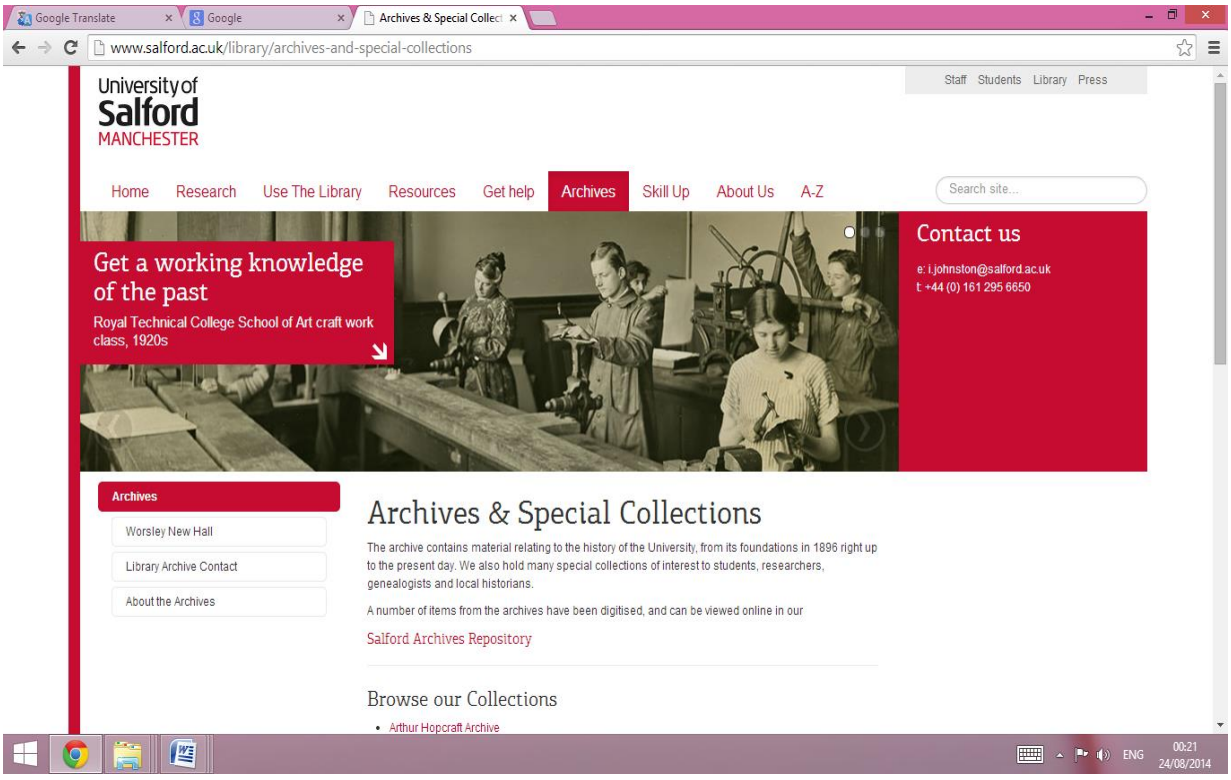


Figure 12: Archives page (Part 1)

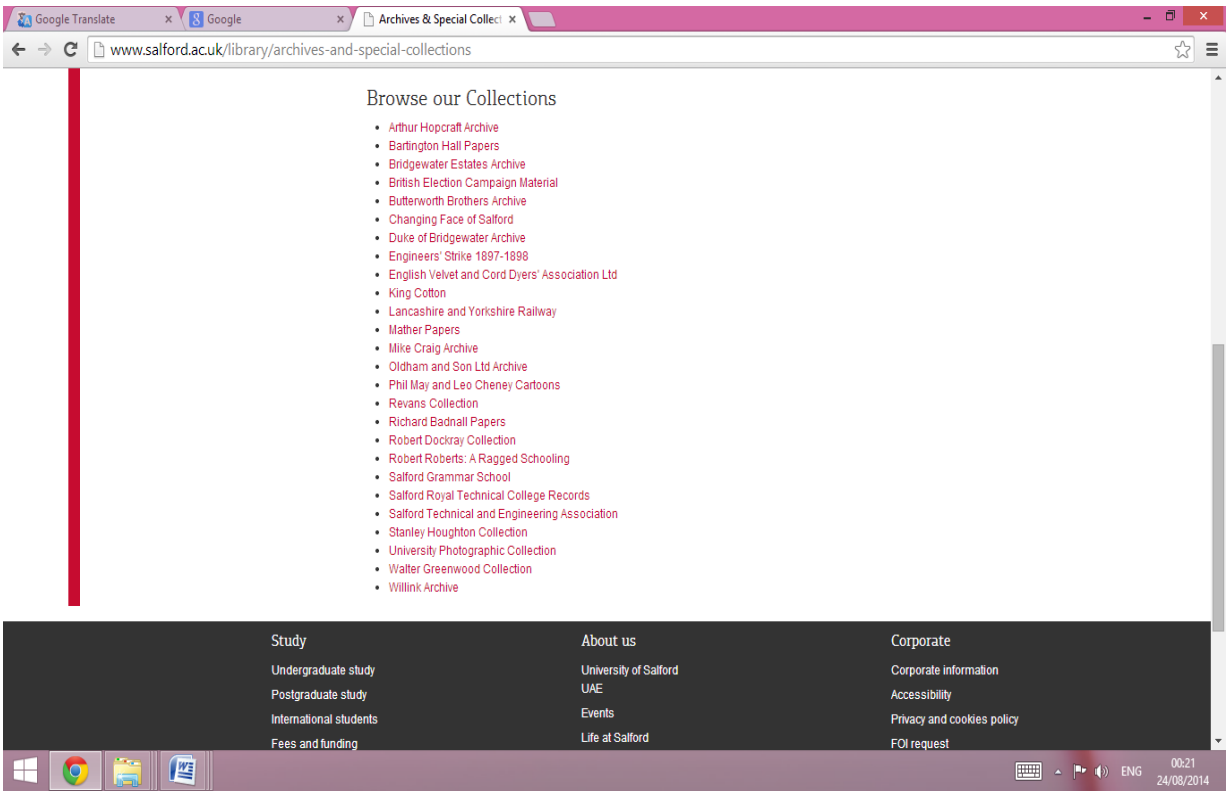


Figure 13: Archives page (Part 2)

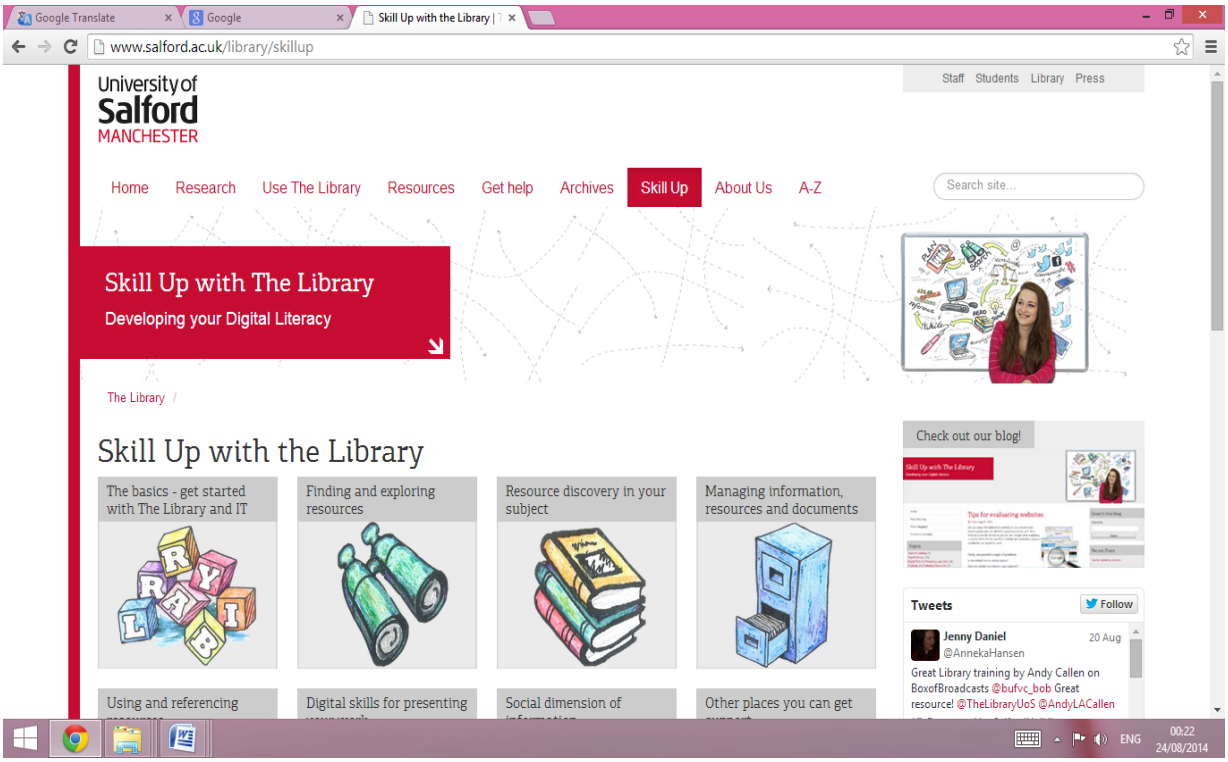


Figure 14: Skill up page (Part 1)

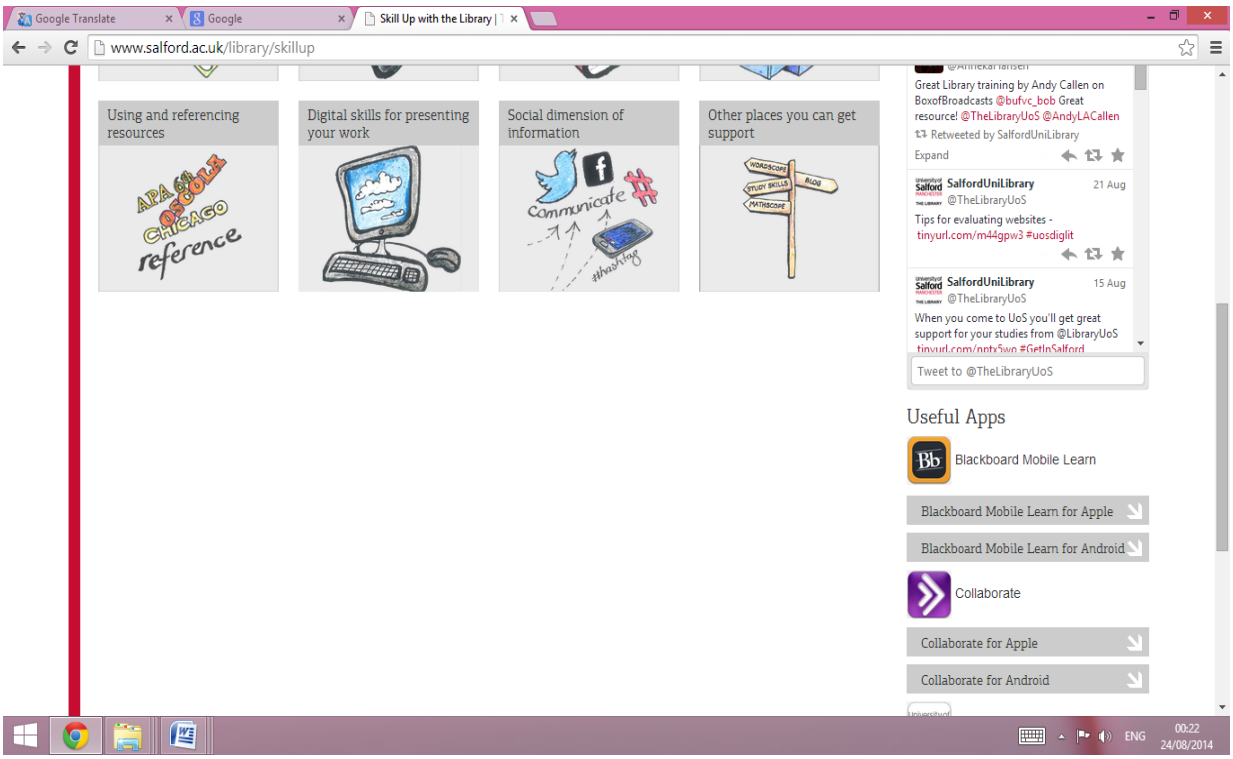


Figure 15: Archives page (Part 2)

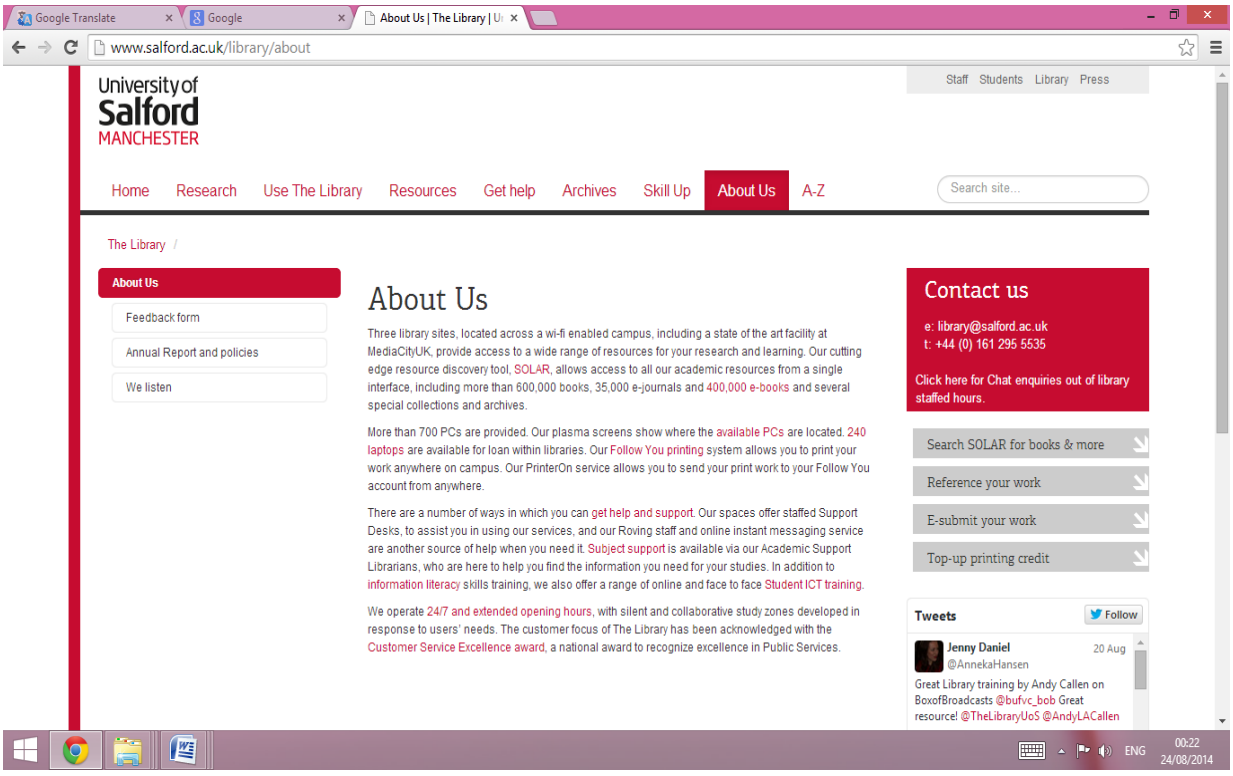


Figure 16: About us page (Part 1)

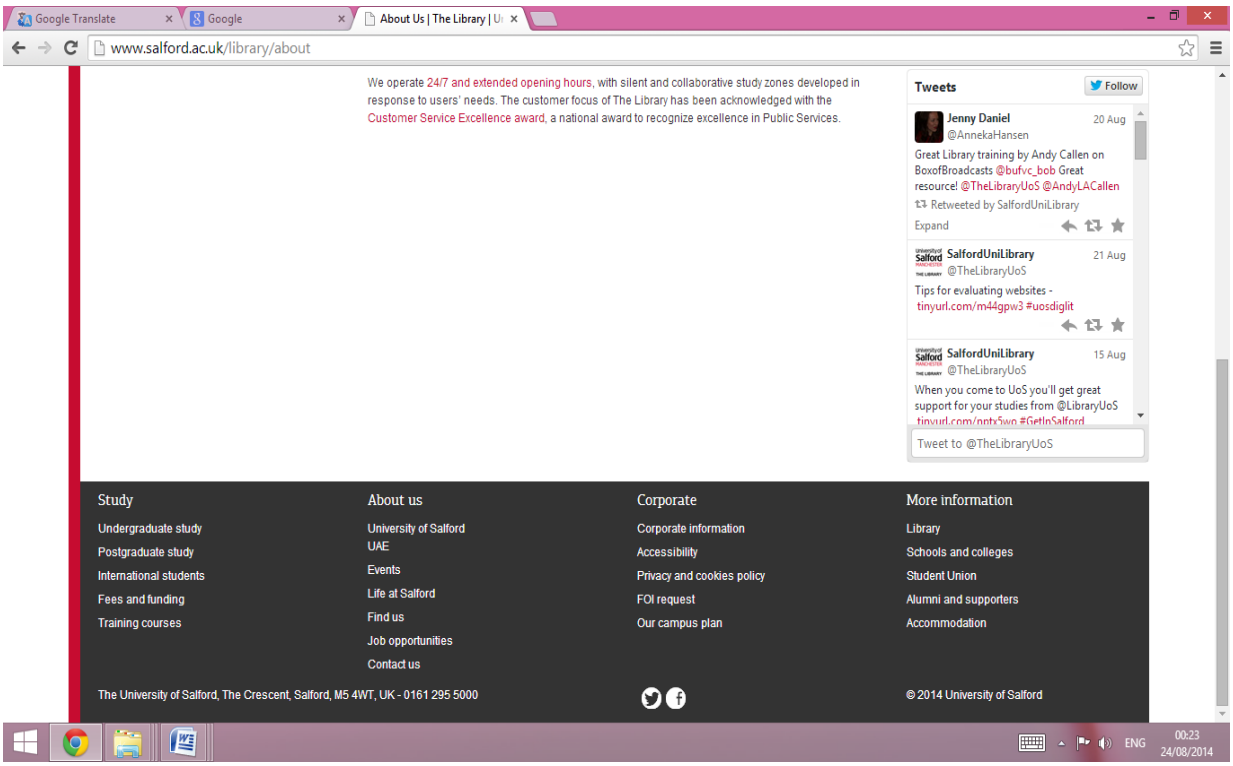


Figure 17: About us page (Part 2)

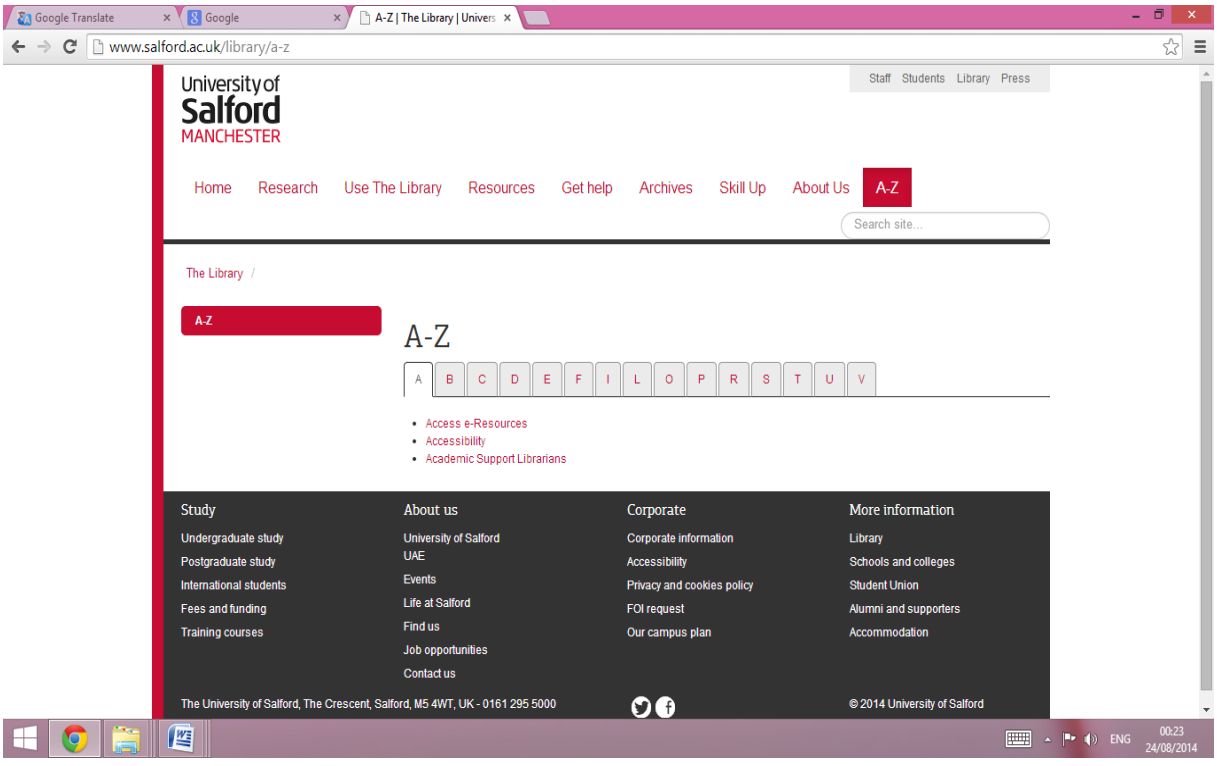


Figure 18: A-Z page

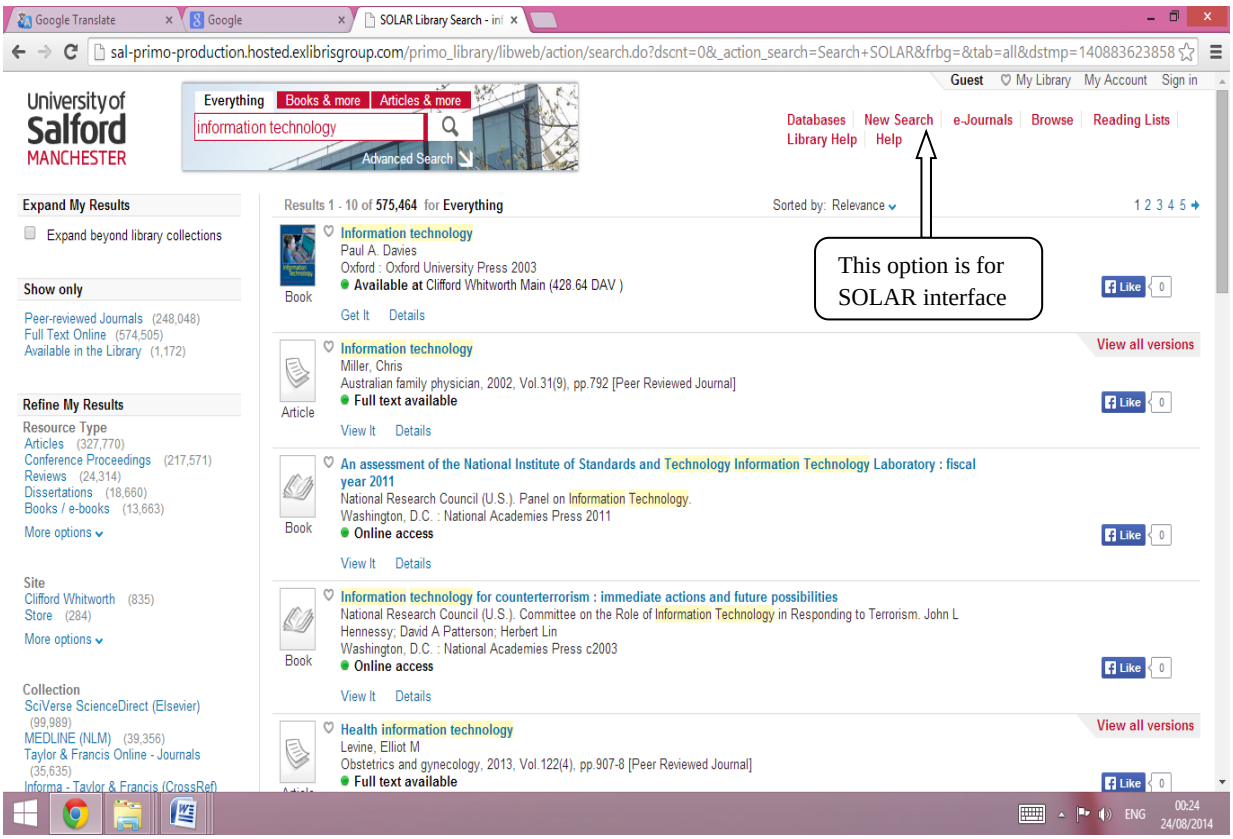


Figure 19: The page displays results when performing search (Part 1)

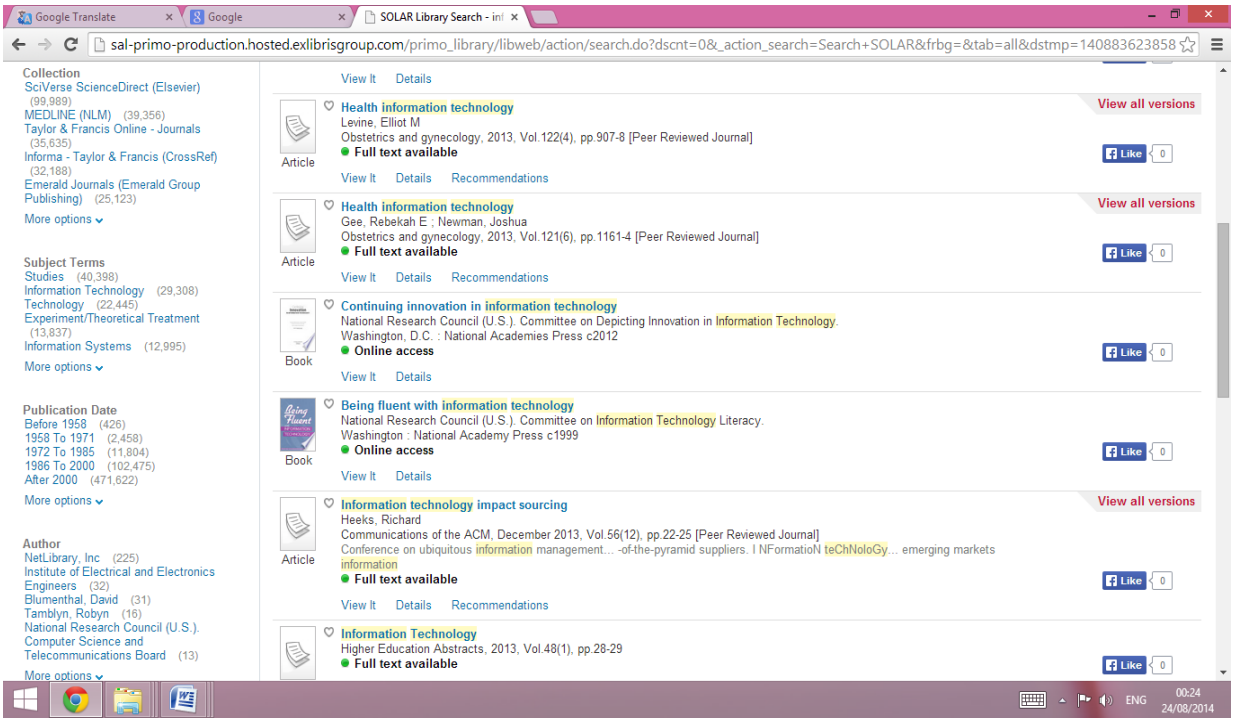


Figure 20: The page displays results when performing search (Part 2)

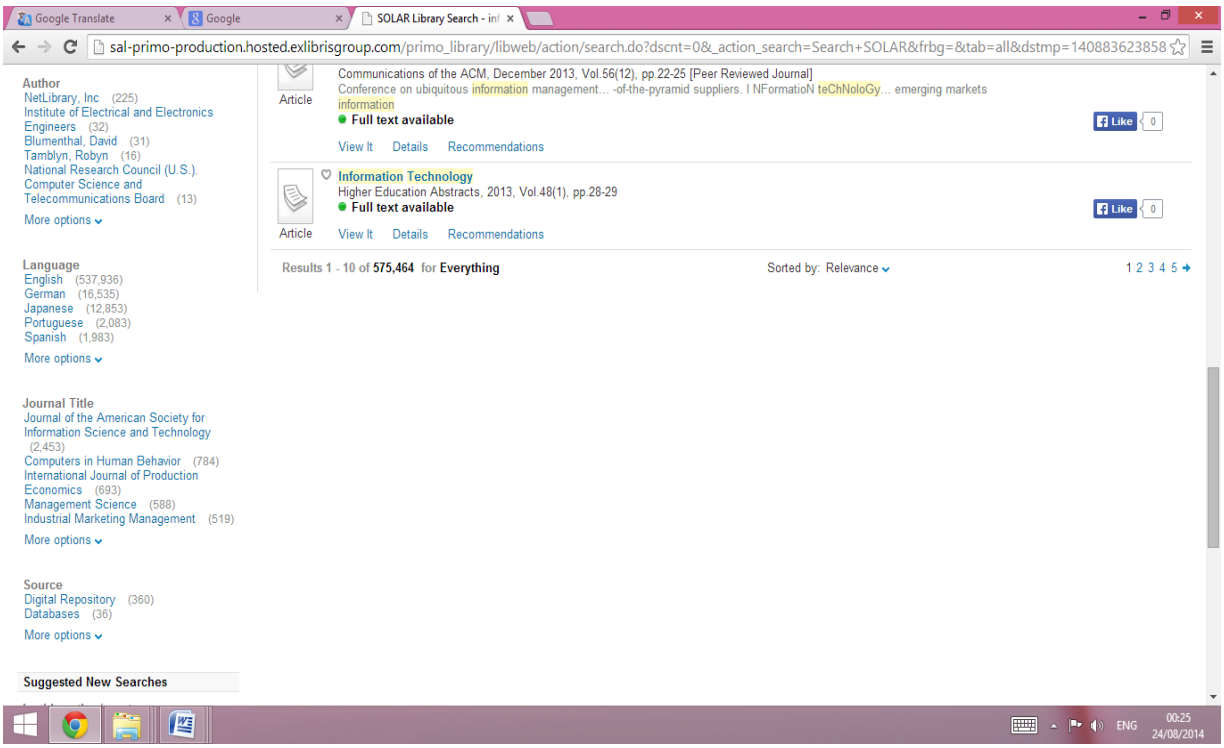


Figure 21: The page displays results when performing search (Part 3)

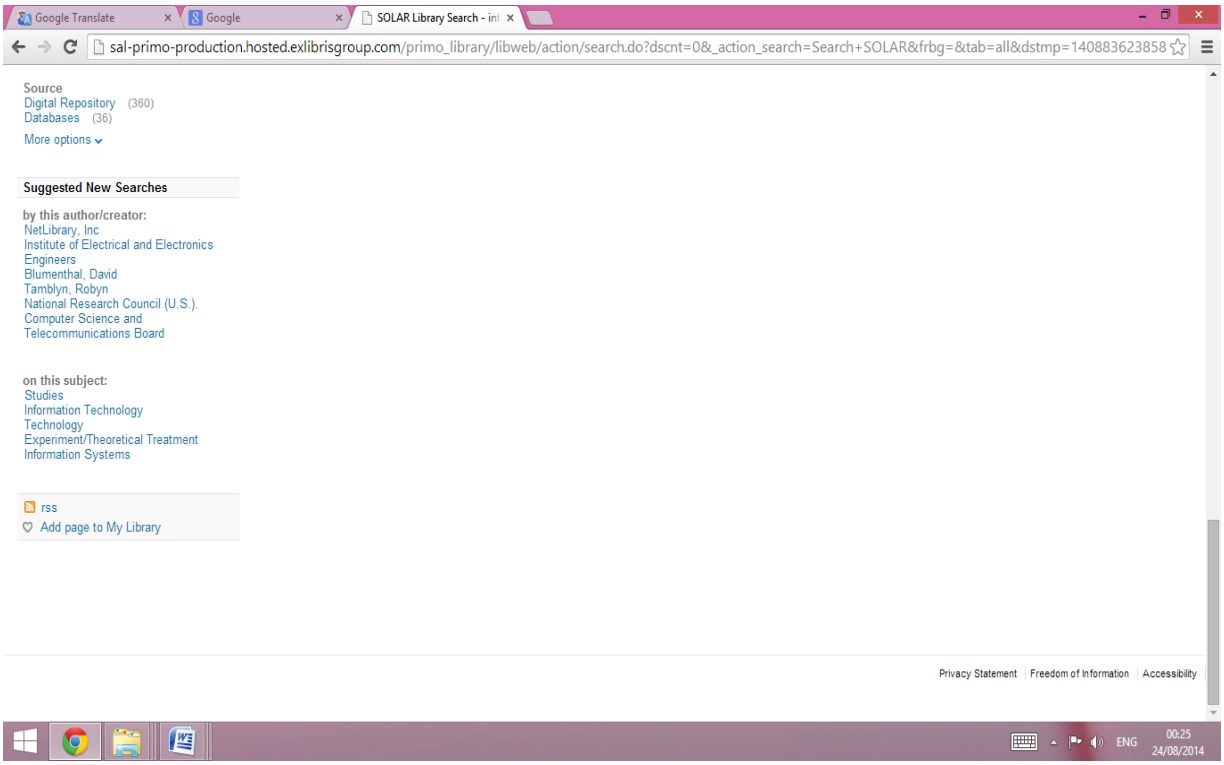


Figure 22: The page displays results when performing search (Part 4)

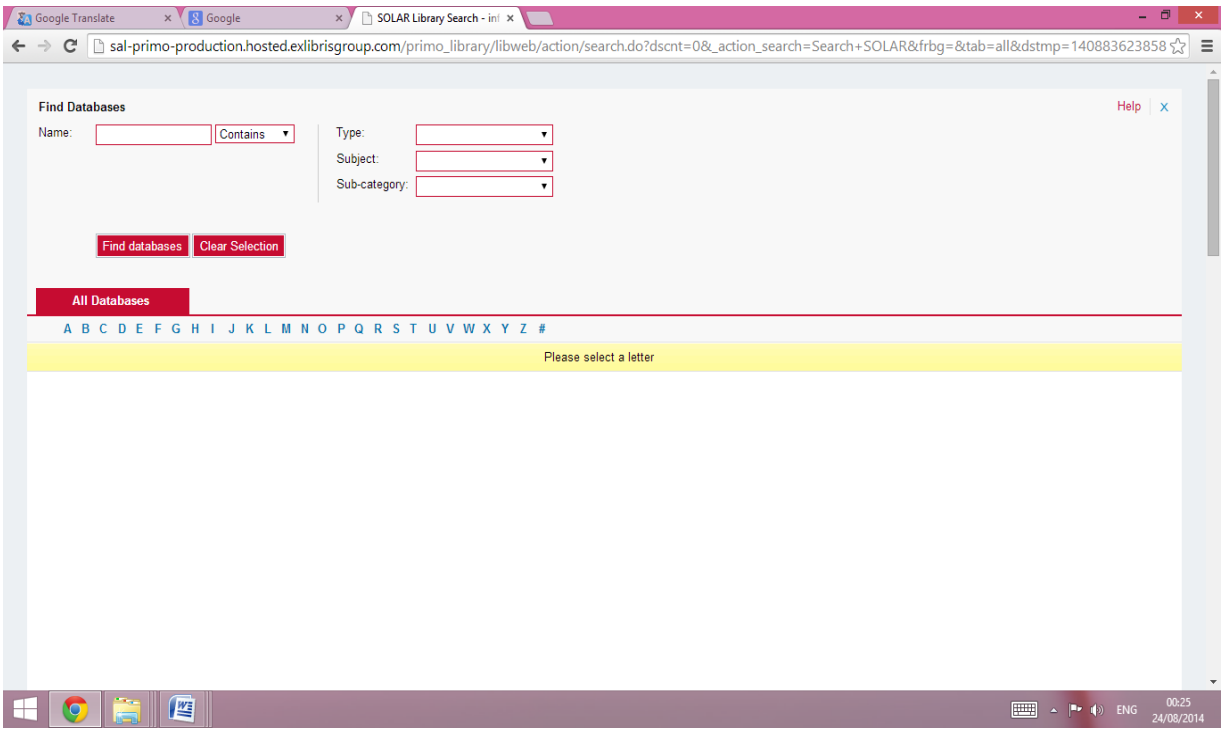


Figure 23: Database page

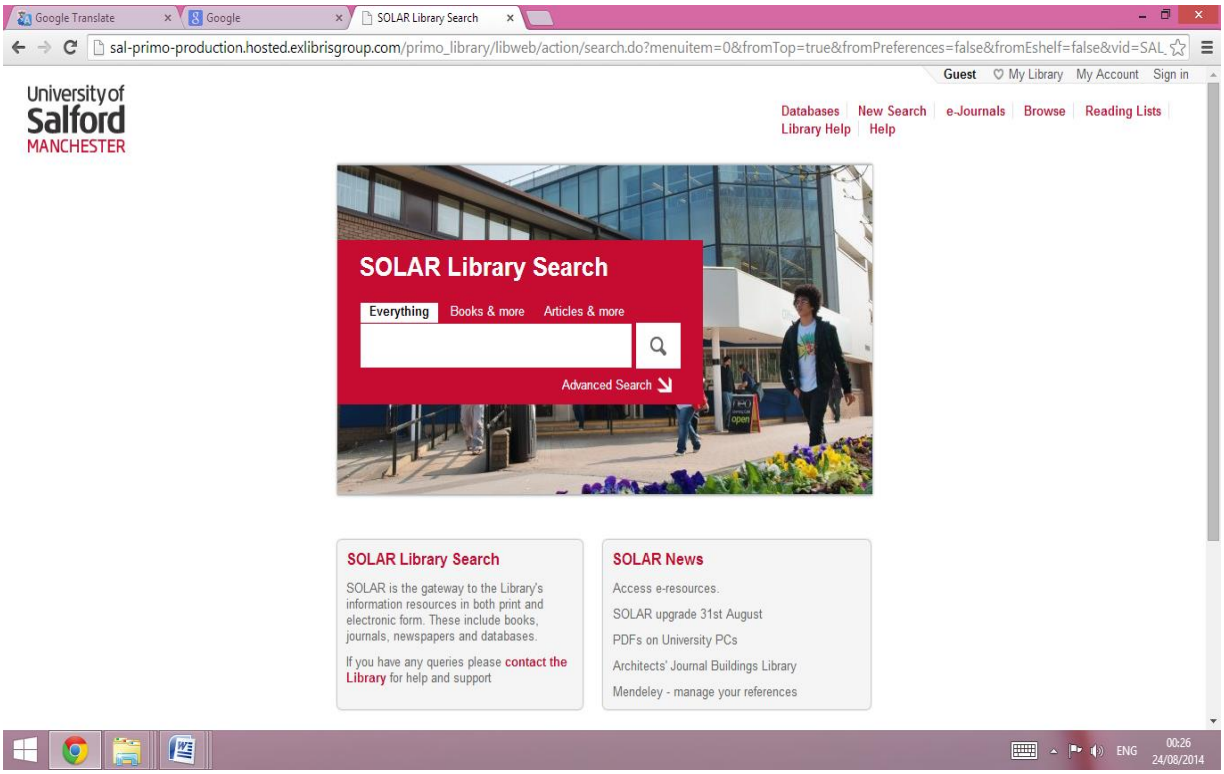


Figure 24: SOLAR interface (Part 1)

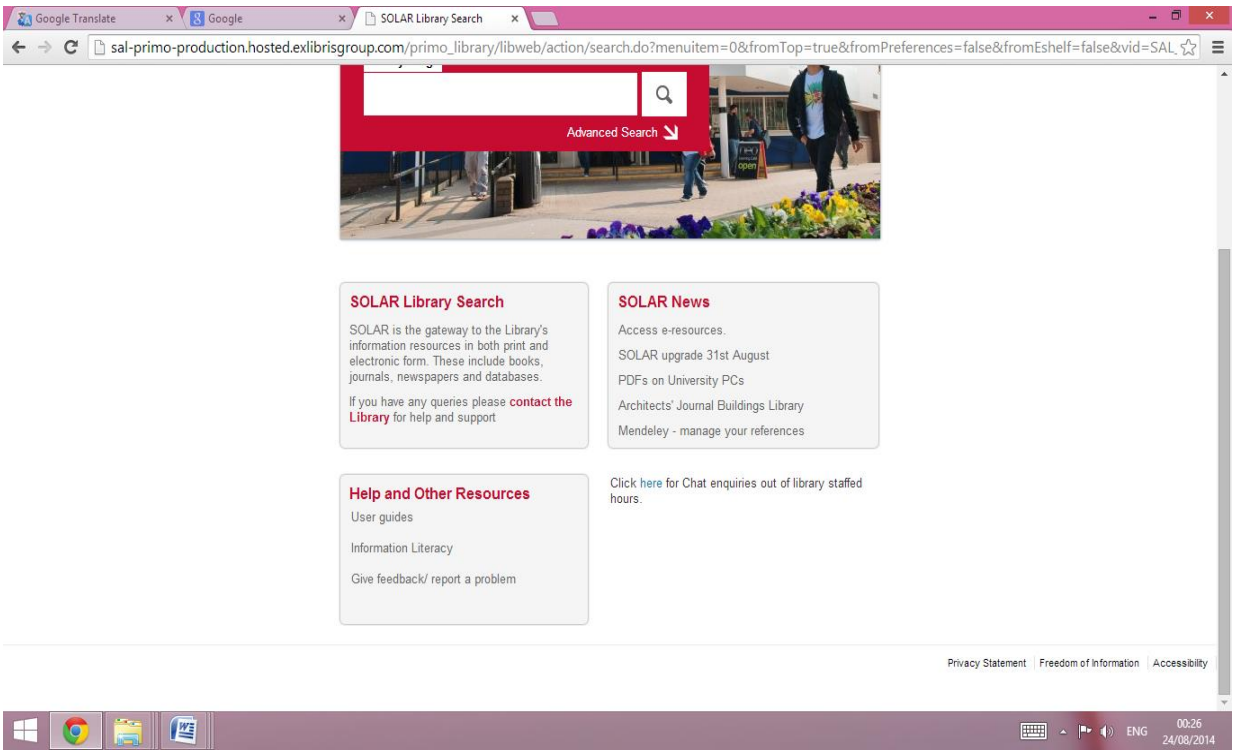


Figure 25: SOLAR interface (Part 2)

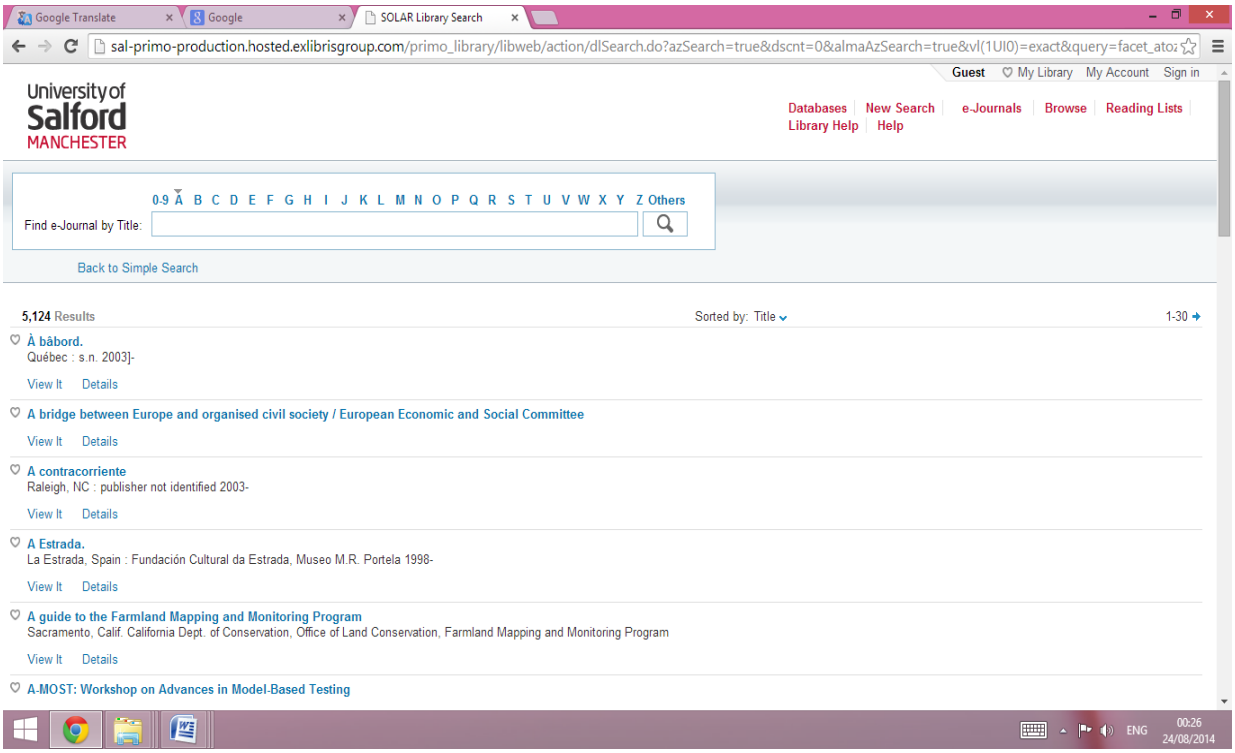


Figure 26: E-Journals page

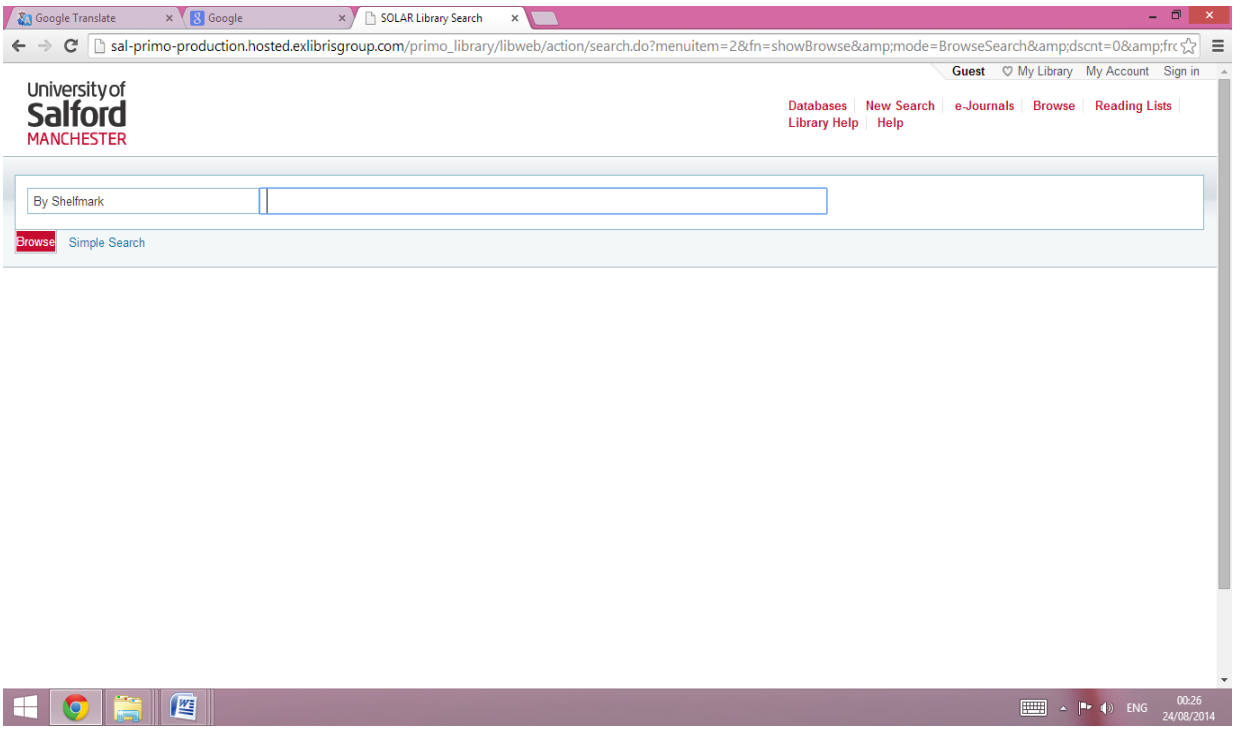


Figure 27: Browse page

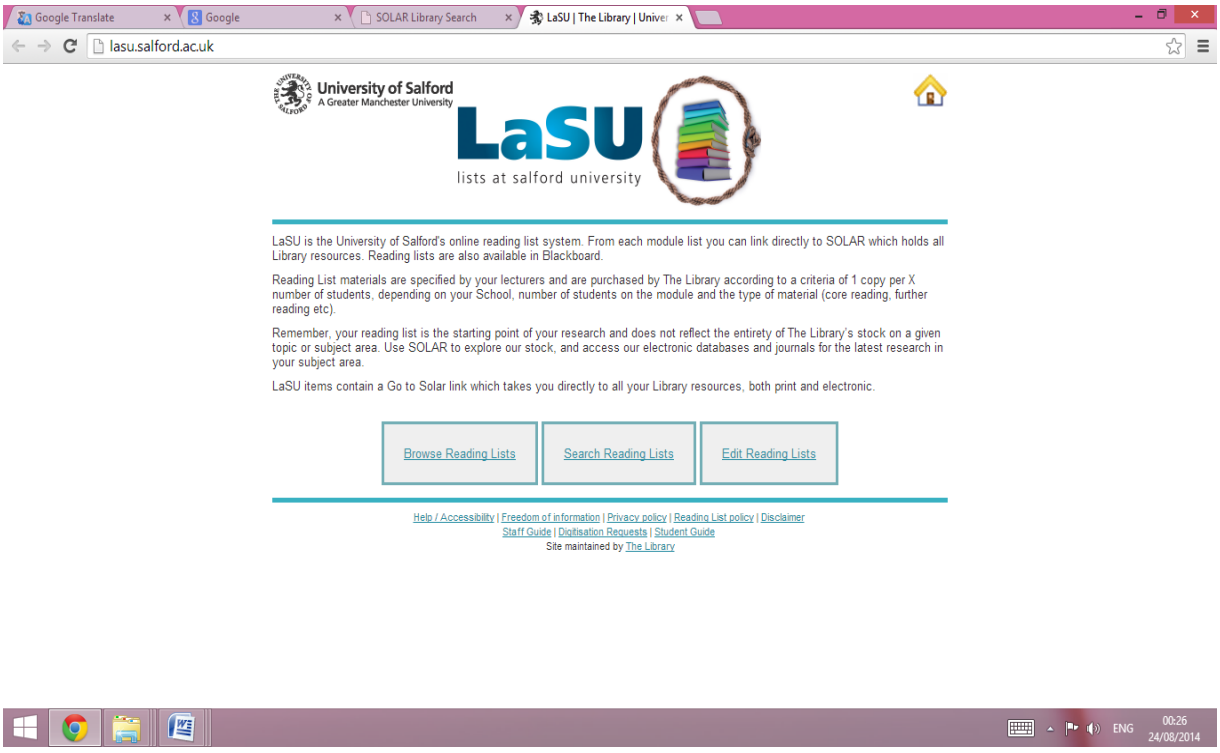


Figure 28: Reading list page

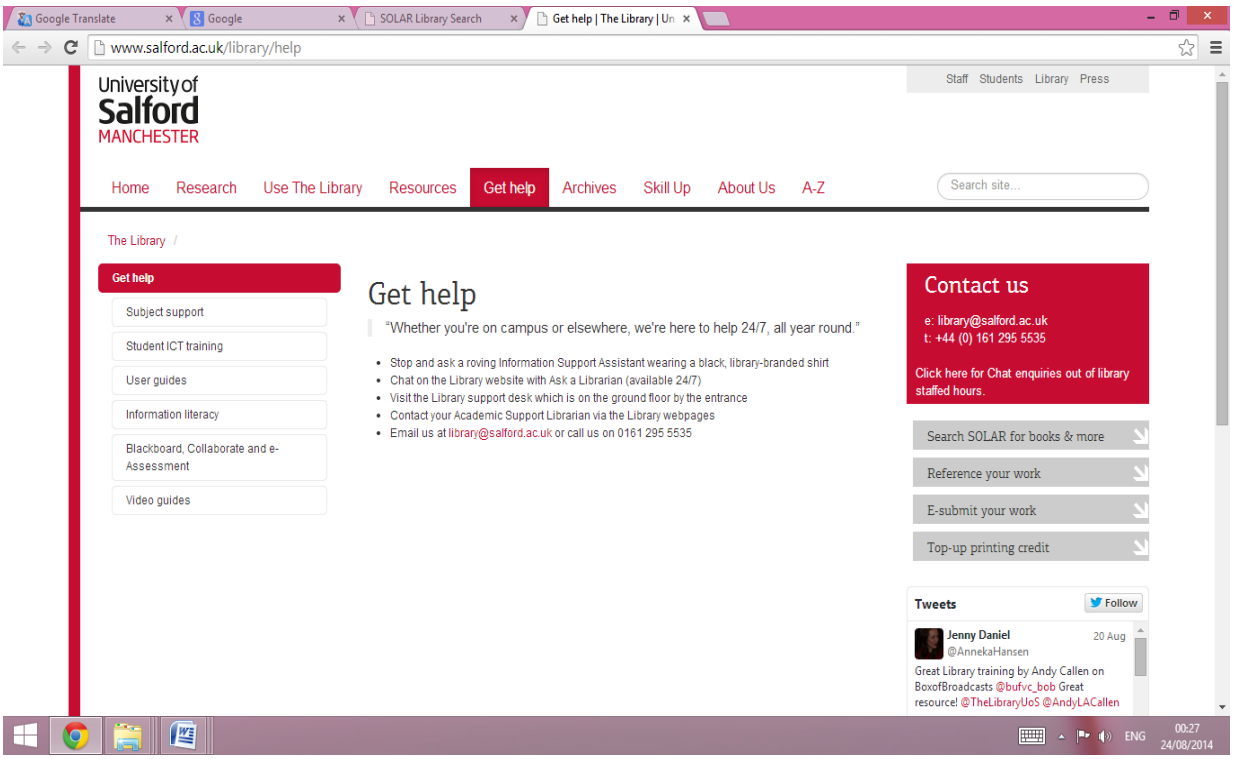


Figure 29: Library help page

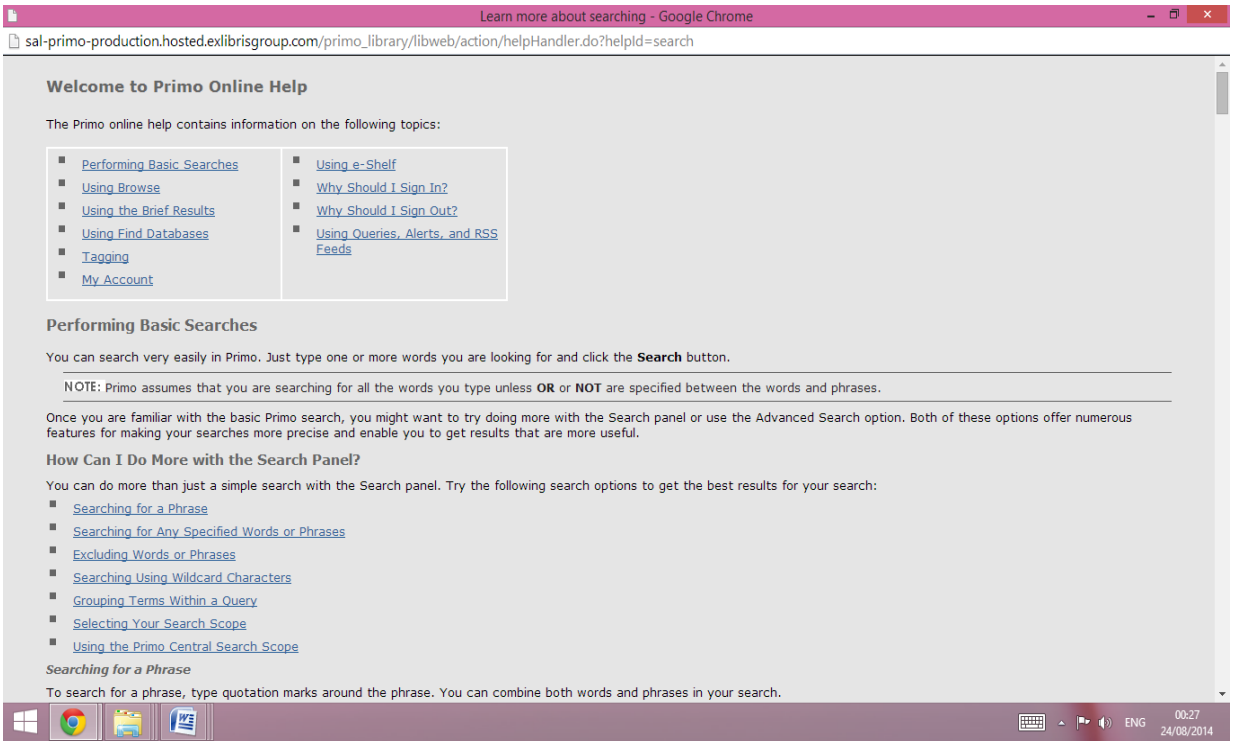


Figure 30: Help page (Part 1)

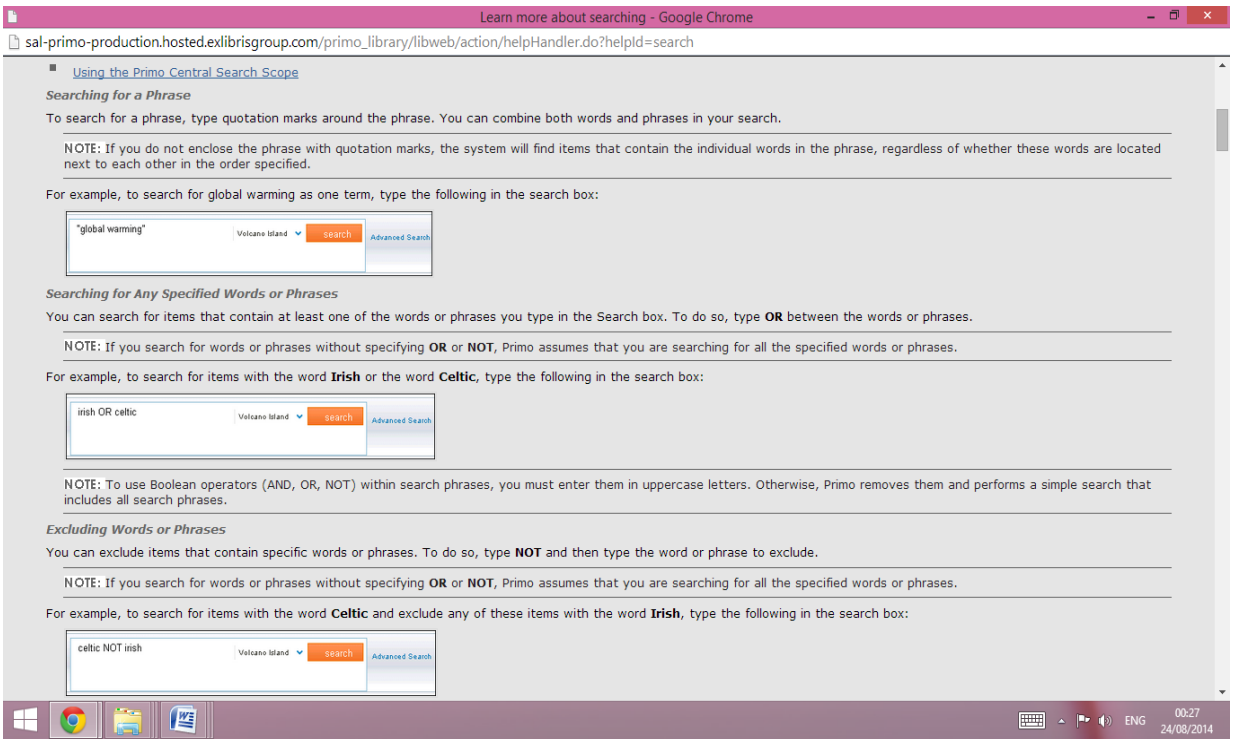


Figure 31: Help page (Part 2)

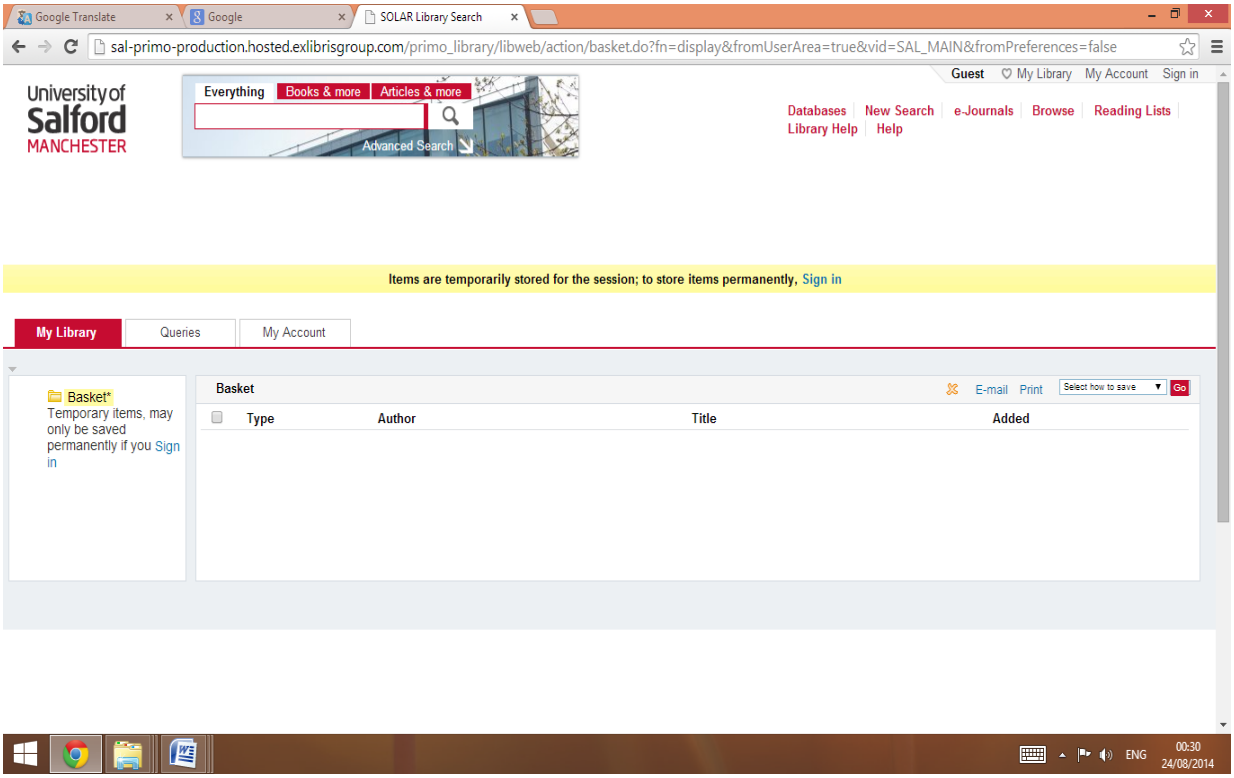


Figure 32: My library page

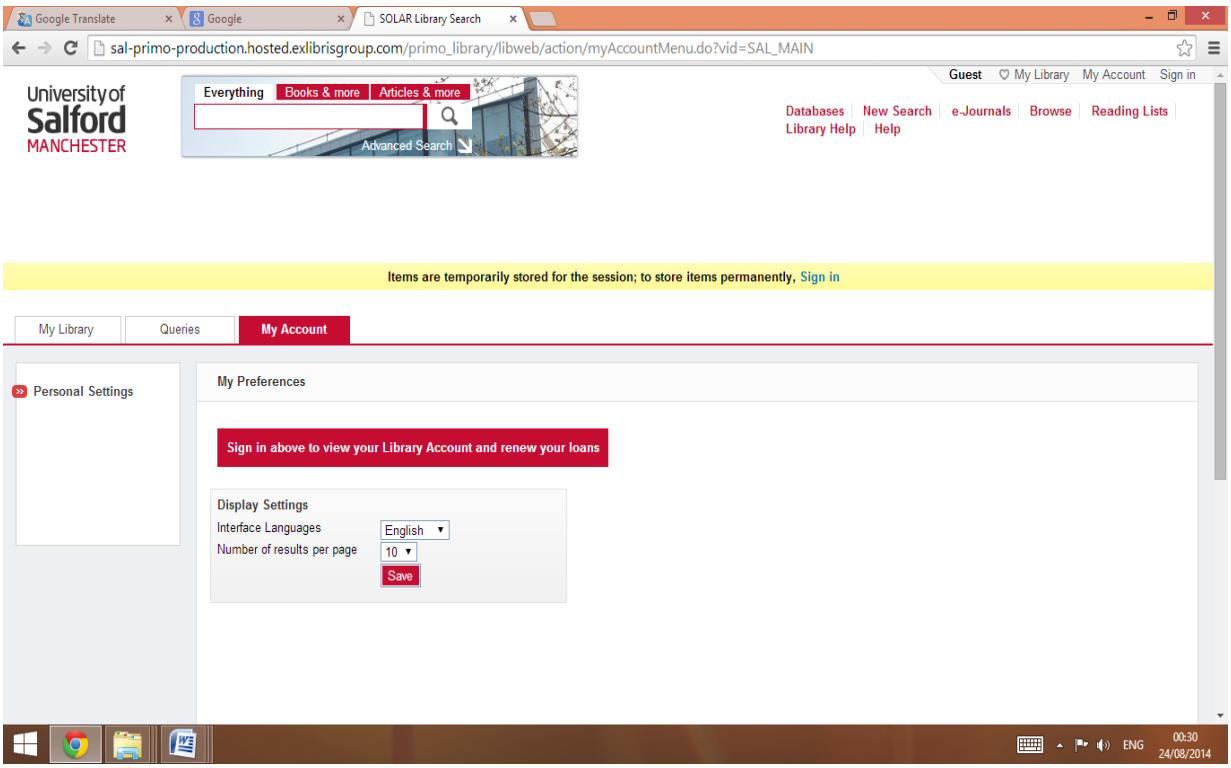


Figure 33: My Account page

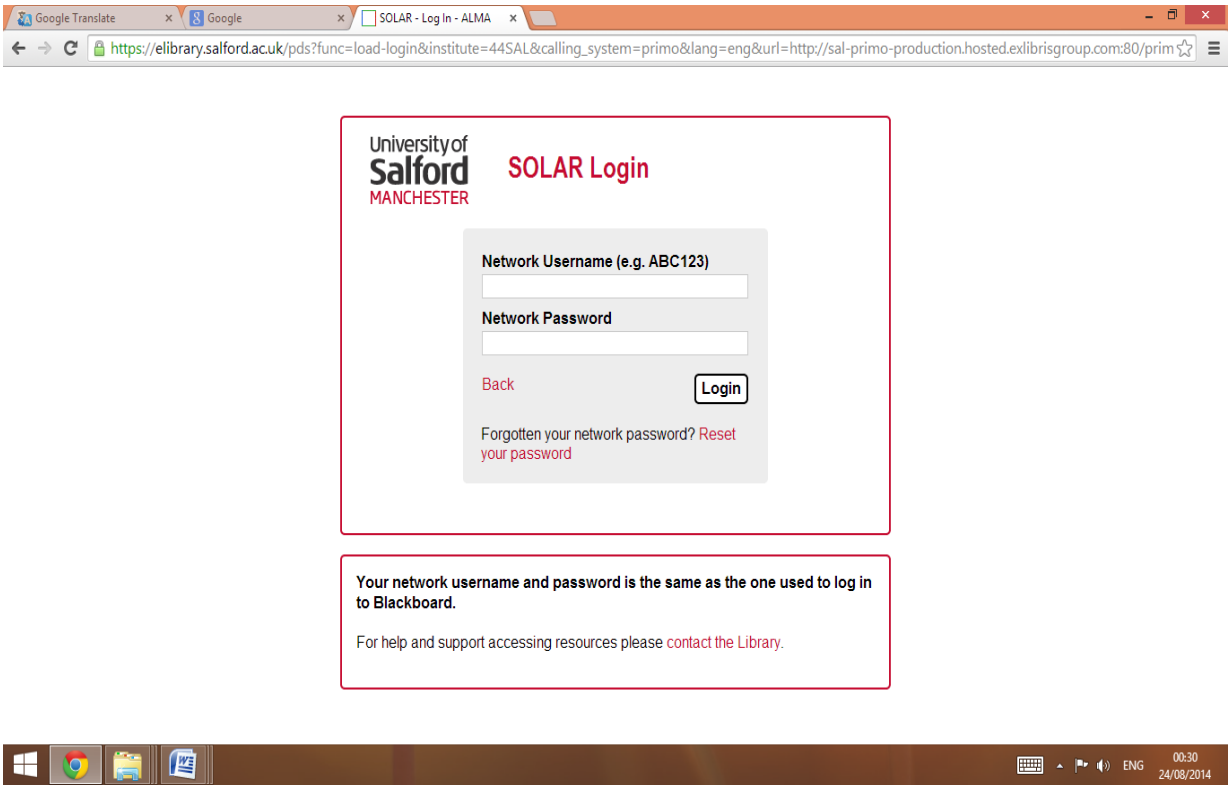


Figure 34: Sign in page

Appendix 5: Interviews' Questions (Librarians)

1. What are the information (library) resources that postgraduate students and academics frequently ask for?
2. What are the information (library) services that postgraduate students and academics frequently ask for?
3. If you cannot find what a postgraduate students and academics are looking for, either information services or resources, what methods (search strategies) do you follow to meet their needs?
4. What are users (postgraduate students and academics) frequently asked questions regarding the obstacles and difficulties they encounter with the library website? Why?
5. What do you think about the library website and how do you evaluate its usability?
6. What do you think about the library system when searching for resources?
7. What do you think about the services provided by the library system when searching for information?
8. Is there anything else that we have not discussed and you would like to add or you think is important and relevant or even suggestions for improving the library website?

Appendix 6: Interviews' Questions (Academics)

1. When you use the library website, what is the purpose of that? If not when you look for information in other place, what is the purpose of that?
2. What methods do you follow when you look for information? (e.g. Library, Internet, ask colleagues?)
3. From where do you carry out your information search (e.g. home, office, library)?
4. What type of library (information) resources do you often need in your practice or teaching?
5. Do you use the library website? If not, why? If yes, how often do you use the library website? If rarely, could you explain why you rarely visit the library website?
6. What kind of library services do you feel you need most? (e.g. Borrowing, Renew borrowing, reserve resources or room, document delivery etc...).
7. When you seek information in the library website, you might encounter difficulties or obstacles, could you speak about what kind of difficulties or obstacles you encounter? (e.g. inform me about the problems you have in using the library website? If so, explain?
8. In case that you did not find what you wanted - either information services or resources, what are the methods (search strategies) you follow to satisfy your needs?
9. When you encounter problem when using the library website, do you ask the librarians for help? If yes, how do you ask them? And what kind of questions do you often ask?
10. What do you think about the library website and its usability when you use it to find the information you need?
11. What do you think about searching for information via library system?
12. What are the advantages you believe are provided by websites you visited or used but do not exist in the library website?
13. Is there anything else that we have not discussed and you would like to add or you think is important and relevant or even suggestions for improving the library website?

Appendix 7: Focus Group Questions (Postgraduate Students)

1. When you use the library website, what is the purpose of that? If not when you look for information in other place, what is the purpose of that?
2. What methods do you follow when you look for information? (e.g. Library, Internet, ask colleagues?)
3. From where do you carry out your information search (e.g. home, office, library)?
4. What type of library (information) resources do you often need in your studies?
5. Do you use the library website? If not, why? If yes, how often do you use the library website? If rarely, could you explain why you rarely visit the library website?
6. What kind of library services do you feel you need most? (e.g. Borrowing, Renew borrowing, reserve resources or room, document delivery etc...).
7. When you seek information in the library website, you might encounter difficulties or obstacles, could you speak about what kind of difficulties or obstacles you encounter? (e.g. inform me about the problems you have in using the library website? If so, explain?
8. In case that you did not find what you wanted - either information services or resources, what are the methods (search strategies) you follow to satisfy your needs?
9. When you encounter problem when using the library website, do you ask the librarians for help? If yes, how do you ask them? And what kind of questions do you often ask?
10. What do you think about the library website and its usability when you use it to find the information you need?
11. What do you think about searching for information via library system?
12. What are the advantages you believe are provided by websites you visited or used but do not exist in the library website?
13. Is there anything else that we have not discussed and you would like to add or you think is important and relevant or even suggestions for improving the library website?

Appendix 8: Tasks for Observations (Postgraduate Students)

Pre-Task Questions

1. When you use the library website, what is the purpose of that? If not when you look for information in other place, what is the purpose of that?
2. Do you use the library website? If no, why?
3. If yes, what do you use it for most often?
4. How often do you use the library website?

Tasks

The tasks aimed to find out the participants' seeking behaviours and interactions with the library websites. The researcher designed the tasks after examining the library websites to make sure that they can be performed via Kuwait University and the University of Salford library websites, except Task 5, which was fake.

No.	Task	Purpose
1	Is the International Journal of Sport and Health Science available in the library?	To find out what participants do if they are looking for a journal title.
2	You were asked to write a report about the history of any discipline of science. Please find an e-book about that.	To identify how participants determine the topic to search for and how to find an e-book.
3	You were asked to write an essay about the importance of vitamin D for the human body. Please find an article and printed book about that topic.	To identify how participants are looking for two different resources on one topic, and how they are looking for a printed book and article.
4	Please find out how many books you are permitted to borrow from the library and for how long. Also, how can you renew the borrowed book online?	To find out what methods participants follow and options chosen to do so.
5	Please find a book about the Second World War written by Addison Griffin.	To find out what the participants do if they did not find what they are looking for.
6	You have read an article written by Peter Ferdinand Drucker, who is a management consultant, and you would like to find out if the library has any copies of his published works. Can you find an available copy? And can you determine what kind of resource it is?	To identify the methods participants follow if they are looking for a resource for a particular name.
7	You were asked to write an assignment about the effects of social network websites (e.g.,	This task aimed to show how participants can find two articles from two different

	Twitter, Facebook) on society. Please find two articles from two different resources or journals about that.	resources or journals on a particular topic.
8	You were requested to write a research paper on a topic you may know a little about, which is the psychology of children. How would you find three different resources on that topic?	This task aimed to show how participants find different resources on a particular topic without indicating the type of resource.

Post-Task Questions

1. What are the positive features of the library website?
2. What are the negative features of the library website?
3. What tasks did you find the most confusing? Why?
4. What other features would you suggest adding to the library website? Why?
5. If you could change something about the library website to improve it, what would it be?
6. Do you have any other comments or suggestions?

Appendix 9: Confidentiality and Ethical Considerations

This research was undertaken with full ethical approval from the University of Salford Research Ethics Panel (Ethical Approval Application – CASS120034) as attention to ethical issues is necessary in any research. Gorman and Clayton (2005, p. 43) pointed out that 'all research subjects have ethical rights: to be consulted, to give or withhold consent, and to confidentiality'. The participation of individuals in research should be in accordance with numerous ethical considerations, without which the research could acquire inaccurate information or opinions. According to Gorman and Clayton (2005, p. 43), 'Many of the approaches used in qualitative research may elicit information that may potentially compromise either the individual or the organisation, which could be open to misuse'.

In the present study, the researcher informed the participants that information obtained during the interviews focus groups and observations would be confidential and used only for academic purposes and objectives. The researcher sent an information sheet in advance to the participants, after which there was an opportunity for them to ask questions. All participants were asked to read and sign a consent form. Robson (2002) suggested that it is better for the investigator to inform participants as early as possible about the objectives of the investigation. In this case, the researcher informed the individuals that they were free to accept or decline participation in the research.

It was important to inform the participants that all information collected would be anonymous and confidential, as this assurance made the participants feel free and comfortable and led to them expressing meaningful points of view and valuable information. The researcher took into consideration that the interviews, focus groups and observations were held at the place and the time preferred by the participants.

Appendix 10: Invitation Letters

A. Invitation letter to postgraduate students

Dear Student,

I am currently a PhD student at the University of Salford. My research topic is about users' information seeking behaviours, their interactions and experience with the academic library web interface.

I will be really grateful if you can help to accept participating focus groups / observation with you. This can help to make a significant contribution to the research. Therefore, your help will be much appreciated.

Please find an information sheet about the research in attachment.

Best wishes,

Talal Alazemi.
PhD Research Student.
Information System Department.
Salford Business School
The University of Salford.
Email: t.r.alazemi@edu.salford.ac.uk

B. Invitation letter to library Manager

Dear Manager,

I am currently a PhD student at the University of Salford. My research topic is about users' information seeking behaviours, their interactions and experience with the academic library web interface.

I will be really grateful if you can help to accept participating interviews with members of the library staff. This can help to make a significant contribution to the research. Therefore, your help will be much appreciated.

Please find an information sheet about the research in attachment.

Best wishes,

Talal Alazemi.
PhD Research Student.
Information System Department.
Salford Business School
The University of Salford.
Email: t.r.alazemi@edu.salford.ac.uk

C. Invitation letter to academics

Dear member of staff,

I am currently a PhD student at the University of Salford. My research topic is about users' information seeking behaviours, their interactions and experience with the academic library web interface.

I will be really grateful if you can help to accept participating interview with you. This can help to make a significant contribution to the research. Therefore, your help will be much appreciated.

Please find an information sheet about the research in attachment.

Best wishes,

Talal Alazemi.
PhD Research Student.
Information System Department.
Salford Business School
The University of Salford.
Email: t.r.alazemi@edu.salford.ac.uk

Appendix 11: Information Sheet

Information about the researcher

My name is Talal Alazemi. I am PhD student, Information Systems Department, Salford Business School, College of Business and Law, the University of Salford. I am sponsored by the Public Authority for Applied Education and Training (PAAET) in Kuwait.

Research Title

Users' Information Seeking Behaviours, their Interactions and Experience with the Academic Library Web Interface

Invitation

You are invited to participate in a research project. Before you accept this invitation, it is important for you to understand what this project involves. Please read the following information carefully, and feel free to discuss it with others if you like. Please take your time to decide whether you agree to participate in this project or not. Thank you for taking the time to consider this invitation.

Research Aim

The aim of this research is to address the following question,

"How do the users of academic libraries search for information and interact with the libraries' web interfaces?"

Why have I been selected?

You have been selected as a researcher who searches through academic library website.

Participation

You are free to decide whether you want to participate in this project or not, and your decision will have no effect on your work or studies. I believe that if you agree to participate in this project, you could make a significant contribution to the research. If you do choose to participate, you are free to change your mind at any time during the participation. If you agree to participate in this project, you will be requested to sign a consent form.

What will I do if I take part?

If you agree to participate in the research, I will contact you for the interview either face to face or by phone. At that point, I can confirm your participation and make arrangements to meet with you at your convenience. Before starting the interview or observation, I will first request you to sign a consent form, and then I will start the interview or observation with you directly.

Will the participation be recorded?

The participation in the interview either face to face or by phone or the observation will be recorded; you are free to accept or refuse recording the interview. If you accept, these recordings will only be used for data collection and will be stored securely. Only my supervisor and I will have access to these recordings.

Risks/Discomforts

All information provided by you will be kept confidential at all times. All the responses to the questions and information provided by you will be anonymised, i.e. no personal details about you or your place of work or study will be recorded anywhere. Therefore, there are no risks or discomforts in participation.

Benefits

There will be no direct benefit to you from participating in this research. However, knowing your needs regarding the use of information resources and services in the library website and you how use and search these resources will help us understand how to improve the library website's interface. This may benefit future users of the library website.

How the results of this study will be used?

The results will be published as part of a PhD thesis, and they might be used in a conference or published in journal papers. Hence, your participation can make an important contribution to the research.

What will happen if there are some mistakes or complaints?

You can contact my academic supervisor; Dr. Maria Kutar: m.kutar@salford.ac.uk

Who is the organiser or sponsorship of this project?

The organiser is the University of Salford. While the sponsorship is PAAET (the Public Authority for Applied Education and Training).

Who has reviewed the ethics of this project?

The ethics of this project have been reviewed by the University of Salford College Ethics Panel.

Contact information

For further information, please contact me at: t.r.alazemi@edu.salford.ac.uk

Thank you for your cooperation.

Appendix 12: Consent forms

A. Interview Consent form

Full title of Project: Users' Information Seeking Behaviours, their Interactions and Experience with the Academic Library Web Interface.

Name, position and contact address of Researcher: Talal Alazemi. PhD Research Student. Information System Department, Salford Business School, the University of Salford. Email: t.r.alazemi@edu.salford.ac.uk

		Please Initial Box
1.	I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.	☐
2.	I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason.	☐
3.	I agree to take part in the above study.	☐
4.	I agree to the interview consultation being audio recorded	☐
5.	I agree to the use of anonymised quotes in publications	☐
6.	I have refused audio recording of the interview but consent to note taking of the interview. I have read these notes and confirm they are an accurate record of the interview and consent to them being used in this study.	☐

Name of Participant	Date	Signature
Name of Researcher	Date	Signature

B. Focus Group Consent form

Full title of Project: Users' Information Seeking Behaviours, their Interactions and Experience with the Academic Library Web Interface

Name, position and contact address of Researcher: Talal Alazemi. PhD Research Student. Information System Department, Salford Business School, the University of Salford. Email: t.r.alazemi@edu.salford.ac.uk

		Please Initial Box
2.	I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.	☐
3.	I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason.	☐
3.	I agree to take part in the above study.	☐
4.	I agree to the focus group consultation being audio recorded	☐
7.	I agree to the use of anonymised quotes in publications	☐

Name of Participant	Date	Signature
Name of Researcher	Date	Signature

C. Observation Consent form

Full title of Project: Users' Information Seeking Behaviours, their Interactions and Experience with the Academic Library Web Interface.

Name, position and contact address of Researcher: Talal Alazemi. PhD Research Student. Information System Department, Salford Business School, the University of Salford. Email: t.r.alazemi@edu.salford.ac.uk

		Please Initial Box
3.	I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.	☐
4.	I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason.	☐
3.	I agree to take part in the above study.	☐
4.	I agree to the observation consultation being audio recorded	☐
5.	I agree to the observation consultation being video recorded	☐
6.	I agree to the use of anonymised quotes in publications	☐

Name of Participant	Date	Signature
Name of Researcher	Date	Signature

Appendix 13: Usability Guidelines and User Interface Design Principles

A. Norman's Design Principles

No.	Principle	Definition
1	Visibility	Functions are visible and easy to see, so users are familiar with what they do
2	Consistency	To design for similar operations and use similar elements to accomplish similar tasks
3	Discoverability	It is possible to determine what actions are possible and the current state of the device
4	Feedback	To send information back about what action was really done and what outcome was achieved
5	Conceptual model	The design projects all the information needed to create a good conceptual model of the system, leading to understanding and a feeling of control. The conceptual model enhances both discoverability and evaluation of results
6	Affordances	A clue that determines and allows people to know how to operate and use an object
7	Signifiers	Effective use of signifiers ensures discoverability and that the feedback is well communicated and intelligible
7	Mapping	The relationship between controls and results in the real world
8	Constraints	To determine what may limit the types of user interaction that can take place

(Norman, 2002, pp. 52-53: Norman 2013, pp. 72-73)

Morville (2005) has added one more principle called "findability", which has become significant, and has been defined as:

- The quality of being locatable or navigable.
- The degree to which a particular object is easy to discover or locate.
- The degree to which a system or environment supports navigation and retrieval (Morville, 2005, p. 4).

B. Jacob Nielsen Usability Heuristics

No.	Heuristics	Description
1	Visibility of system status	Feedback should be provided to the users by the system within a timely period at all times
2	Match between system and the real world	The user language should correspond to the systems; whereby words, phrases and concepts are not alien to the user, in place of system-oriented. Ones Real-world conventions will be adhered to, and information should be natural and in a logical order
3	User control and freedom	System functions may be chosen by mistake and in this case users may require a clearly delineated "emergency exit" so that they may quit the undesired state, not needing to engage in lengthy dialogue. Support undo and redo
4	Consistency and standards	Users should be spared the worry of whether different situations, words, or actions are similar in meaning, merely follow platform conventions.
5	Error prevention	Superior to an error message would be a careful design avoiding the problem fin the first instance. Error-prone conditions should be removed or checked for and a confirmation option should be presented to users so as to avoid the action taking place.
6	Recognition rather than recall	Making visible the options, objects, actions will mean that the user's memory load will be reduced. The system's instructions for use should easily retrievable or visible whenever possible so that he/she does not need to recall information from one part of the dialogue to the other.
7	Flexibility and efficiency of use	For the system to benefit both inexperienced and experienced users, accelerators may be used (often the novice user is oblivious to these) to increase the rate of interaction. This affords the users the possibility of frequent actions.
8	Aesthetic and minimalist design	Due to the fact that any erroneous unit of information fights with the relevant units of information thereby minimising their visibility; dialogues would do better not to contain this information.
9	Help users recognise, diagnose, and recover from errors	Plain language should be employed to indicate error messages (no codes, to isolate the problem, and to then come up with a constructive solution.
10	Help and documentation	Documentation should be made available even if the system can function without documentation; this information should have the following assets: searchability, a focus on the user's task, a list of concrete steps to be enacted as long as they are not too overbearing.

(Nielsen, 1995) (www.nngroup.com)

C. Eight Golden Rules for User Interface Design by Shneiderman and Plaisant.

No.	Rule	Description
1	Strive for consistency	Actions should be consistent in nature in similar situations whereby terminology is the same in prompts; as well as menus, help screens, and this consistency should stretch to, commands used throughout.
2	Cater to universal usability	The user's wish to diminish the quantity of interactions and increase the pace of interaction comes about as the rate of use rises. For an expert: abbreviations function keys, hidden commands, and macro facilities serve useful functions.
3	Offer informative feedback	System feedback should be given to every operator action. Depending on the seriousness of the actions the response should be tailored: for frequent and minor actions, the feedback will be limited, and for infrequent and major actions, the response will be greater.
4	Design dialog to yield closure	Categories of beginning, middle, and end should be assigned to the sequences of actions. Once information has been fed back at the end of a group of action, there will be a sense of relief, a sense of satisfaction or accomplishment for the operators as well as giving the signifying the rejection of any kind of contingency plans and other ideas from their minds. Then the path is open for the following group of actions.
5	Prevent errors	The potential for making a serious error should be minimised in terms of the system design. In the case of an error, there should be swift detection in the system and mechanisms which are both simple and comprehensible for dealing with the error.
6	Permit easy reversal of actions	This allows the user to feel relief at knowing that errors can be reversed; letting them seek out less known options. These units of reversibility may take the form of a data entry, one sole action, or a set of actions.
7	Support internal locus of control	Experienced operators require the feeling that they stay in control of the system and it directly reacts to their actions. It is therefore important to create a system where users are the initiators of actions instead of the responders.
8	Reduce short-term memory load	As a result of the limits of human information processing in short-term memory means that the following be honoured: simple displays, consolidation of multiple page displays, reduction of window-motion frequency, and adequate training time dedicated to sequences of actions, mnemonics and codes.

(Shneiderman and Plaisant, 2010, pp. 88-89)

D. Sommerville User Interface Design Principles

No.	Principle	Description
1	User familiarity	The interface should use terms and concepts which are drawn from the experience of the people who will make most use of the system
2	Consistency	The interface should be consistent in that, wherever possible, comparable operations should be activated in the same way
3	Minimal surprise	Users should never be surprised by the behaviour of a system.
4	Recoverability	The interface should include mechanisms to allow users to recover from errors
5	User guidance	The interface should provide meaningful feedback when errors occur and provide context-sensitive user help facilities
6	User diversity	The interface should provide appropriate interaction facilities for different types of system user

(Sommerville, 2007, p. 364)

E. Sommerville Usability Attributes

No.	Attribute	Description
1	Learnability	How long does it take a new user to become productive with the system?
2	Speed of perations	How well does the system response match the user's work practice?
3	Robustness	How tolerant is the system of user error
4	Recoverability	How good is the system at recovering from user errors?
5	Adaptability	How closely is the system tied to a single model of work?

(Sommerville, 2007, p. 384)

F. Constantine and Lockwood User-Interface Design Principles

No.	Principle	Description
1	The structure principle	The design should organise the user interface purposefully, in meaningful and useful ways based on clear, consistent models that are apparent and recognisable to users, putting related things together and separating unrelated things, differentiating dissimilar things and making similar things resemble one another. The structure principle is concerned with the overall user interface architecture.
2	The simplicity principle	The design should make simple, common tasks simple to do, communicating clearly and simply in the user's own language, and providing good shortcuts that are meaningfully related to longer procedures
3	The visibility principle	The design should keep all needed options and materials for a given task visible without distracting the user with extraneous or redundant information. Good designs don't overwhelm users with too many alternatives or confuse them with unneeded information.
4	The feedback principle	The design should keep users informed of actions or interpretations, changes of state or condition, and errors or exceptions that are relevant and of interest to the user through clear, concise, and unambiguous language familiar to users.
5	The tolerance principle	The design should be flexible and tolerant, reducing the cost of mistakes and misuse by allowing undoing and redoing, while also preventing errors wherever possible by tolerating varied inputs and sequences and by interpreting all reasonable actions reasonable
6	The reuse principle	The design should reuse internal and external components and behaviours, maintaining consistency with purpose rather than merely arbitrary consistency, thus reducing the need for users to rethink and remember

(Constantine and Lockwood, 1999, pp. 51-61)

G. Dix et al. Principles which support Usability

- **Learnability**

This is the ease with which new users can begin efficient interaction and accomplish maximal performance. Specific principles which support Learnability have been subdivided into categories and are shown in the following table:

No.	Principle	Definition
1	Predictability	Support given to the user to measure the results of action based on past interaction history. It is related to the operation visibility principle which refers to how the user is shown the availability of operations that can be performed next.
2	Synthesizability	Support afforded to the user gauge the effects of past operations on the presiding state. This is related to the principle of honesty which relates to the ability of the user interface to provide an observable and informative account of such change and this notification can come immediately, requiring no further interaction initiated by the user. At the very least, the notification should appear eventually, after explicit user directives to make the change observable.
3	Familiarity	the degree to which a user's knowledge and experience in other-real world or computer-based domains can find its place when interacting with a new system.
4	Generalisability	Support in that a user can transfer his/her knowledge of specific interaction within and across applications over to other similar situations.
5	Consistency	Similarity in input-output behaviour due to situations or task objectives being alike.

(Dix et al., 2004, p. 261)

- **Flexibility**

This refers to the multiplicity of ways in which the user and system exchange information. Specific principles which support Flexibilty have been subdivided into categories and showing in the following table.

No.	Principle	Definition
1	Dialog initiative	Giving the user freedom from artificial constraint on the input dialog imposed by the system.
2	Multi-threading	The system's ability to enable user interaction in more than one task simultaneously.
3	Task migratability	So that control can be transferred in terms of the performance of an assigned task a whereby it is internalized by the user or the system or shared between them.
4	Substitutivity	The capacity for equal input and output values to be replaced randomly for each other.

5	Customizability	The ability to alter the user interface by the user or the system.

(Dix et al., 2004, p. 266)

- **Robustness**

This translates as the level of support provided to the user in determining successful achievement and assessment goals. Specific principles which support Robustness have been subdivided into categories and showing in the following table.

No.	Principle	Definition
1	Observability	The evaluation of the internal state of the system of those features which are visible. This is related to the principles of browsability, static/dynamic defaults, reachability, persistence, operation visibility.
2	Recoverability	A user's capacity for corrective action after the error is noticed. This is related to the principles' reachability, forward/backward recovery, and commensurate effort.
3	Responsiveness	The ways the user understands the rate of communication with the system.
4	Task conformance	The extent that services support the chosen tasks of the user and the methods that user employs.

(Dix et al., 2004, p. 270)

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