Perceptions of University Digital Libraries as information source by international postgraduate student

FAIZ ALOTAIBI

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Department of Information and Communications

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Abstract

University digital libraries (UDLs) have taken the place of the traditional library in the present day. In the university context, in particular, they are the obvious solution to the library needs of students. However, they encounter considerable competition from web-based search engines on the internet, which limits effective usage of the library resources by students. This research set out to identify factors that affect international postgraduate students' choice to use Google Scholar over their UDL to create an information driven framework that can positively influence and be responsive to dynamic needs and search strategies of the end-user (student). This research utilises two theoretical models: the unified theory of acceptance and use of technology (UTAUT) model (Venkatesh et al., 2003), and Wilson's (1999) model of information-seeking behaviour, in the process of achieving its aim of identifying factors influencing information search strategy by postgraduate students. The research used an extended version of UTAUT to evaluate the factors influencing the adoption and acceptance of UDLs and Google Scholar. The research was designed to use a mixed methodological approach, with a sample-frame of 400 international postgraduate students in two groups: both groups based in a large city in the United Kingdom.

The study utilised a questionnaire to survey 400 respondents; it contained questions relating to the UTAUT model, as well as students' intent to use their UDLs or Google Scholar. The collected data were quantitatively analysed using various statistical tests including regression and Structural Equation Modelling (SEM). Open-ended questions were also conducted to obtain further information examining six aspects of their intention to use– namely spectrum, search and functionality, availability, accessibility, accuracy, and references. The research found that international students preferred to use Google Scholar over UDLs because it was perceived to be faster and easier to use. It was also found that there were myriad factors that influenced the behavioural intent of the information seeker, such as social influence, domain knowledge, perceived outcome, and perceived effort. The research found that international students were not only using Google Scholar on its own, but also found the use of UDLs as the most valuable source of quality information that they could rely on. Based on the above stated findings, the research has contributed to knowledge by proposing a step-wise framework that can be used in UDLs as a means of harnessing the strength in digital libraries and amalgamate it with the technological platforms used by students. The framework takes into consideration systems features of information search platforms, behavioural intentions of each individual student as well as the social contextual environment that international students find themselves. Adoption of the proposed framework is recommended for university libraries to establish the ideal intervention point for educating and training students on the use of their digital library.

Keywords: University Digital Libraries (UDL), Google Scholar, individual differences, system features, technology adoption, technology acceptance, UTAUT, Wilson's model, information seeking, information behaviour

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Abbreviations

DOI	Diffusion of Innovations Model
DOIT	Diffusion of Innovation Theory
DTPB	Decomposed Theory of Planned Behaviour
EU	European Union
FWK	Flat World Knowledge
GS	Google Scholar
HESA	Higher Education Statistics Agency
MRA	Multiple Regression Analysis
OECD	Organisation for Economic Co-operation and Development
SCT	Social Cognitive Theory
SEM	Structured Equation Modelling
TAM	Technology Acceptance Model
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UK	United Kingdom
UKCISA	UK Council for International Student Affairs
UDL	University Library Website
US	United States
UTAUT	Unified Theory of Acceptance and Use of Technology

Chapter 1: Research Background

1.1 Introduction

The evolution of information and communication technologies (ICT) in the past few decades has resulted in their becoming an integral component of conventional and distance systems of education (Hrtoňová, Kohout, Rohlíková, & Zounek, 2015; Nirban & Chasul, 2014). This has been accompanied by an increase in the use of digital media in the education sector. As a result, institutes of education are placing great emphasis on providing effective Web-based services to fulfil the knowledge and education requirements of potential users (Arif, Ameen, & Rafiq, 2018). In other words, the notion of the electronic (e-library) or digital library which is a library that is "ubiquitous and available anytime anywhere, allowing users to access it over the internet via their personal computers, mobile computers, and mobile devices" (Hwee & Yew, 2018, p.75) has become an integral part of the educational context.

E-library systems have become popular and offer convenient access to scholastic and research resources during the academic existence of an individual as student (Hwee & Yew, 2018). An e-library has also been described as an accumulation of information and services that facilitate the management of information objects which can be directly or indirectly accessed by end users through electronic or digital devices (Che Rusuli, Tasmin, Takala, & Norazlin, 2013; Miller & Khera, 2010; Ramayah, 2006). Similar to its traditional counterpart, the functions of an e-library encompass searching, locating and copying, requisitioning and obtaining in the context of e-books and e-journals (Park, Roman, Lee, & Chung, 2009; Sheeja, 2010). Significant advantages over conventional libraries include the ease with which digital resources can be monitored, the speed and unbiased access to library collections, and the provision for users to utilise search engines to locate required resources (Hwee & Yew, 2018; Thong, Hong, & Tam, 2002).

Alongside the development of university e-library services, the academic search engine Google Scholar (GS) appeared in 2004, and has since grown rapidly both in size and popularity. According to Cothran (2011), the use of various federated and Google search tools by higher education students like GS is a prevailing and popular topic in the academic library literature. Indeed, GS is widely used by academics (Ollé & Borrego, 2010) and students (Cothran, 2011) alike. In 2014, the size of the GS database was approximately 160 million documents (Orduña-Malea, Ayllón, Martín-Martín, & López-Cózar, 2015), whereas in 2019 it had grown to almost 390 million records (Gusenbauer, 2019). Apart from this, in comparison to the Web of Science Core Collection (WoSCC) or Scopus, GS is known for its widespread coverage, exposure to broader varieties of languages and publications, high rate of growth, and retrieval of greater numbers of citations (de Winter, Zadpoor & Dodou, 2014; Harzing, 2013; Meho & Yang, 2007; Orduña-Malea & López-Cózar, 2014).

1.1.1 Information Behaviour

In general, information behaviour has been defined as those "activities a person may engage in when identifying their own need for information, searching for information and using or transferring that information" (Wilson, 1999, p.249). The first step of this behaviour, the need for information, has been described as an "anomalous state of knowledge" signifying that a person's knowledge status is somehow inadequate with regard to assisting the person to achieve a goal (Belkin, 1980, 2005). Moreover, the information need arises from an acknowledged variance "in the user's state of knowledge concerning some topic or situation and that, in general, the user is unable to specify precisely what is needed to resolve that anomaly" (Belkin, Oddy, & Brooks, 1982, p.62). On the other hand, Dervin (1983) perceives an information need to be a course of sense-making wherein a person's personal perspective is shaped. Wilson (1997) emphasises that this need is a personal experience not evident to an observer as it is encountered only in the thinking of the individual in need.

Three kinds of motives could drive the need for information, namely physiological (such as thirst and hunger), unlearned (such as sensory stimulation and curiosity), and social (such as the longing for affiliation, support or status, or hostility) (Morgan & King, 1971), which correspond to Wilson's (1981) evaluation of needs as being "cognitive, affective, or physiological" (Wilson, 1997, p.553). Consequently, it would appear that the behaviour undertaken to satisfy the need for information is associated with an underlying motive. Another perspective is provided by Case (2012), who highlights that information need is an acknowledgment of the inadequacy of a person's existing knowledge to fulfil that person's goal. Weijts, Widdershoven, Kok, and Tomlow (1993) submit that the notion of information need could be broken down into three categories: "requests for new information, requests for elucidation, and requests for confirmation" (p.403).

That is, information need encompasses a requirement for fresh information, and the necessity to interpret and verify existing information.

A natural consequence of the information need is behaviour related to seeking information which, according to Wilson (2000), 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)" (p.49).

Likewise, Case (2012) describes information seeking as a deliberate attempt to obtain information to satisfy a need or a knowledge gap. Ingwersen and Järvelin (2005) introduce the role of sources of and systems for information when they describe human information behaviour as "searching or seeking information by means of information sources and (interactive) information retrieval systems" (p.21).

Some scholars (e.g., Sadeh, 2010; Wilson, 2000) make a distinction between behaviours associated with information seeking and information searching. Wilson (2000) justifies the distinction when he states that "information searching behaviour is the 'micro-level' of behaviour employed by the searcher in interacting with information systems of all kinds" (p.49). In other words, information searching behaviour comprises all dealings with the system, regardless of level of interaction (that is, interaction between human and computer or merely intellectual) which will also consist of intellectual actions, such as assessing the significance of the retrieved information or data. Sadeh (2010) highlighted that information searching behaviour is one facet of information seeking behaviour that specifically addresses "active, directed searching in information systems for data that can be specified to some degree" (p. 20). However, the present study will use the proposition of Ingwersen and Järvelin (2005) that searching and seeking are synonymous.

1.1.2 Technology Adoption

The term 'adoption' typically refers to the decision made by an organisation or an individual to implement a new practice or technology, while the term 'diffusion' means the temporal and spatial proliferation of the new practice or technology throughout the organisation or among individuals. A distinction has been made between the terms of adoption and diffusion by Kripanont (2007, citing Rogers (1983), who defines diffusion as a kind of cumulative adoption – a process whereby a technology is communicated between members of a social community over a period of time, using particular channels of communication. Adoption, on the other hand, is defined as the use of a new technology by an individual over a specific period of time. It is also stated that the decision to adopt an innovation is a process that happens within the mind of an individual; this process begins when the individual becomes aware of an innovation, and leads to their decision to either reject or adopt it. The diffusion process, conversely, takes place among the components of a social community/system or within a nation. Further elaboration is given by Kurtenbach and Thompson (1999) who define the adoption of technology as the stage at which an individual, group, institution or organisation selects the technology for use, and then acknowledges the usefulness of that technology for their work and therefore utilises it.

According to Swanson (1994), the adoption of information systems innovation by individuals or organisations can be classified into three main types:

- Innovations that occur within the information systems function (Type I);
- Innovations that occur at the individual user or work group level (Type II); and
- Innovations that occur at the organisational or institutional level (Type III).

Many studies have been conducted around the world with a focus on user acceptance of electronic and digital library services. Lee et al. (2005) utilised the technology acceptance model (TAM) approach to look at the effect of interface characteristics of digital libraries on users' perceived ease of use, and sought to find out whether there exists a relationship between them that has statistical significance. Their results showed that there is a certain level of impact from interface characteristics on users' perceived ease of use and perceived usefulness. It was also revealed that the terminology used regarding digital libraries also affects perceived ease of use. Johnston et al (2015) explored the electronic format that is required for the textbooks in the higher education. It is assessed by evaluating the experience of the student on the electronic textbooks (e-textbooks) by undergoing a pilot project with two textbook publishers namely Flat World Knowledge (FWK) and Nelson Education (Nelson). It further adopted the framework of the Technology Acceptance Model (TAM) for the achievement of its objective. The results of the study showed that student's preference does not increase the likelihood to seek out and utilise the print options. It was also noted that the experience of the student with the open/affordable textbook (FWK) was comparable with Nelson, which is a high-cost commercial text.

Colleges and universities spend highly significant amounts of money on developing and creating digital libraries (Sun & Yuan, 2012; Thong, Hong, & Tam, 2002). Studies have shown, however, that digital libraries are not being used as frequently as they could be (Allameh & Abbasi, 2010; Orji, Cetin, & Ozkan, 2010; Thong et al., 2002).

Research has typically shown that levels of user acceptance to new technology vary among countries. This is because the factors that affect innovation adoption vary widely between nations due to the differences in culture (Yang & Lee, 2007). Zhu et al., 2006) states that the perception of value from new technologies differs considerably between adopters. Yang and Lee (2007) utilised the unified theory of acceptance and use of technology (UTAUT) framework and found that in Korea, adoption of information technologies is impacted significantly by social influence and performance expectancy; interestingly, this is not the case in the USA, where different factors influence their acceptance due to their differing culture and values. Hence, the study of the acceptance and use of new technologies is important for successful implementation and adoption, particularly taking account of the key determinants according to the context or culture in which the technology will be introduced.

1.2 Problem Statement

A behavioural shift in the information requirements of students has been observed in recent years. This shift indicates that information in electronic format is preferred over the traditional printed format. Therefore, it is now mandatory for university libraries to provide services to cope with the changing attitudes and requirements of students. Developments in ICT and accessibility of online information repositories attract students and the extent and nature of their use of library resources is changing. Additionally, Google Scholar is very popular amongst university students. Indeed, many studies performed around the world have identified that Google Scholar is the most popular and friendly medium for information seekers (Beckmann & von Wehrden, 2012; de Winter et al., 2014; Mayr & Walter, 2007; Mikki, 2009). Some studies have revealed that Google Scholar's popularity among students is drawing them away from their institutional libraries (Dewan, 2012;

Georgas, 2014). Google Scholar's online availability, its ease of use, and effectiveness in providing access to vast amounts of information to satisfy student requirements are making it more popular among students (Cothran, 2011; van Aalst, 2010). At the same time, academic libraries in the United Kingdom (UK), the United States (US), and the European Union (EU) are facing budget limitations due to reduced funding and the increasing cost of new technology (Jubb, 2010). It is estimated that considerable amounts must be invested in reshaping traditional libraries into digital libraries as this can include conversion into digital format, training staff to maintain digital library resources, and the maintenance of online resources (that is, bandwidth expenses, servers, etc.). Moreover, extensive costs can be incurred with regard to hardware and competent personnel due to the need for information to be 'migrated' periodically to the most current digital media (Sun & Yuan, 2012).

However, it is evident that there are many unanswered questions in the literature regarding whether students, and in particular postgraduate students, use them, how they use them, and what the factors are that facilitate the students to use their University Digital Library (UDL) or online search engines such as Google Scholar.

1.3 Rationale for the Study

The preceding discussions indicate that while digital libraries are the obvious solution to the library needs of individuals and students in the present day, they face considerable competition from Google Scholar. However, there is limited information regarding the factors that hinder students' use of their UDLs or explain their inclination to use Google Scholar. The rising costs of academic journal subscriptions also constrain UDLs' expansion of their electronic databases. A major part of a library's allocated budget is dedicated to electronic database subscriptions; therefore, it is important to ensure that these resources are effectively utilised and optimally used by the students (Jubb, 2010). The success of a library depends on satisfying user requirements; this satisfaction comes through better services and access to huge resources (Adeniran, 2011; Larson & Owusu-Acheaw, 2012).

As Catalano (2013) highlights, the information needs of postgraduate and undergraduate students differ considerably, chiefly because the needs of the former are more advanced and intricate. Awareness of their information seeking behaviour can help interested stakeholders such as librarians, teaching staff, and supervisors, among others, to influence these behaviours by providing suitable and essential coaching, resources, and facilities.

Further, in several countries, the student population includes a considerable number of international students (Organisation for Economic Co-operation and Development [OECD], 2018a). This population principally studies at institutes of higher education outside their countries of origin (OECD, 2018a). The UK continues to be the predominant European country of choice for international students and is the most popular destination overall for such students after the US (Marginson, 2018). The Higher Education Statistics Agency (HESA) (2019) reported that about 24% of the total students in higher education in 2016/17 and 2017/18 in the UK were undertaking postgraduate programmes. Of these, about two-fifths (19%) were international students (UK Council for International Student Affairs [UKCISA], 2019).

Accordingly, this research aims to identify the factors that facilitate or hinder the use of university library e-resources, and specifically in comparison to the use of Google Scholar by postgraduate international students studying in the UK. The findings, in providing insight into students' perceived use of their UDLs and Google Scholar, will assist decision makers in their provision and management of the university e-library, and in particular to inform a major question faced by all university libraries which is whether to retain or cancel their present e-resource subscriptions.

In particular, as noted in many studies related to information system technologies, an innovation (in this case, digital and electronic library services) must be first accepted by users before it can be utilised. When an organisation implements a new technology, it is essential that those who will be using it accept the technology. In other words, acceptance by the end user is a prerequisite for the use of a new innovation (Min & Qu, 2008; Tibenderana & Ogao, 2008b; Zhou, 2008). As well as a deep understanding of the adoption decisions of those using new technologies, a fundamental understanding of the variations in usage and values after adoption is also crucial (Zhu et al., 2006). For this reason, the current study empirically investigates and validates the determinants of electronic library service users' acceptance and use, specifically international postgraduate students in the context of UDLs in universities in Manchester. It must be noted that this study will investigate Type II – individual adoption of technology. This is due to the fact that the core determinant of actual new technology usage is user acceptance of a new technology (Min & Qu, 2008).

This study's understanding of the term 'international students' is students "who received their prior education in another country and are not residents of their current country of study" (OECD, 2018b, p.134) and those who "left their country of origin and moved to another country for the purpose of study" (OECD, 2018a, p.201).

1.4 Research Aim and Objectives

The aim of this study is largely twofold:

(i) To identify factors that affect international postgraduate students' choice to use Google Scholar over their University Digital Libraries (UDLs);

(ii) To develop an information driven framework to determine an information search strategy responsive to dynamic end-user (student) preferences in the library.

Based on the aims, the following objectives have been drawn:

(i) To examine students' online search behaviour, with specific reference to their use of Google Scholar and university digital libraries.

(ii) To examine international students' perspectives on the factors that affect their use of Google Scholar.

(iii) To examine international students' perspectives on the factors that affects their use of University Digital Libraries (UDLs).

(iv) To propose and test a conceptual model of the factors that affect international students' use of Google Scholar as opposed to the University digital library, and vice-versa;

(v) To compare the factors that influence the use of Google Scholar and those that affect the use of University Digital Libraries (UDL).

(vi) To develop an information driven framework that can be used by libraries to determine an information search strategy responsive to dynamic end-user (student) preferences.

1.5 Research Questions

Keeping in view the aim and objectives of the research, the following research questions have been developed:

RQ1: What are the factors that affect the acceptance and use of University Digital Libraries (UDL) and Google Scholar in universities at Manchester?

a) How effectively does a modified UTAUT model evaluate the use of UDLs by international postgraduate students in universities at Manchester?
b) How effectively does a modified UTAUT model evaluate the use of Google Scholar by international postgraduate students in universities at Manchester?

RQ2: What are the international postgraduate students' perceptions of and attitudes towards the University Digital Libraries (UDLs) and Google Scholar?

RQ3: What are the key factors that influence international postgraduate students' acceptance and usage of University Digital Libraries (UDLs) and Google Scholar in universities in Manchester?

a) To what extent can individual differences and system features increase use of UDLs?
b) To what extent can individual differences and system features increase use of Google Scholar?

RQ4: What is the current state of knowledge on student online search behaviour, with specific reference to their use of Google Scholar and university libraries?

The researcher selected the UTAUT model after consideration of the suitability of different theories and models related to information seeking and technology adoption to answer the research questions. A further theoretical lens is provided through the use of Wilson's model (1999) of information-seeking behaviour of international postgraduate students, which has been derived from a scrutiny of existing models (please see Chapter 2 for more details).

1.6 Significance of the Study

In the present day, there is a great influx of international students into UK universities in pursuit of higher education. However, their previous experiences with information sources in their native countries and their own information searching behaviour could influence their usage of, and perhaps preference for, the UDLs in their chosen universities and Google Scholar. While there are indications that the usefulness of Google Scholar in satisfying the research requirements of students is widely accepted by the scholastic community, there is, to the researcher's knowledge, limited literature comparing the perceived usefulness of Google Scholar and UDLs (for example, Asher, Duke, & Wilson, 2013; Brophy & Bawden, 2005; Georgas, 2013, 2014, 2015; Wu & Chen, 2014). Thus, the findings of this research can be useful in several ways as it will help to understand the perspectives of postgraduate students regarding the comparative usefulness of UDLs and Google Scholar. This study will also help create awareness in institutions regarding how postgraduate students effectively use UDLs or Google Scholar. Hence, the results of this study could be expected provide insights regarding the design of a UDL, which could result in enhanced usage of a UDL over Google Scholar. Further, it is anticipated that some insights will be obtained regarding the information searching behaviour of international students which could additionally inform the design of a UDL. Moreover, the findings will also help understand the benefits and reasons related to students' preference for either Google Scholar or a UDL.

Further, rather than limiting the study to a comparison of the perceptions of students regarding UDLs and Google Scholar, this study utilises an extended UTAUT to determine and explain the factors that influence the adoption of UDL and Google Scholar by international postgraduate students. It is believed that an empirical study which focuses on students' perspectives to study UDL adoption will help university decision makers understand the factors that affect student adoption of UDLs in order to enhance the usability/usefulness of UDLs. It must be noted, however, that the intent of the research is principally to scrutinise students' behavioural intention to use their UDL or Google Scholar. Consequently, the use of the UTAUT model will be limited to development and assessment. In other words, the model will not be refined during the course of this study.

1.7 Contributions of the Research

This study is anticipated to contribute to both knowledge and practice: knowledge related to the factors influencing the use of information sources by international students, and practice related to the design of an effective UDL. It is anticipated that the study's findings will:

(i) Identify delay in the evolution of tools and techniques for capturing dynamic information needs of the library end-user;

(ii) Identify the ease of use platform for accessing information with limited restrictions;

(iii) Propose a simpler platform that recognises Domain Knowledge, Computer Efficacy and Motivation;

(iv) Lack of awareness of the powerful search mechanisms available at UDL leading to a parallel typically use with

(v) Use multiple regression analysis (MRA) and the Structured Equation Modelling (SEM) to map the relationships between factors influencing information seekers.

1.8 Structure of the Thesis

The thesis is structured as follows:

Chapter 1 (Introduction) provides the context for the research, outlines the central problem and rationale, identifies aims, and articulates the research questions and objectives. It introduces the approach used to address the research questions. Finally, the intended contribution of this research to the body of knowledge and theory is outlined.

Chapter 2 (Literature Review) offers a review of extant literature related to digital libraries and Google Scholar. The chapter also includes a discussion on student information seeking behaviour. The theoretical underpinnings of the study related to information seeking behaviour and technology acceptance and adoption are also discussed. Further, existing literature related to students' usage of digital resources, information seeking behaviour, and technology adoption is reviewed.

Chapter 3 (Research Methodology): This chapter describes the methodology adopted for the investigation of comparison of postgraduate international students' perceived use of Google Scholar and of their University Digital Libraries (UDL). Accordingly, the research design, instruments and procedure adopted for this research, data collection, sampling techniques used for data collection, and the method used for data analysis, are each described in this chapter.

Chapter 4 (Research Findings): This chapter presents the findings of the research from the data obtained using the questionnaires designed for the study.

Chapter 5 (Discussion): This chapter discusses the findings with regard to existing literature to interpret the results.

Chapter 6 (Conclusion): This final chapter summarises the study and details the conclusions derived from the findings. Recommendations are also made in the light of the findings. Suggestions for future research are provided.

Chapter 2: Libraries and the Technology for Information Searching Services

2.1 Introduction

Information seeking is a natural activity that students are expected to undertake in order for them to complete their studies. However, we rarely stop to reflect on the key drivers for seeking information as well as the how such drivers combine with the technology of the day in order to create a workable platform for searching information. Even though learning institutions provide platforms for accessing information through their libraries, students opt to search for it using other sources. Currently, learners have a myriad of options, which could be used to successfully find the information they need. Accordingly, the theoretical basis upon which information seeking and behaviour of those seeking it has been under review for decades. For instance, models such as those developed by Wilson(1999), Kuhlthau (1991) , Ellis (1989) and Marchionini (1995) have been critical in explaining the rationale behind information seekers' behaviour. With the changing library platforms, it was critical that this chapter examines literature related to digital libraries and university libraries, external platforms such as Google Scholar, and the like. This chapter, therefore, reviews information seeking patterns and behaviour that influence students' usage of digital resources and technology adoption. This chapter strives to examine literature that could be critical in the identification of factors 'that affect international postgraduate students' choice of using Google Scholar over their University Digital Libraries (UDL)', as stated in the main aim (section 1.4). The chapter addresses objectives (i) and (ii) that state that the research would "examine student online search behaviour, with specific reference to their use of Google Scholar and university libraries" and "examine international students' perspectives on the factors that affect their use of Google Scholar" (section 1.4).

This chapter uses information seeking behavioural models to conclude that student use e-libraries and web search engines as the initial point of action in their search for information. It also concludes that the digital library was often not the first choice of students and instead they preferred internet search engines to their libraries. In the context of international postgraduate students, it could be seen that environmental, linguistic-cultural, and affective dimensions influenced their usage of the university e-library. For instance, they could be unaware of the library and its associated processes and technologies. Further, several studies used/extended Wilson's model of information seeking behaviour and it could be seen that the information-seeking context influenced the information seeking behaviour of individuals.

2.2 Basic Concepts and Definitions of Digital Libraries

Traditionally, the role of a library is acknowledged to be storage, distribution, and sharing of knowledge, preservation and upkeep of culture, retrieval of information, learning, and societal dealings (Neal, 1997). A digital library, it can be assumed, performs the same function although in a different manner. The term 'digital library' refers to a "library where some or all of the holdings are available in electronic form, and the services of the library are also made available electronically – frequently over the internet so that users can access them remotely" (Rosenberg, 2005, p.2).

The origins of the term 'digital library' can be traced to a report to the Corporation for National Research Initiatives (CNRI) in 1988 (Kahn & Cerf, 1988). The term grew in popularity due to the Research in Digital Libraries Initiative of NSF/DARPA/NASA (Griffin, 1998). Nevertheless, the term 'digital library' has been used to describe a variety of entities and concepts. For instance, Lynch and Garcia-Molina (1996) regarded digital libraries as systems that provide "a community of users with coherent access to a large, organized repository of information and knowledge" (p.4). On the other hand, Borgman (1999) describes digital libraries as "content collected and organized on behalf of user communities" (p.239) and highlights that librarians place emphasis on "digital libraries as institutions or services" (p. 229). In his book '*Practical Digital Libraries: Books, Bytes, and Bucks*,' Michael Lesk (1997) defines the digital library simply as a "collection of information that is both digitized and organized" (p.1).

Researchers have suggested that digital libraries improve access to print content by converting them to digital format (Yeates, 2002); moreover, that they are systems for displaying collections that can be archived in different kinds of media (Passos, Carolino, & Ribeiro, 2008). Yao and Zhao (2009) offer a narrow perspective of a digital library when they submitted that it "is a specific organization, which uses modern information, computer and network technology dig, collect, sort, and store informational resources" (p.308-309). Digital libraries also offer access to several external sources of information and thus are a "comprehensive collection of digitized resources, readily accessible to all types of users, and managed by professionals who see their role as stewards of the intellectual and cultural heritage of the world" (Marcum, 2003, p.279). They are also said to behave as "cognitive tools, component repositories, and knowledge networks (Sumner & Marlino, 2004).

A digital library was defined by the DELOS Digital Library Reference Model as:

> "[an] organization, which might be virtual, that comprehensively collects, manages, and preserves for the long term rich **digital content**, and offers to its **user** communities specialized **functionality** on that content, of measurable **quality** and according to codified **policies**" (Candela et al., 2007, p.16/193, emphasis – the authors').

The Digital Library Federation defines it as:

> "Organizations that provide the resources, including the specialised staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily available for use by a defined community or set of communities" (Waters, 1998).

The Berkeley Digital Library Project, University of California, describes a digital library as a collection of information sources that are distributed (Trivedi, 2010).

It is evident from these definitions that a digital library is not a standalone or single unit. Instead, it requires technology to connect the resources from various databases. Nevertheless, the connections between the resources and the digital library are transparent to the users. Moreover, the database of the digital library is not restricted to document substitutes (bibliographic records), but also contains actual digital objects such as texts, pictures, etc. (Trivedi, 2010).

Scholars (e.g. Trivedi, 2010; Uzuegbu & McAlbert, 2012) suggest that digital libraries have various significant purposes, such as:

- Ensuring effective and economical delivery of information to users.
- Supporting networking and communication between educational organisations.
- Accelerating the systematic growth of techniques for collecting, storing and organising data digitally.
- Promoting supportive efforts in computing, communication networks, and research resources.

- Encouraging institutional networking and exchange programmes.
- Acquiring the role of leadership in generation and distribution of information.

Similarly, digital libraries have been perceived to have different functions (Trivedi, 2010). These may include providing assistance to students in information search and recovery, backed by a user-friendly interface. Moreover, digital libraries allow students to access information sources both on the internet and intranet. Further, access to prominent sources of information is provided. Thus, users can obtain access to large amounts of information wherever and whenever they require it. Additionally, digital libraries support associations with other digital libraries and support different kinds of content (e.g., multimedia, text). Digital libraries utilise a client-server architecture and use hypertext links to provide navigation (Trivedi, 2010).

It is evident then that digital libraries are viewed differently by companies and people, and consequently, different implications are associated with them. Depending on the user group, for instance, a digital library may be considered to be a pool of databases, learning material, digital documents and video games, which can be accessed through computers by students. On the other hand, for a space scientist, a digital library might signify the collection of satellite images, video gallery, CAD and GIS data on the internet. Likewise, for a businessperson, the collection of stocks and shares information, business deals, business reports, budget information over the internet might signify a digital library. To put it simply, a collection of digital data, which is systemised for a community or a group of people, is called a digital library. Various terms are used for digital libraries in different aspects, such as while mentioning distantly related activities like data mining, data warehouses, digital archives, publisher records, eBooks, data recovery, online data sources, multimedia records, electronic libraries, image application, digital protection, e-Journals, virtual libraries, etc.

The World Wide Web is a quite remarkable example of what many people today regard as a digital library as it is a collection of several thousand documents. It would seem that this tremendous collection could be termed a digital library since information can be found in it (Cleveland, 1998). However, Clifford Lynch (1997), a leading scholar in the field of research in digital libraries, corrected this notion when he stated that the internet "is not a digital library" (p.72) as it was "not designed to support the organized publication and retrieval of information, as libraries are."

2.2.1 Digital Libraries in the University Context

Al-Qallaf and Ridha (2018) suggest that libraries in colleges and universities must necessarily utilise converging technologies to make the instructional, learning, and research settings of these academic institutions more robust. Thus, the academic library website becomes the centre for the "dissemination of digital information; the portal to a multitude of e-resources and e-services; the main gateway for virtual users; and a marketing tool allowing libraries to project their image" (p.1). Liu (2008, p.14) submits that academic library websites are "libraries' virtual presentation to the world." Moreover, academic library websites offer access to "online catalogs, electronic databases, subject resources, library instruction/tutorials, and digital collections" (p.6). Thus, academic library websites have the potential to serve as a centralised ecosystem for information where users' effort in locating information is minimised and the development and sharing of learning, concepts, and experiences are nurtured. Moreover, they can support the changing requirements of users and give them occasions to communicate, impart, and learn (Liu, 2008).

Academic libraries are challenged by the increased availability, on the internet, of different sources of information. This availability has resulted in users of academic libraries, such as academics and postgraduate students, utilising other information sources together with the library website (Bates, 2007). A 2007 study by the European Library Automation Group (ELAG) (Sadeh, 2007b) submits that libraries are threatened by various challenges. For instance, the direct means offered to users by the internet to access information have made it possible not only for them to find information online, but also to use different internet services to obtain physical items. In other words, the internet has reduced the necessity for users to visit, or even look for information through, the library. Moreover, internet search engines provide a straightforward and more instinctive search process. Consequently, users do not acquire the searching proficiency associated with libraries. Additionally, the use of online searches has resulted in a novel method of human communication. For instance, users utilise citation metrics to determine the usefulness of an article, rather than consulting an impartial, well-informed reference librarian (Sadeh, 2007b).

Researchers have also inquired into the reasons why postgraduate students and scholars utilise, or do not utilise, academic library websites. In the case of postgraduate students, many studies have indicated that the students' preference for internet search engines, such as Google and Google Scholar, limited their usage of the library. Vezzosi (2009), for instance, found that doctoral students limited their usage of the library to a few services, such as delivery of documents and loans between libraries. In other words, they placed considerable reliance on the internet due to the availability of straightforward and simple tools for research. Moreover, they relied on people to suggest relevant documents. Nevertheless, Google seemed to be the point of origin for their search for information regardless of context despite their stated awareness of online journals, catalogues, and databases. Moreover, Google and Google Scholar were valued for their ease of usage and the simplicity of their search interface. Relatedly, Drachen, Larsen, Gullbekk, Westbye, & Lach (2011) found that Google or Google Scholar were the search engines most frequently utilised by PhD students, their rationale for this usage being the greater user-friendliness of these engines in contrast to the ineffective function of library-provided databases. Another study by Wu and Chen (2014) involving graduate students found that these students drew attention to the usability of Google Scholar. The students believed that Google Scholar was an information source of great significance when they had information requirements related to academic learning and research, and they utilised it chiefly to obtain full-text documents. An interesting aspect of their use of Google Scholar was to confirm the quality and reliability of documents based on the citation information provided by Google Scholar. Nevertheless, these students also indicated that library databases provided documents of higher quality and were again critical tools for locating academic documents. This study also indicated that libraries have tried to make their interfaces more user-friendly by incorporating metasearch tools or next-generation online public access catalogues.

A study by Ganaie and Rather (2014) found that search engines were utilised by postgraduate students to access electronic library resources as they found use of the university library website to be hindered by difficulties such as network issues, restricted access to resources through temporary user credentials, and lack of e-resources due to limited subscriptions. These findings were supported by Uwakwe, Shidi, and Abari (2016) and Khan, Bhatti, Khan, and Ismail (2014). Their studies, in the respective contexts of the Benue State University Library and the University of Peshawar, found that lack of subscriptions, and inadequate physical facilities such as low bandwidth or poor internet connection, inadequately trained staff, frequent power failure, lack of finance, and insufficient ICT infrastructure were some of the challenges impacting students' use of virtual libraries.

Nevertheless, research has shown that faculty members can enhance library usage due to their critical role in encouraging postgraduate students to utilise the library to complete their assignments, study, and undertake research (Al-Muomen, Morris, & Maynard, 2012). Similarly, a study by Yousef (2010) also found that students were generally directed by several faculty members to visit the library and also the manner in which to utilise its resources.

Haglund and Olsson (2008) reported that Google was utilised by researchers instead of libraries to locate all types of information, as they had limited interaction with the library. As they observed, the majority rarely started their information search from the library web page. Instead, they utilised their own bookmarks/shortcuts, added on earlier visits, to access information sources. Further, the researchers believed in their ability to succeed independently, and placed considerable dependence on immediate access to electronically available information resources. Other studies (e.g., Khan & Shafique, 2011; Marouf & Anwar, 2010) observed that the library's use by faculty was very poor, finding instead that they preferred to use the Google search engine. These findings were attributed to poor quality resources, limited collections, restricted access to foreign sources, inadequate library staff, and poorly organised sources.

It would thus appear that there is significant research supporting the argument offered by Anderson (2005) that "Google has succeeded wildly at finding its users the information they want in return for a minimum investment of time and energy" (p.32). That is, it would seem that the usage of library websites continues to be limited due to the preference of students and academics for other tools, such as search engines on the internet.

Conversely, several studies indicate that scholars and postgraduate students continue to use the library frequently to look for information. Student library surveys (e.g., Webster University Library, 2016; Wyndham Robertson Library, 2016) indicated that more than 90% of the students were satisfied with their usage of the library website, library databases, and access to online articles. Another survey at Boston University (Boston University Libraries, 2017) reported that 57% of graduate students used the libraries' online resources at least once a week. Moreover, they were generally satisfied with the provision made by the libraries for different resources such as library journals and databases. Further, the most significant methods utilised for searching for resources were reported to be library databases, search engines, and BU Libraries Search. In the

UK, a survey of the Loughborough University Library (Loughborough University, 2015) indicated that 55% of the postgraduate students (by research) utilised the online resources at least once a week while 29% used the resources every day. In contrast, 44% and 31% of the taught postgraduate students utilised the online resources daily and at least once a week, respectively. These findings would appear to indicate that there is a growing acceptance and inclination to utilise University Digital Libraries (UDL) among postgraduate students in universities across the world. Moreover, these findings may well suggest that libraries have already improved their services to users.

2.3 Google Scholar

Google Scholar™ (http://scholar.google.com) was launched by Google in 2004 (van Aalst, 2010). Google Scholar queries a Web database of academic documents utilising a version of the Google search engine. The databases may include journal articles, conference papers, book and book chapters, and theses. The outcomes of a search on Google Scholar include links to full-text versions of documents, citation totals, and sorted listings and hyperlinks of citing documents. Google Scholar has been at the receiving end of considerable research attention as a tool for scrutinising the status of research in certain areas and to identify and find significant publications (e.g., Halevi, Moed, & Bar-Ilan, 2017; Harzing & Alakangas, 2016; López-Cózar, Orduna-Malea, & Martín-Martín, 2018; Moed, Bar-Ilan, & Halevi, 2016). Google Scholar's advantages include its availability for free on the Web and its coverage of a broad variety of scholarly resources. The significance of Google Scholar is such that Sage Publishing (n.d.) offers the following advice to writers:

> Google and Google Scholar are the principal ways in which people will find your article online today. Between them they account for 60% of referral traffic to SAGE Journals Online. The search engine is now the first port of call for researchers and it is of paramount importance your article can be found easily in search engine results.

Unsurprisingly perhaps, a study conducted by Al-Moumen et al. (2012) investigated the information need of the user. Their information seeking behaviour, difficulties, and experiences of students found that it was complex to find information on the library websites because of the use of incomprehensible terms; therefore, students increasingly relied on using Google and Google Scholar for finding relevant information (Sadeh, 2008).

The popularity of Google Scholar (GS) has been examined by main scholars since its debut. Since GS is a commercial product, its coverage and algorithms for ranking, being proprietary information, cannot be accessed by researchers (Wenzler, 2008). Further, its strengths and weaknesses have been explored through comparisons with library subscription databases, other search engines, and library federated search tools. Since the present study places emphasis on libraries, the following scrutiny is limited to comparisons of GS in the library context.

Early studies by Mullen and Hartman (2006) and Neuhaus, Neuhaus, and Asher (2008) examined the acceptance of GS in academic institutions and found that only a few institutions offered direct access to GS on their homepage. The same studies found that institutions primarily placed GS on their library websites. Moreover, Neuhaus and colleagues (2008) submitted that the placement of GS on library websites would signify that those institutions accepted GS as a worthwhile resource for academic research. A follow-up study by Hartman and Mullen (2008) of the same institutions scrutinised earlier (Mullen & Hartman, 2006) reported that the penetration of GS had increased in the two-year period.

Some other studies have contrasted GS's retrieval and accuracy with those of subscription databases and reported that GS's performance has improved over time (Chen, 2010; Neuhaus, Neuhause, Asher, & Wrede, 2006). A study by Walters (2009), for instance, measured GS's performance against different subscription databases and reported that GS's performance exceeded that of many of the databases.

Researchers have also argued that the simplicity of its search interface is preferred by library users and that there is a likelihood that these users would choose GS over more complex interfaces, even if they are more useful (King, 2008). In this context, Cooke and Donlan (2008) compared GS, Serial Solution's Central Search, and Windows Live Search Academic. This study reported that straightforward, more efficient interfaces may be as useful as complex search interfaces, although the latter may provide more relevant retrievals. Nevertheless, the authors concede that this may depend on the preferences and information needs of users. Another early study comparing GS with subscription-based, commercial federated search engines (e.g., MetaLib and WebFeat) drew attention to GS' ease of use, speed, and usefulness (Chen, 2006). In a finding very relevant to the present study, Giglierano (2008) illustrated that the culture of a library influenced the usage of GS.

More recently, Wang and Howard (2012) analysed GS usage data from 2006 at the San Francisco State University for three library tools: SFX link resolver, Web Access Management proxy server, and ILLiad interlibrary loan server. This study found that GS's usefulness as a resource had grown and it was consequently a significant addition to the collection of research databases at the library. On the same lines, Adriaanse and Rensleigh (2013) compared ISI Web of Science, Scopus and GS and reported that GS did not fare as well as the two other databases in terms of citation results or in retrieval of the most unique items or in inconsistencies with regard to verification and quality of content. Martín-Martín, Orduna-Malea, Thelwall, & López-Cózar (2018) compared GS with Web of Science and Scopus and reported that the unique citations reported by GS have a much lower scientific impact, on average, than the citations found by the other two databases. Moreover, about half of the unique citations from GS are not from journals while a considerable number are not in English. Harzing (2013) demonstrated that the coverage of GS was increasing steadily and also that it was able to provide considerable coverage for various disciplines, increasing its suitability as a resource not only for evaluation of research, but also bibliometric research. From these studies, it can be seen that there were conflicting opinions regarding the usefulness of GS as a resource in contrast to other library tools and databases.

In the context of university students, a quantitative evaluation of GS use and acceptance in this population was conducted by Cothran (2011) who reported that the respondents viewed GS as easy to access and easy to use. Shen (2012) studied the usage frequency of GS among university students and the factors promoting its use and found that there are various factors that strongly affect the intention of university students in using GS, which includes apparent ease of use, sense of loyalty, and perceived advantages of GS. Another study by Tella, Oyewole, & Tella (2017) analysed the viewpoints of postgraduate students of the University of Ilorin, Nigeria, concerning the importance of Google Scholar. It is found that while most of the students were aware of GS and even used it, they were not satisfied with its performance as its use does not make their research easier, nor does it speed it up. Nevertheless, GS was regarded to be useful as it provided coverage of broad topics in the field of interest and typically provided relevant articles associated with the students' search. Further, a study conducted by Ankrah and Atuase (2018) investigated the factors affecting the level of awareness of using electronic resources among postgraduate students. The results depicted that these students were more comfortable in accessing information from Google

Scholar, rather than the databases present within the library. Again, it could be seen that the opinions regarding GS varied across studies. Nevertheless, it would seem to appear that evidence supported its ease of use and usefulness.

GS has also been on the receiving end of some criticism. For instance, Giustini and Boulos (2013) reported that GS has not improved sufficiently to be utilised solely for searchers related to systematic reviews. Indeed, these authors aver that its continuously-changing content, database structure, and algorithm make GS a poor choice for this purpose. Further, Halevi, Moed, and Bar-Ilan (2017) drew attention to GS's limitations with regard to advanced searching, its lack of support for data downloads, absence of quality control, and clear indexing guidelines, all of which restrict its use as a sole bibliometric source.

2.4 Student Information Seeking/Searching Behaviour

Information seeking cannot be separated from the context in which it takes place (Johnson, Case, Andrews, Allard, & Johnson, 2006). Nevertheless, in most cases, individuals are likely to turn primarily to the internet over other sources such as other individuals and libraries (Johnson et al., 2006). Studies exploring information searching or seeking in academic contexts are numerous and find, for instance, that research tasks are explorative, undefined, complex, rational, flexible, and continuous (Du & Evans, 2011). Moreover, the characteristics of users' searching behaviour include the use of several search systems, construction of various search queries, utilisation of basic search functions, and query reformulations (Du & Evans, 2011).

Collaborative information seeking behaviour was typically demonstrated during the preliminary stage when an information need was identified and then ultimately when the information was utilised in final reporting (Saleh & Large, 2011). Leeder and Shah (2016) reported that the individual contributed to the quality of search outcomes as better quality sources were found by searchers who were effective and efficient. Moreover, the individual's attitude and experience towards the assignment also influenced the quality of the search outcomes. Although the present study does not place emphasis on collaborative information seeking, it is interesting to note that the individual has a considerable part to play in the effectiveness of the seeking, even in a group context.

Some investigations have placed emphasis on information seeking behaviour in terms of the disciplines of students. For instance, Majyambere and Hoskins (2015) studied the seeking behaviour of international postgraduate students in Humanities/Arts and found that they exhibited active and passive information seeking behaviours. In particular, the academic information needs of the students had created a need for them to consult different sources such as lecturers, supervisors, and subject librarians. On the other hand, interactions with colleagues or the use of internet facilities satisfied their personal information needs. On similar lines, Sahu and Nath Singh (2013) investigated the information seeking behaviour of academics in the astronomy/astrophysics fields and found that the information seeking behaviour and needs varied by discipline. The primary purpose of the information seeking was research work and teaching and web pages were the most commonly utilised method of information seeking. It could be inferred that the information needs of the students were influenced by their discipline, which in turn influenced their information seeking behaviour.

In keeping with the context of the present study, a study by Lacović (2014) reported that academic libraries and the internet had a considerable role in university students' information behaviour. Further, Catalano (2013) reported that graduate students commenced their research on the internet, conferred with their faculty advisors, and utilised libraries. Nevertheless, their search behaviour varied by discipline, their origin (i.e., international or home students), and their level of study (e.g., master's, doctoral). Liao, Finn and Lu (2007) found that the top two methods of commencing the general information-seeking process were searching the internet and exploration of library electronic resources, with the internet coming first. Moreover, this study found that while international students used library services more frequently than the national (American) students, they perhaps required instruction on information competence skills of a higher level such as precise definition of research problems, formulation of successful search strategies, and sorting and evaluation of resources suitable to academic research. In other words, it would appear that international students were more likely to require assistance to effectively use library services. The following sections discuss the different theories associated with information seeking and technology adoption. The rationale for including this discussion at this juncture is to provide a connection between the basic concepts discussed in the preceding sections and the related research which follows in subsequent sections. Moreover, building the theoretical framework for this study necessitated a scrutiny of various models related to information seeking/searching along with theories of technology acceptance and adoption. This scrutiny was informed by the study's objectives and research questions. Theories and models of information seeking are scrutinised in the next section.

2.5 Theories Related to Information Seeking/Searching Behaviour

In general, information seeking behaviour can be assumed to be defined by context and accompanying sub-contexts (Abbas, 2018). Accordingly, several models have been proposed over time to explain the process of information seeking/searching. Moreover, the evolution of these models can be traced to the shift of information behaviour from system-centric to user-centric (Abbas, 2018).

A few salient models are selected for scrutiny in the following sub-sections due to their relevance in the context of the present study. The discussion of these models progresses from the general to the more specific. In other words, the models scrutinised encompass various aspects of information searching such as preliminary actions, drivers, obstacles, and the different phases of the process of information seeking. Moreover, models that summarise the interaction of individuals with information systems and the phases associated with this facet of information seeking are also examined.

Generic models of information seeking behaviour are described first.

2.5.1 Wilson's Model of Information Seeking Behaviour

Several models of information-seeking behaviour have been suggested by Wilson (1999). An early model from 1981 submitted that information-seeking behaviour was the outcome of an information user's perceived need. Accordingly, to fulfil that need, the user inquires within authorised or unauthorised information resources or facilities; this inquiry may or may not be successful in locating appropriate information. In the event that appropriate information has been successfully found, the user then utilises this information and the perceived need is either completely or partly fulfilled. If the information found does not succeed in fulfilling the need, the search may have to be repeated. Further, this early model indicated that other people may be involved in some part in information seeking behaviour through information exchange and transfer. The 1981 model included three entities identified by Wilson, namely the user of information, the user's need for information, and the environment in which this information is sought (Figure 2.1).

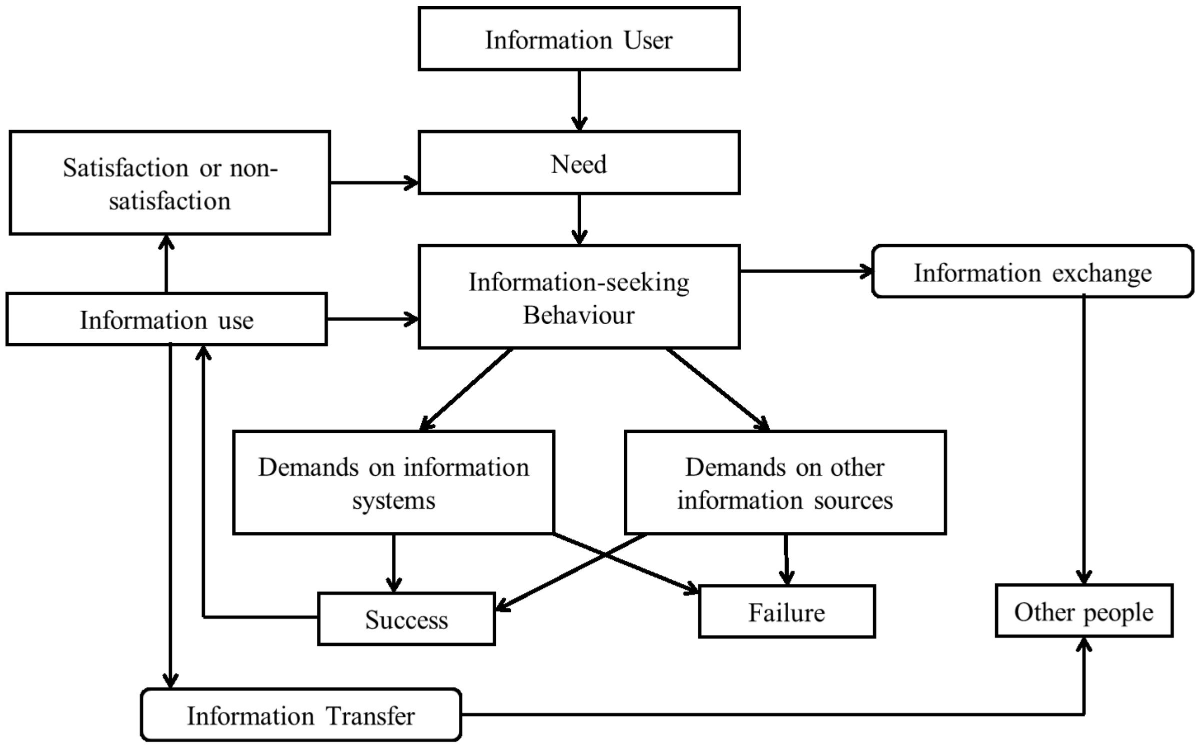


Figure 2.1 *Wilson's 1981 model of information behaviour*

(Source: Wilson, 2006, p.659)

Wilson's model was centred on the need for information, which was believed to be defined by the environment, role, and requirements ('physiological,' 'affective,' and 'cognitive') (Figure 2.2). Subsequently, the information need was stated to affect the information seeking behaviour of a user, though not before any probable barriers (personal, interpersonal, and environmental) encountered by the user tempered it.

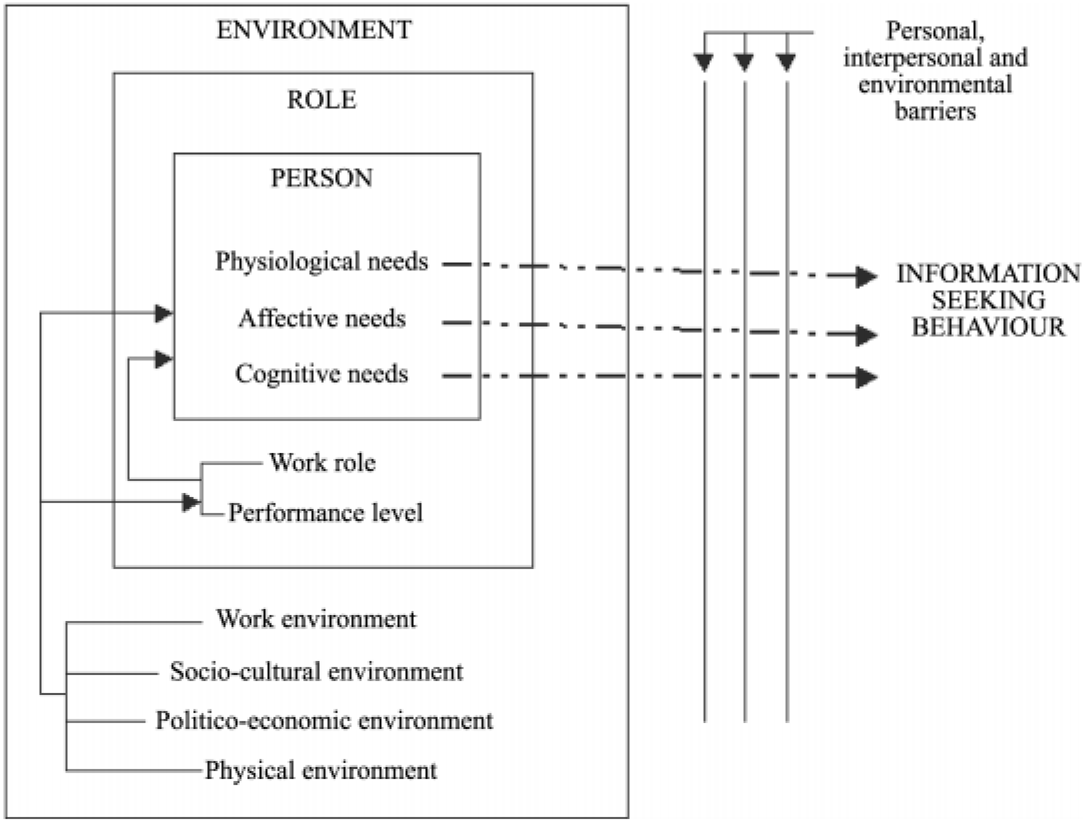


Figure 2.2 *Wilson's 1981 model of information seeking behaviour*
(Source: Wilson, 2006, p.66)

A later model (Figure 2.3) from 1996 extends the fundamental structure of the earlier model to include 'intervening variables'. These variables may serve to support or prevent usage of information. More kinds of information-seeking behaviour are included instead of being limited to 'active search'. Moreover, processing and usage of information is depicted as an essential component of the feedback loop with regard to fulfilling information needs. Three significant hypothetical notions are offered to explain why some requirements to do not trigger information-seeking behaviour (stress/coping theory); which information sources may be preferred over others by a specific individual (risk/reward theory); and the belief that an individual can effectively implement the behaviour necessitated to deliver anticipated outcomes (self-efficacy theory) (Wilson, 1999). Wilson's models were evaluated using insights from research performed in different fields, such as innovation, psychology, decision-making, consumer research, and health communication (Wilson, 1999; 2005).

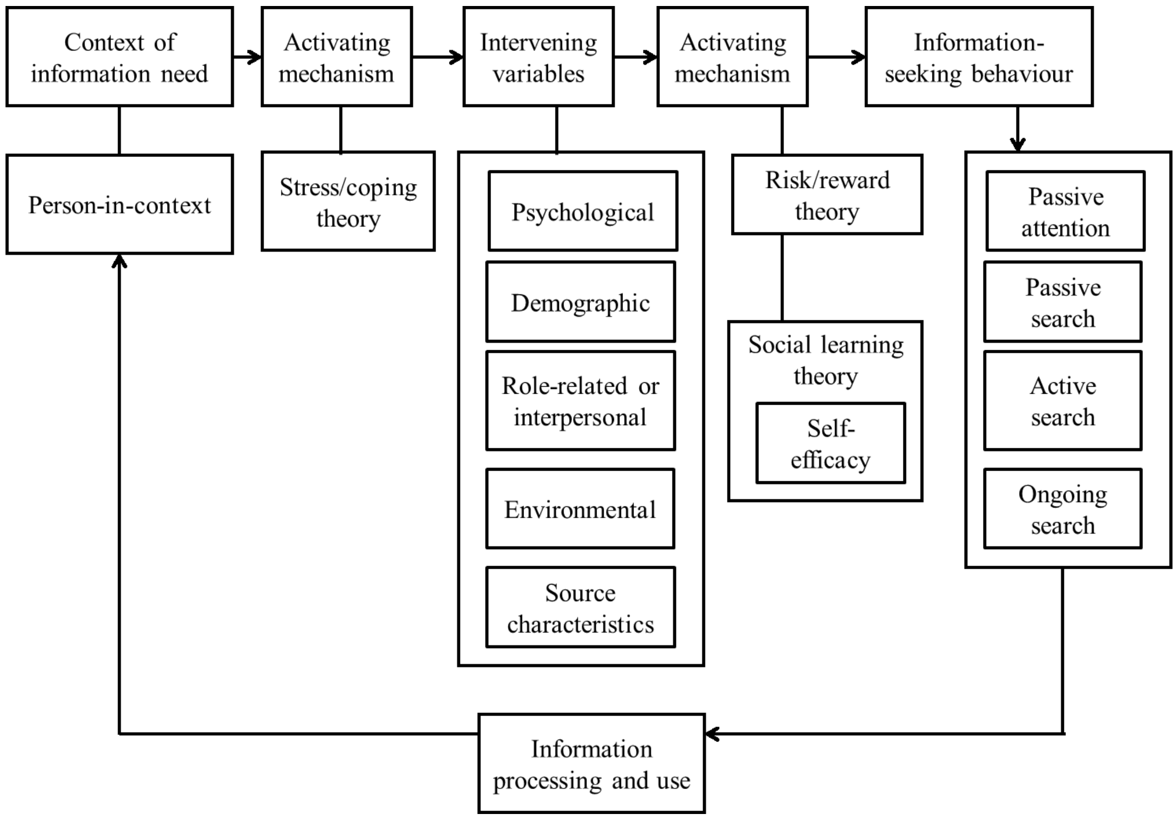


Figure 2.3 *Wilson's 1996 model of information behaviour*

(Source: Wilson, 1999, p.257)

Wilson's model is acknowledged to be complex as it calls upon definite theories adapted from different fields of study. For example, the psychological theories of stress and coping and social learning help explain why information seeking is prompted by some needs and not others, and also why some persons are able to track a goal effectively based on their perceptions of their self-efficacy (Case, 2012). Moreover, from consumer research, the risk and reward theory helps explain the preference for some sources of information over others (Bloch et al., 1986).

2.5.2 Kuhlthau's Information-Search Process (ISP)

The emphasis of Kuhlthau's information-search process (ISP) is on cognitive admittance to information and concepts, together with the process of searching for meaning. The course of information seeking is described by ISP from the perspective of construction, placing emphasis on the feeling (affective), thought (cognitive), and action (physical) aspects of the information searching experience of users. Kuhlthau (2005) submits that there are six phases of information seeking: initiation, selection, exploration, formulation, collection, and presentation. These phases encompass the spectrum of feeling, thought, and action experienced by users as they progress through the search for information. For instance, users may experience uncertainty accompanied by unclear thoughts when they start the search. This can progress to feeling optimistic when search tasks are chosen, followed by confusion and frustration when the exploration reveals inconsistent information. Actions, on the other hand, could range from exploring information to documenting it (Table 2.1). Kuhlthau's model was evaluated through mixed-method studies involving students (university, college, secondary school) and users of public libraries.

Table 2.1 *Kuhlthau's Information-Search Process (adapted from Kuhlthau, 1991, pp.367, 369)*

ISP Stage	Feelings	Thoughts	Actions	Task
Initiation	Ambiguity	Universal/ Ambiguous	Looking for Contextual Information	Identify information need
Selection	Confidence			Isolate broad theme
Exploration	Uncertainty/ Irritation/ Disbelief		Looking for Appropriate Information	Scrutinise information on broad theme
Formulation	Clearness	Focused/ Sharper		Articulate emphasis
Collection	Feeling of control/ Assurance	Enhanced Attention	Looking for Appropriate or Concentrated Information	Collect information relating to area of emphasis

ISP Stage	Feelings	Thoughts	Actions	Task
Presentation	Respite/ Contentment or Dissatisfaction	Clearer or Directed		Accomplished search for information

2.5.3 Ellis's Model of Information-Seeking Behaviour

The original purpose of this model was to examine retrieval of information from the perspective of social science. Thus, its principal objective was to propose a behavioural method of information retrieval as opposed to a cognitive approach. The design of the model was informed by semi-structured interviews with researcher groups from different academic and industrial disciplines (Ellis, 1989; Ellis, Cox, & Hall, 1993; Ellis & Haugan, 1997).

Ellis' model (Figure 2.4) acknowledges the existence of eight kinds of activities related to information seeking: starting/surveying; chaining; monitoring; browsing; differentiating/distinguishing; filtering; extracting; and ending. Starting/surveying pertains to the activities associated with the initial search for information, while chaining (which may be backward or forward) refers to using a preliminary resource as a point of reference to perform follow-up searches. The next step, browsing, is a type of searching that is semi-directed; that is, the search is narrowed by this time through the use of contents, title lists, subject captions, and summaries. On the other hand, filtering pertains to using certain methods or conditions to ensure the relevance and exactness of the information. Relatedly, differentiating indicates sifting through the information on the basis of the features of the scrutinised material. Monitoring encompasses tracking sources to remain aware of developments in the area, and extracting consists of methodically reviewing resources to select items of relevance. Finally, verifying and ending pertain respectively to ascertaining the correctness of the information, and stopping the process at the end of a task. It must be noted that the model "does not attempt to specify either the exact interrelationships of the activities or the order in which they are undertaken, because this might vary from project to project and to some extent depends on the phase and stage of the project" (Ellis & Haugan, 1997, p.388).

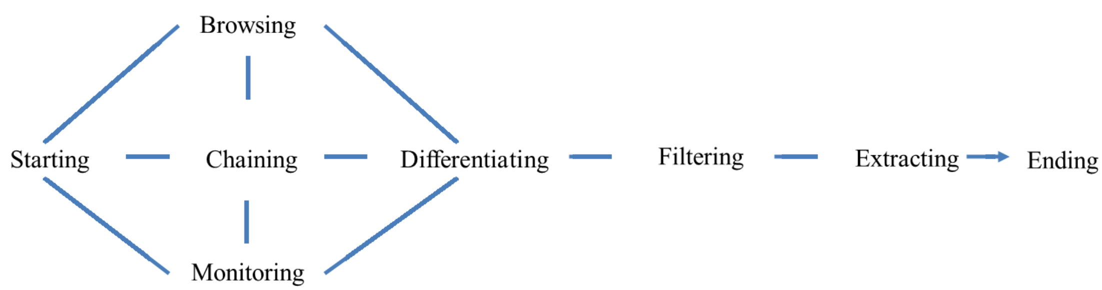


Figure 2.4 *Ellis' model for Information System Design*
(Source: Knight & Spink, 2008)

2.5.4 Belkin et al.'s Information-Seeking Strategies (ISS)

Belkin, Marchetti, and Cool (1993) suggest that all strategies related to information-seeking could be considered to be exchanges between a user and other facets of a system for information retrieval (IR). They identified four aspects or facets of strategies to look for information: scanning-searching; learning-selecting; recognition-specification; and information items-meta-information. That is, there is an approach and goal associated with user interaction; a method of information retrieval; and contemplation of resources. Belkin and colleagues (1993) state that different behaviours can be detected when a person is involved in searching for information. These could include "searching for some known and identifiable item(s);* searching for items similar to some known item; searching for items on some identified topic; looking around for something interesting among items; inspecting items and their contents; identifying useful items by inspection; and browsing among item descriptors and item organization schemes" (p.325). This model (Figure 2.5) was evaluated using observations and findings from other experimental studies.

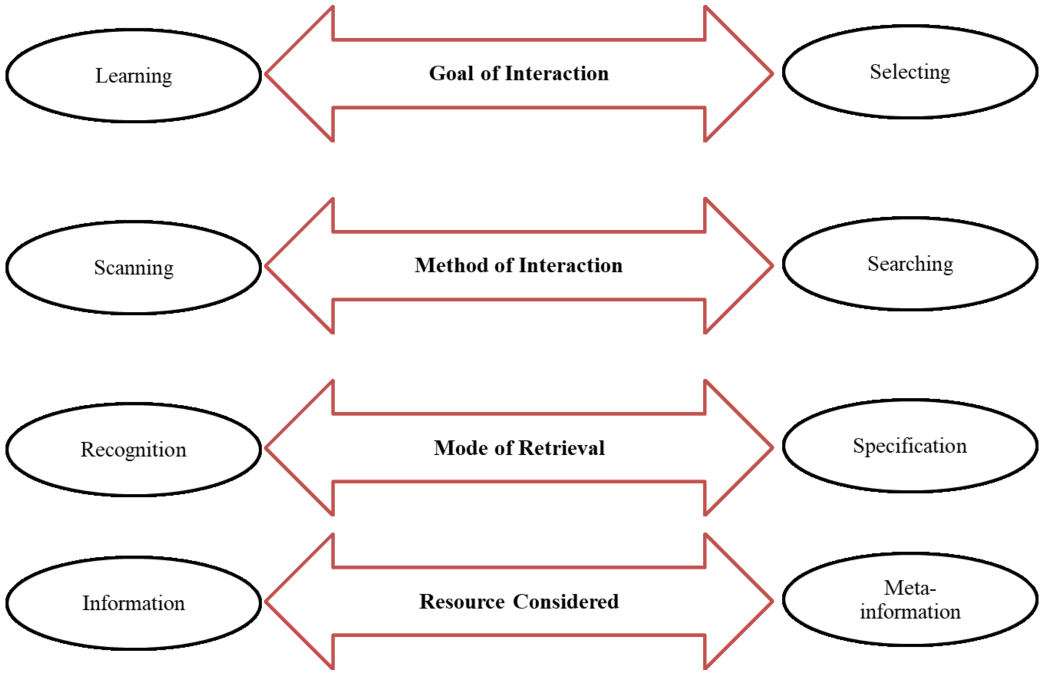


Figure 2.5 *Information-Seeking Strategies*

(Adapted from Belkin et al., 1993)

The next few sub-sections describe interactive models of information seeking behaviour which describe the manner in which a person may, to obtain required information, interact with information resources or systems.

2.5.5 Bates' Berry-picking Model

Bates (1989) describes an interactive information seeking behaviour model called the Berry-picking Model (Figure 2.6). This model explains information seeking as a sequence of progressing activity with the principal idea being that search evolves overall numerous phases of inquiry, reflection, assessment, and persistence. In other words, although the search commences with a single idea or topic, it progresses through different sources which may or may not cause new ideas to arise due to new information, and consequently the original inquiry may progress in an entirely new direction (Knight & Spink, 2008).

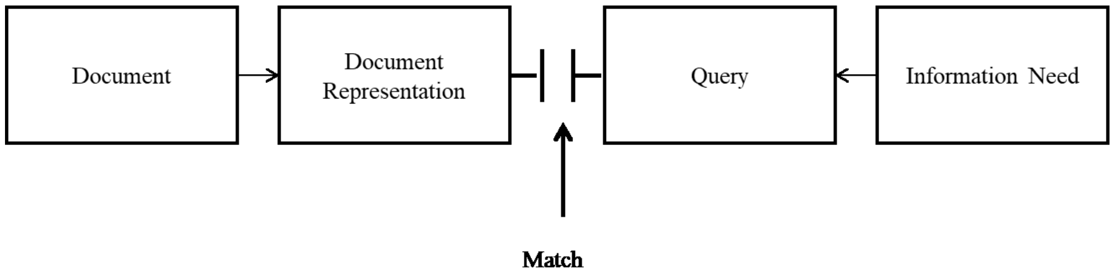


***Figure 2.6** Illustration of a classic model of information retrieval*

(Source: Bates, 1989)

In contrast to the linear model depicted above, Bates (1989) submitted that information seeking is an evolving activity where the outcome(s) of every query triggers an intellectual reaction from the searcher (Figure 2.7). This reaction may serve to strengthen a search inquiry, result in its extension or modification, lead to it being totally overhauled, or even abandoned (Knight & Spink, 2008).

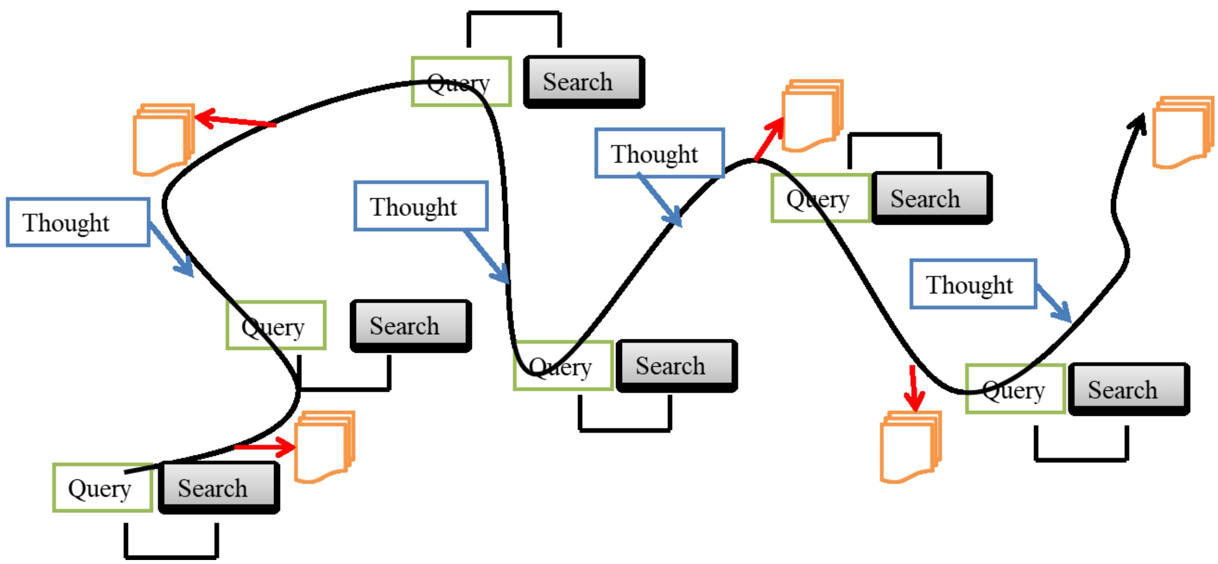


***Figure 2.7** Illustration of a berry-picking search*

(Source: Knight & Spink, 2008)

2.5.6 Marchionini's Information-Seeking Model

Information-seeking strategies were categorised by Marchionini (1995) into two significant categories: analytical or browsing. Analytical strategies are more methodical and deliberate whereas browsing strategies are less orderly. Nevertheless, Marchionini's model principally assumes that information seeking is more or less a linear process (Figure 2.8). The inference, despite the existence of a 'reflect, iterate, stop' phase, is that the person seeking information continues to separately assess information needs. The seeking for information commences with identifying and acknowledging a matter and persists until the matter is resolved or discarded. The assessment of this model was performed using various individual and environmental processes and factors. This model helps depict the experience of an end-user interacting with an electronic resource (Abbas, 2018).

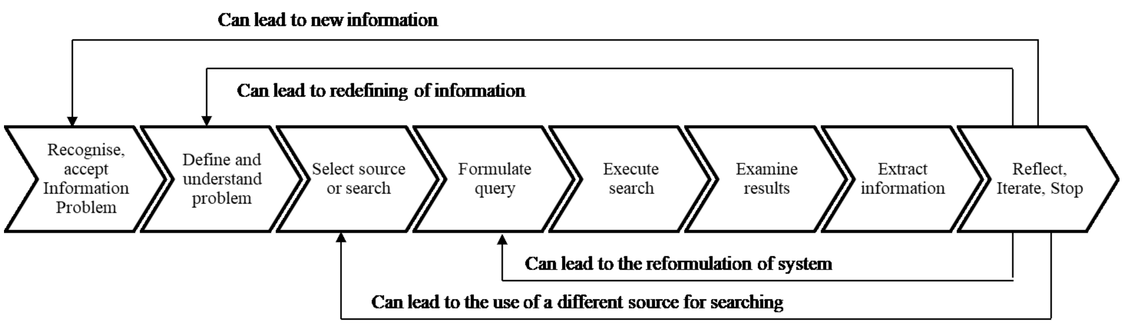


Figure 2.8 *Information-Seeking Model*

(Source: Marchionini, 1995)

2.5.7 Other Models

In addition to the models described in the preceding sections, other models have been suggested by various researchers, each exploring different facets of information search behaviour. For instance, the model offered by Spink (1997) examined the strategic actions utilised during the process of seeking information interactively (Figure 2.9). Spink's view was founded on user reasoning, search strategies, and feedback loops which interactively connect the interactions of information retrieval directly with overall information-seeking behaviour.

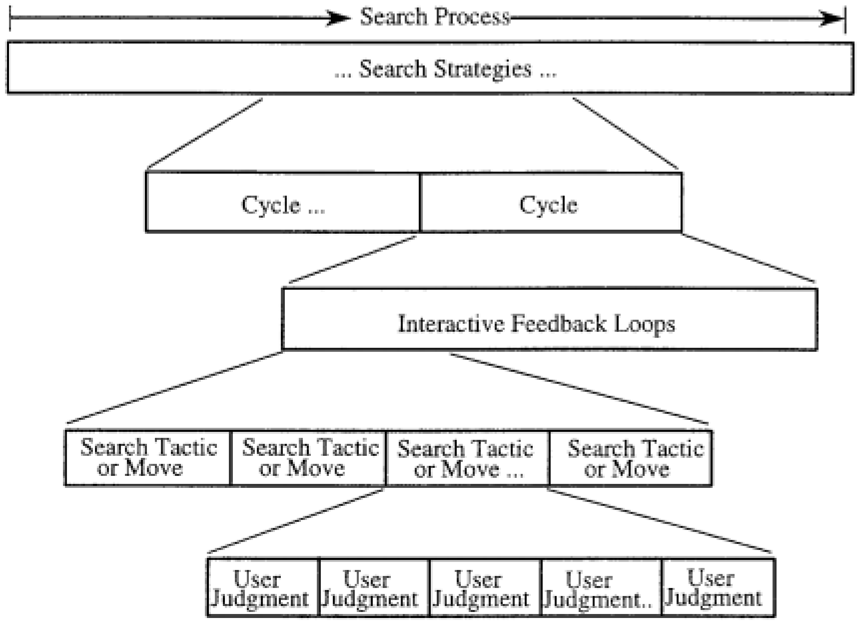


Figure 2.9 *Interactive Search Process – Elements*

(Source: Spink, 1997, p.391)

A further set of models scrutinise information seeking in the context of Web interaction. Knight and Spink (2008), for example, derived a theoretical macro model of human information retrieval behaviour on the Web (Figure 2.10). This model incorporates the individual (characteristics, roles) and the interacting system, along with the inputs and influences of other models of information seeking. The role of the Web in the model is pivotal. This model incorporates facets of information seeking from other models such as Wilson (1981), Ellis (1989), Kuhlthau (1991), Johnson and colleagues (1993), Choo et al. (2000), Marchionini (1995), Bates (1989), Ingwersen (1996), Saracevic (1996), and Spink (1997).

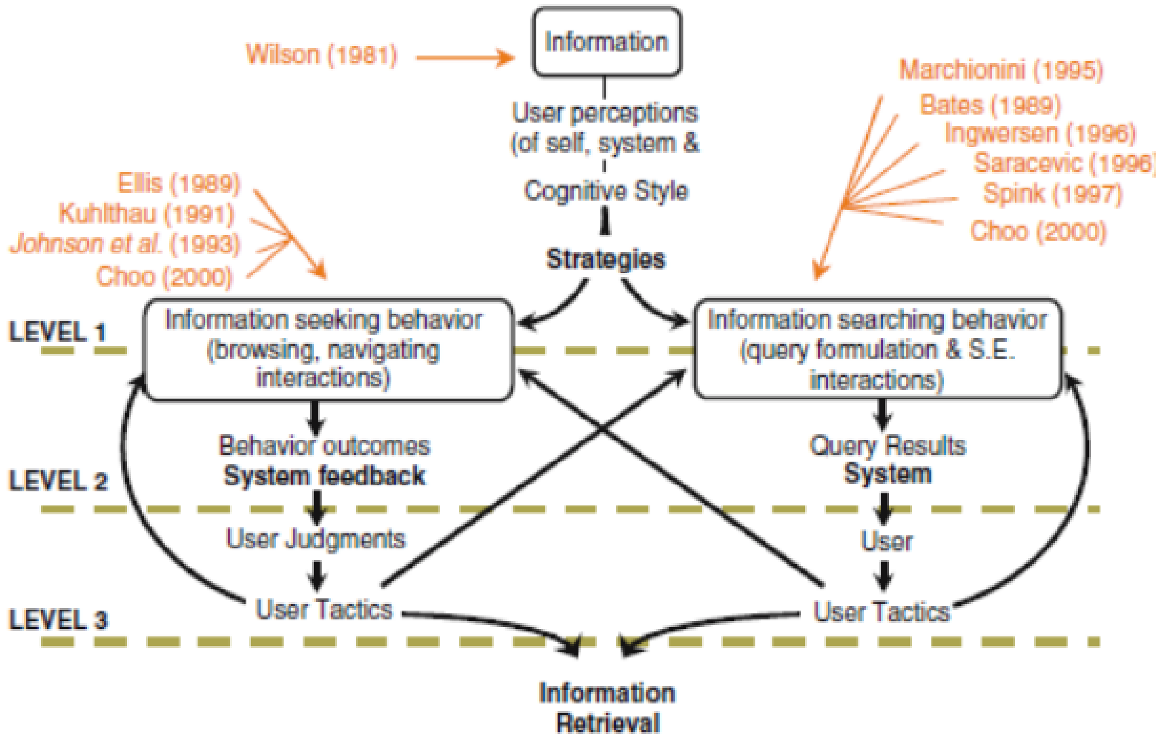


Figure 2.10 *Macro Model of Human Information Retrieval Behaviour on the Web*

(Source: Knight & Spink, 2008, p.230)

Another perspective pursued in models of information-seeking behaviour is related to an emphasis on the profession of the information seeker. In this group of models are included Johnson and Mieschke's (1991) Comprehensive Model of Information-Seeking which was developed based on their recognition of the impact of context (for instance, women with breast cancer) on seeking behaviour. And Leckie's (Leckie, Pettigrew, & Sylvain, 1996) model which was developed based on research performed on the behaviour of professionals (lawyers, healthcare professionals, and engineers) when seeking information.

2.5.8 Comparing the Models of Information Seeking/Searching Behaviour

Table 2.2 provides a summary of the models reviewed in the preceding sections. It can be seen that while all the considered models scrutinised the various phases involved in looking for information, some differences exist among them. For instance, Ellis' model does not clarify the associations among the facets of information-seeking behaviour, whereas Kuhlthau's model connects the phases of the searching process to feelings of users. On the other hand, the model of Belkin et al. was informed by the observations of the authors and the findings from other studies. Likewise, Wilson's models were developed based on different fields and seemed suitable for generic information searching behaviour, which perhaps makes them suitable for the present study. Marchionini's model also did not consider user inputs or capabilities but instead was based on various individual and environmental processes and factors. Nevertheless, this model also appeared to be appropriate for a general information searching context. Bates' (1989) model drew attention to the interactive nature of an information search, which again has some aspects that may relate to the context of the present study.

***Table 2.2** Comparison of Models of Information Seeking/Searching Behaviour*

Model (Year)	**Distinguishing features**	**Merits**	**Demerits**
Wilson (1981, 1996)	Combines earlier models and integrates studies from different areas	Kinds of search behaviour classified. Scrutiny of difficulties encountered when looking for information	Very general as it comprises concepts, variables, and behaviours
Kuhlthau (1991)	Information seeking takes place in phases	Emphasis on experience of users via the interface of opinions, outlooks, and activities	Information seeking specifies phases, not users
Ellis (1989)	Information seeking takes place in activities	Emphasis on behaviour (activities) instead of process	Dependency on conditions of the individual's information-seeking activities associated with a specific point in time

Model (Year)	Distinguishing features	Merits	Demerits
Belkin et al. (1993)	User interacts within the system	Designed to facilitate user's communication with the interface of the system	Depends on findings of other studies
Bates (1989)	Information seeking is interactive	Highlights that searches evolve and are accompanied by intellectual reactions from the searcher	Not empirically validated
Marchionini (1995)	Information-seeking procedure involves a succession of sub-procedures	Offers flexibility for progressing between sub-procedures during the course of the procedure	Does not consider abilities of the user

Overall, it can be seen that none of these models place specific emphasis on information seeking/searching in the context of students, though it could be assumed that they cover students in the encompassing definition of users. Moreover, it is evident in the context of this study that the discussed models, while providing insights regarding the different approaches a user may undertake to search for information; do not directly contribute to a theoretical basis for choosing to use a certain tool for information searching. Nevertheless, these models are of significance in the context of this study since an individual's information-seeking behaviour in the present day involves both processing of information and interaction with technological information sources as in the present study – that is, the use of Google Scholar and UDLs. Moreover, understanding the information searching process can facilitate enhancement of the design of the search features of an academic library interface (Hearst, 2009).

2.6 Theories of Technology Acceptance and Adoption

As seen in the preceding section, it would appear that models related to information searching behaviour were of relevance in the context of the present study, as information searching in the present day typically involves the use of technological systems. As a natural progression perhaps, the researcher's attention turned instead to facets that influence a user's acceptance and adoption of technologies – in this case, the UDL and Google Scholar. Accordingly, this section discusses models and underlying theories of technology acceptance and adoption.

Several different models and theories of technology acceptance have been designed for use in a range of disciplines, for example information systems, sociology and psychology, and they are used to explain, understand, and make predictions about how individuals accept and ultimately adopt new IT products and services. The models have been amended and revised over time, coming as a result of many attempts to validate or extend them through use. The field of psychology, specifically Ajzen and Fishbein (1980), developed the Theory of Reasoned Action (TRA) which was extended by 1985 into the Theory of Planned Behaviour (TPB); this then developed again with Taylor and Todd's (1995) Decomposed Theory of Planned Behaviour (DTPB). The field of information systems made a contribution with the Technology Acceptance Model (TAM) (Davis, 1986), which builds on the TRA, and this has been extended further both in the TAM2 (Venkatesh & Davis, 2000). The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003); these are both aggregates of the Model of PC Utilisation (Triadis, 1979), the Rogers' Diffusion of Innovations Model (DOI) (Rogers, 1983), the Motivational Model (Deci & Ryan, 1985), and Social Cognitive Theory (Bandura, 1989).

Such models and theories consist of their own constructs and philosophical assumptions, and these vary between frameworks since they are designed for their respective disciplines, as is briefly discussed in the following sections. Nevertheless, it must be noted that they have also been criticised as they can be restrictive in terms of explaining, predicting and understanding technology adoption processes in the individual, and hence researchers typically choose a model or theory that is best suited to their study context.

2.6.1 Theory of Reasoned Action (TRA)

The TRA, first established by Fishbein and Ajzen (1975), arose from the authors' discontent with existing research on behaviour and attitude. The three components that make up TRA are the following:

- Behavioural intention (BI);
- Attitude (A); and

- Subjective norm (SN).

The basis of TRA is that an individual’s behavioural intention is dependent on their attitude towards the behaviour, as well as subjective norms. As an equation, this assertion can be explained as BI = A + SN. Thus, an individual chooses their behaviour based on their attitude toward that particular behaviour, as well as how they feel others will perceive them if they carry out that behaviour.

The components of the equation were examined in more detail by Miller (2005), who asserted that attitude is made up of an individual’s beliefs about a particular behaviour and these are weighed up by evaluations of such beliefs. In terms of subjective norms, here the individual takes into account the influence of others on their behavioural intention, for example what peers may think about that particular behaviour. Lastly, behavioural intention is the result of attitudes and subjective norms towards that specific behaviour; actual behaviour is predicted by behavioural intention.

Many researchers have proven that the theory is effective in predicting human behaviour (Lin, 2005). There have been some criticisms of this theory, however, since despite having demonstrable benefits there are some notable limitations. One such criticism is that the theory applies only to those behaviours that have been thought out consciously before taking place. TRA does not account for irrational behaviour, actions carried out as a force of habit, or any behaviour that has not been considered consciously. Additionally, in order for a particular behaviour to be predicted by TRA, there is a ‘problem of correspondence’ – in other words, intention and attitude must agree on target, action, time frame, context and specificity. The theory is also limited as it relies on self-report measures in terms of analysis of participant attitudes (Abdulhafez & Gururajan, 2008).

2.6.2 Technology Acceptance Model

The Technology Acceptance Model (TAM) has been developed to predict and explain behaviours specifically related to technologies (Davis, 1989). This theory came from Fishbein and Ajzen’s (1975) Theory of Reasoned Action, and has been subject to several revisions and extensions including UTAUT, TAM2, and TAM3. In TRA, an individual’s attitude towards and subjective norms regarding a certain behaviour have an impact on their behavioural intention (Ajzen &

Fishbein, 1980). As defined by Ajzen and Fishbein (1980, p.6), an individual's attitude towards a behaviour is 'the individual's positive or negative evaluation of performing the behaviour', while subjective norms are said to be 'the person's perception of the social pressures put on him to perform or not perform the behaviour in question'. As well, both of these factors are a function of a person's beliefs, with attitude being attitudinal and subjective norms being normative. It is worth noting that while subjective norms and attitudes are not independent, if an individual perceives a degree of social pressure then this may conflict or coincide with their attitudes.

TRA provides that an actual behaviour is carried out based on the construct of the individual's intention. The technology acceptance model, then, asserts that the actual use of a technology – the behaviour – is influenced by the individual's intention to use that technology, for example, an e-library. A major objective of the TAM is to provide a foundation for tracking the effects of external factors on internal attitudes, intentions and beliefs, to therefore enable researchers and practitioners to determine the reasons why a technology may be inappropriate and take steps to remedy this (Davis, 1989). The two key components of the TAM are 'perceived ease of use' and 'perceived usefulness'. Davis (1989) describes perceived ease of use as "the degree to which a person believes that using a particular system would be free from effort", and perceived usefulness as being "the degree to which a person believes that using a particular system would enhance his or her job performance" (p.320). Principally, the main hypothesis of the technology acceptance model is that attitudes and perceived usefulness have a significant impact on an individual's behavioural intentions, with perceived usefulness and perceived ease of use having a significant effect on attitudes, and perceived ease of use directly influencing perceived usefulness (Figure 2.11).

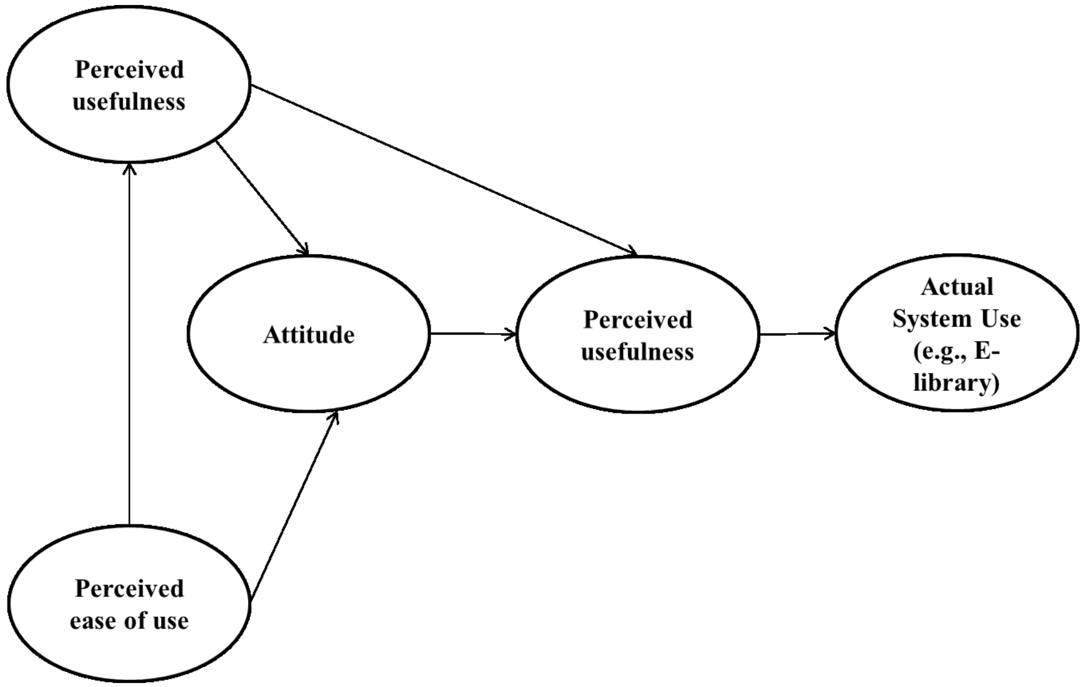


Figure 2.11 *Technology Acceptance Model*

(Source: Davis, 1986)

The technology acceptance model is the most commonly used and widely accepted model for use in the field of technology adoption and acceptance (Conklin, 2006; Hong et al., 2002; Lin, 2005). It has also been asserted by Sandberg and Wahlberg (2006) that the TAM is particularly useful for research into IT acceptance as it can be utilised in numerous contexts and settings, such as internet usage behaviours, internet banking, online shopping, gaming, online learning, and digital libraries.

Thong et al.'s (2002) research revealed that perceived ease of use and perceived usefulness are both determinants of students' acceptance of digital technologies. For digital library technology, perceived ease of use is affected by interface characteristics as well as individual differences, and both perceived ease of use and perceived usefulness are impacted by organisational context.

A further study by Hong, Thong, Wong and Tam (2002) utilised the TAM framework to study the determinants of user acceptance (again, of digital libraries) through the critical examination of two external variables, namely system characteristics and individual differences. The findings were that these two external variables were significant determinants in terms of users' perceived ease of use of the digital technology. In addition, it was revealed that both perceived usefulness and perceived ease of use were significant antecedents of users' intention to use the digital technology. Content based system characteristics, as another external variable, had more of an effect than interface-based system features on perceived usefulness. The research by Hong et al. (2002) was user-centred rather than focusing primarily on the technology, showing that user acceptance is a key determinant for actual usage of the technology.

In the context of electronic library usage, Ramayah and Bushra (2004) investigated the role played by self-efficacy among Malaysian public university students. The authors applied 'self-efficacy' as an external variable to the TAM constructs of perceived usefulness and perceived ease of use. The study findings were that there was a significant direct impact from self-efficacy on perceived ease of use and perceived usefulness in terms of electronic library usage. Additionally, self-efficacy, perceived usefulness, and perceived ease of use all had significant direct impacts on e-library use. It was also found that self-efficacy is fully mediated by perceived ease of use in the e-library context, and perceived ease of use was fully mediated by perceived usefulness when predicting the usage of e-libraries.

There are a number of limitations to the TAM, however, that must be acknowledged. The most common complaint about the model is that it relies heavily on respondents' self-reporting, and as a result the model depends on the assumption that self-report measures are accurate enough to build results on (Sun & Zhang, 2006). Another issue is that it is challenging to generalise findings taken from samples often taken for studies that focus on specific professionals and/or from students in the university community. There is also limited guidance, as the TAM model has not been given sufficient attention in terms of its core concepts. There is no means for providing tips or feedback in terms of how TAM can be improved so that adoption can be improved, for example integration, flexibility, information currency, or completeness of information (Sun & Zhang, 2006; Venkatesh et al., 2003). Further criticism has included the model's poor explanatory power and the inconsistent nature of its constructs' patterns and relationships (Sun & Zhang, 2006).

2.6.3 Motivational Model

The motivational model was an expansion of Self-Determination Theory by Al-Qeisi (2009) which became the Hierarchical Model of Motivation. Many studies in psychology carried out over a number of years led to the development of this model to describe human behaviour, and was adapted for use in technology adoption studies by Davis et al. (1992) in order to explain technology acceptance. The model considers motivation and self-determination theory to be on the same continuum, with motivation operating across three distinct levels: the situational (state) level, the contextual (domain) level, and the global (personal) level.

There are two main constructs to the motivational model. Firstly, extrinsic motivation is based on the assumption that technology use in the workplace will have the support of anticipated or expected reward, for example a bonus or a pay rise, as long as the technology is deemed useful in meeting these objectives. Secondly, intrinsic motivation is based on the likelihood that use of the new technology will be enjoyed by the user, no matter whether the objectives are met or not (Manzari, 2008).

2.6.4 Theory of Planned Behaviour

Ajzen's (1985) theory of planned behaviour (TPB) was based on the foundations of the Theory of Reasoned Action. The model hypothesises an individual's intention to carry out a certain behaviour in relation to that behaviour's most immediate or important determinant (Ajzen, 1991). Generally speaking, the TPB posits that attitudes, perceived behavioural control, and subjective norms impact on behavioural intention (Ajzen, 1991). Perceived behavioural control is defined as the 'factors [that] influence an individual's decision through that person's perception of how easy or difficult it would be to perform a behaviour' (Ajzen, 1991, cited in Teo, 2014, p.28).

TPB hypothesises that an individual's behaviour occurs from salient beliefs related to the behaviour, and where these beliefs are perceived as the most important determinants of action and intention. These salient beliefs, or antecedents, include behavioural beliefs that have an impact on behaviour, normative beliefs that have an impact on dominant subjective norms, and control beliefs that have an impact on the power of the perceived behavioural control. In addition, it is possible that another salient construct, actual behavioural control, may directly influence behaviour as well as perceived behavioural control (Ajzen, 1991).

As a theory, TPB makes the assumption that the importance of each determinant – attitude, subjective norms, and perceived behavioural control – hinges on the extent to which it influences the individual's intention to carry out the behaviour itself. However, in this theory, the degree of direct dependence of the behaviour on perceived behavioural control (as opposed to indirectly through intention) is also hypothesised, as depicted in Figure 2.12. This moves away from the notion that intention is the only immediate, significant determinant of action.

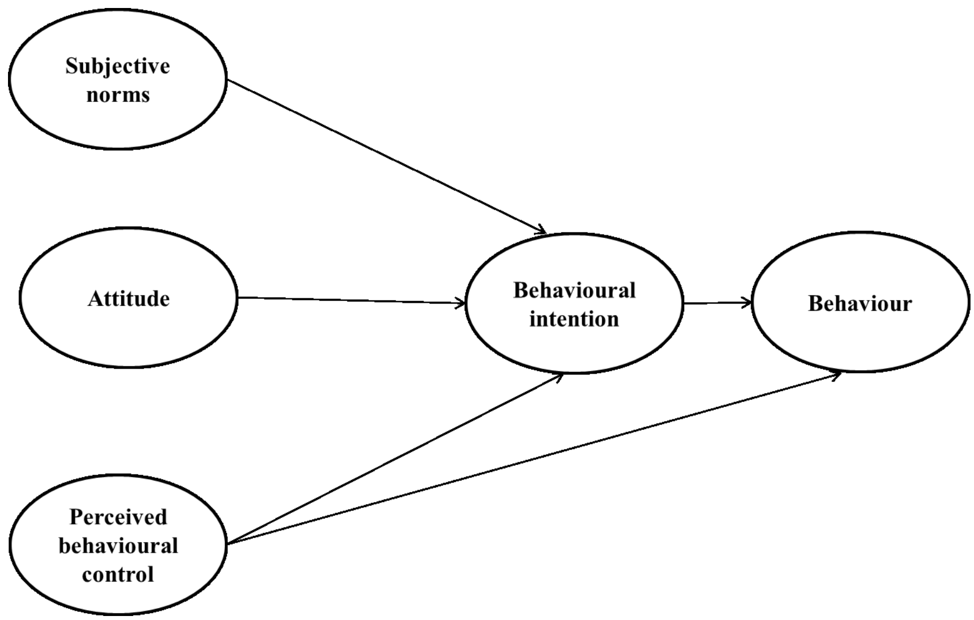


Figure 2.12 *Theory of Planned Behaviour*

(Source: Ajzen, 1985)

The Theory of Planned Behaviour has faced criticism for its weaknesses, particularly in that TPB fails to address the variables of perceived moral obligation, habit, and self-identity; these variables have often been found to predict behaviour and intentions (Eagly & Chaiken, 1993). A further aspect of TPB is that it explains the characteristics of adoption at the individual rather than the organisational level of analysis (Gururajan, Hafeez-Baig, & Gururajan, 2008). Consequently, it has limited utility in the case of adoption based principally on organisational units (Ajzen, 1985, 1991).

2.6.5 Decomposed Theory of Planned Behaviour

Taylor and Todd (1995) designed the Decomposed Theory of Planned Behaviour (DTPB) as an extended version of TPB, which itself was an augmented version of the TRA, by decomposing the main aspects of TPB and including constructs from Diffusion of Innovation Theory (DOIT) to make more detailed components (Pavlou & Fygenson (2006). The three main constructs of TPB are decomposed into variables or sub-constructs in the DTPB, as follows:

- Attitude – decomposed into ‘compatibility’, ‘perceived usefulness’, and ‘perceived ease of use’
- Subjective norm – decomposed into ‘supervisor’s influence’ and ‘peer influence’
- Perceived behavioural control – decomposed into ‘self-efficacy’, ‘technology facilitating conditions’, and ‘resource facilitating conditions’ (Al-Qeisi, 2009).

Taylor and Todd (1995) submitted that an advantage of DTPB is the ease with which it can be used in different conditions. Moreover, from a decision-making perspective, DTPB has greater significance in the establishment of definite aspects that result in technology adoption and usage (Hernandez & Mazzon, 2007). This is accomplished by DTPB by further decomposing the three principal aspects that affect intention into more definite elements (Tan & Teo, 2000).

The DTPB provides better predictive power than either TPB or TAM due to the inclusion of several belief constructs based on theory, for example the decomposition of subjective norms to describe the social influence that may affect the intention of an individual to utilise technology, for example, the influence of supervisors and peers in the context of a university, and the addition of resource and efficacy factors under the ‘perceived behavioural control’ aspect (Tan & Teo, 2000; Taylor & Todd, 1995).

2.6.6 Combined TAM and TPB (C-TAM-TPB)

The C-TAM-TPB model is a combination of the predictors of TPB and TAM’s perceived usefulness, resulting in a hybrid model (Taylor & Todd, 1995, cited in Lin et al., 2002). The TPB and the TAM are key models for helping to explain technology acceptance and adoption decisions, and these are adaptions of the Theory of Reasoned Action. The combined model incorporates the strengths of both earlier models (TAM and TPB), which are compatible with one another and which complement each other's predictive and explanatory power.

The idea of integrating different models to enhance the results of a study has run through a significant amount of research, which Lin et al. (2002) sought to synthesise for a deeper understanding of combining models. The authors concluded that proper integration of different models' constructs does indeed result in more detailed explanations of technology acceptance and adoption decisions among organisations and individuals. Taylor and Todd (1995) assert that the addition of two factors from the TPB model – perceived behavioural control and subjective norms – into the TAM model has meant that key determinants of IT usage can be tested more effectively. For this reason, the C-TAM-TPB hybrid model was developed and used with effective results within the field of social psychology.

2.6.7 Model of PC Utilisation

The model of PC utilisation (MPCU) was born out of the lack of synthesis or agreement between various disciplines in explaining the relationship between values, attitude, and other acquired behavioural inclinations. This model, according to Triandis (1979, cited in Al-Qeisi, 2009), is able to describe how behaviours actually take place and also accounts for the variables associated with inducing behaviour in humans. Studies have shown that MPCU is the most appropriate model to use for understanding and explaining the use of computer technology in a voluntary setting. The model has the ability to predict behaviours relating to information technology usage, specifically those adapted for PC use. This model consists of five primary constructs, namely 'affect towards use', 'long-term consequences', 'job fit complexity', 'facilitating conditions', and 'social factors'. The attributes of this model also make it very useful in predicting an individual's technology acceptance and usage (Manzari, 2008).

2.6.8 Social Cognitive Theory

Social cognitive theory (SCT) is based on the social foundations of people's actions and thoughts. The theory was derived from social learning theory, an idea first put forward by Miller and Dollard (1941) who established the principle of learning through 'models'. SCT was developed by Bandura (1986), who took aspects from social learning theory and expanded on them by introducing key concepts such as self-efficacy, reciprocal determinants, and the notion that temporal variations in time lapse can take place between a cause and an effect (Bandura, 2005).

The theoretical perspectives of SCT provide that the functions of an individual are the result of a dynamic interrelationship between environmental influences and personal behaviour. The theory also emphasises that the ability for an individual to construct reality, encode information, self-regulate and carry out behaviours are influenced entirely by cognition (Bandura, 1986). Furthermore, SCT incorporates several important determinants of behaviour, including personal self-efficacy, affect, outcome expectation, and anxiety (Manzari, 2008).

There are a number of key factors that both regulate and motivate established social, cognitive, and behavioural skills. One of these factors is 'reciprocal determinism', which states that human behaviour is the result of dynamic, reciprocal and triadic interaction of personal factors, environment, and behaviour. Other key factors are 'forethought', 'self-reflective capability', and 'vicarious capacity'. Social cognitive theory links adoption decisions with incentive motivators, and these motivators can be categorised into three forms: social, material, and self-evaluative. Bandura (2001) links SCT with DOIT and highlights that the relationships between the psychological determinants of adoption behaviour, the network structures that give the social pathway of influence, and the characteristics of innovations that may help or hinder adoption are the best way of explaining and demonstrating the link between DOIT and SCT.

2.6.9 Unified Theory of Acceptance and Use of Technology

The Unified Theory of Acceptance and Use of Technology – UTAUT – is most frequently used in studies investigating the reasons why people choose to adopt or choose to reject an information technology (Gruzd et al., 2012). The model was established by Venkatesh and colleagues (2003) after the comparison and testing of the eight previous technology acceptance theories mentioned above: the theory of reasoned action, the motivational model, the technology acceptance model, the theory of planned behaviour, the combined TAM and TPB, innovation diffusion theory, social cognitive theory, and the model of PC utilisation. Each of the models were assessed and compared so that their strengths and limitations became clear. Following this, certain constructs were chosen as the key components that make up UTAUT (Venkatesh et al., 2003). The four core concepts of UTAUT are Effort Expectancy, Performance Expectancy, Facilitating Conditions, and Social

Influence (Figure 2.13). All of these constructs are direct determinants of behaviour and acceptance of a technology by users. The model also incorporates four moderating variables, namely age, gender, experience, and voluntariness (Venkatesh et al., 2003).

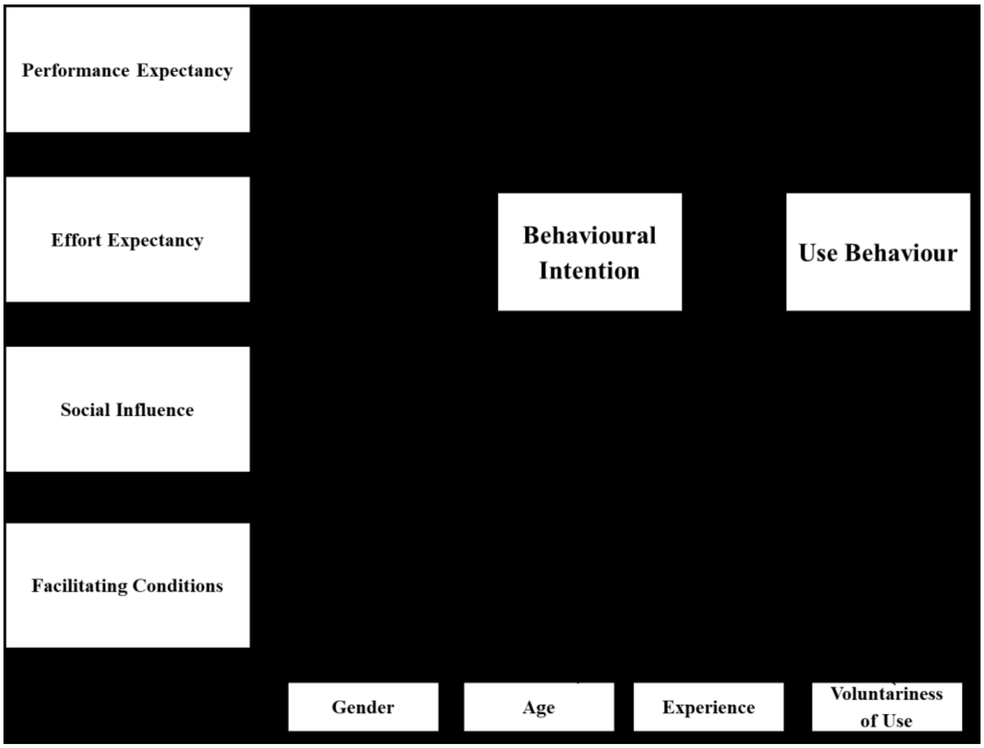


Figure 2.13 *Unified Theory of Acceptance and Use of Technology*
(Source: Venkatesh et al., 2003)

The following sections present further detail about each of the model's constructs.

2.6.9.1 Performance Expectancy

Venkatesh et al. (2003, p.447) define Performance Expectancy as "the degree to which an individual believes that using a system will help him or her to attain gains in job performance". There are five minor constructs within the main Performance Expectancy component, all of which have been taken from other models. These are extrinsic motivation, perceived usefulness, relative advantage, job-fit, and outcome expectations. As also pointed out by Venkatesh et al. (2003), age and gender are moderators of the relationship between intention and Performance Expectancy. In terms of gender, men have a tendency to accept a new technology more quickly than their female counterparts (Minton & Schneider, 1980). For age, prior studies have demonstrated that age plays no significant role in IT usage, although older users are generally less accepting of new information systems and do not have the same perception of usefulness when using them (Burton-Jones & Hubona, 2005). It has been suggested by Levy (1988) that any research carried out on gender or age should be carried out in parallel, as studies into gender differences have a tendency to be rather deceptive if age is not taken into account as well. Age and gender might therefore result in higher or lower values for Performance Expectancy for certain types of IT.

2.6.9.2 Effort Expectancy

Venkatesh et al. (2003) define Effort Expectancy as "the degree of ease associated with the use of the system" (p.450). In this model, three concepts have been designed using existing models that are concerned with Effort Expectancy: ease of use (taken from IDT), complexity (from MPCU), and perceived ease of use (from TAM and TAM2). It has been suggested that females are more anxious to use new information systems (Venkatesh et al., 2000), which in the present study, concerns e-libraries. Women appear to be more concerned about the new technology's ease of use. In addition, older people seem to struggle more with the retrieval of information, and this is exacerbated as the individual becomes older (Morris & Venkatesh, 2000). Another factor that moderates Effort Expectancy is experience of use. The longer an individual uses a technology, the more their confidence increases (Venkatesh et al., 2003). Therefore, behavioural intention is influenced by effort expectancy, but this is moderated by age, gender, and experience.

2.6.9.3 Facilitating Conditions

Facilitating Conditions are defined by Venkatesh et al. (2003) as "the degree to which an individual believes that an organisational and technical infrastructure exists to support the use of a system" (p.453). The factor of Facilitating Conditions is taken from three constructs: facilitating conditions (taken from MPCU), perceived behavioural control (from TPB/DTPB, C-TAM/TPB), and compatibility (from IDT). The moderating factors for Facilitating Conditions include age and experience, at least with regards to IT usage. Older users tend to place importance on receiving help while at work (Hall & Mansfield, 1975). If there is sufficient help available to users from their organisations, the number of different types of technology increases (Bergeron et al., 1990).

2.6.9.4 Social Influence

Social Influence has been defined as “the degree to which an individual perceives that important others believe he or she should use the new system” (Venkatesh et al., 2003, p.451). This factor is found in TAM2, TRA and TPB/DTPB as a subjective norm, in IDT as an image, and in MPCU as a social factor (Venkatesh et al., 2003). Age, gender, experience and voluntariness all moderate the influence of social behavioural intention. As highlighted by Venkatesh et al. (2003), the effect can be significant, particularly in mandatory settings, among senior females, and during the initial stages of experience.

Studies investigating technology acceptance commonly make use of the UTAUT model. UTAUT was created through the combination of the most appropriate components of existing theoretical models, and as such it is now perceived as the most suitable for describing and predicting individual’s usage intentions (Venkatesh et al., 2003). The UTAUT model is applied in studies across a range of disciplines. The model was utilised by McKenna et al. (2013) along with the theory of organisational services to assess the ways in which individuals perceived and adopted IT-based services related to travel, including obtaining locations and directions and purchasing tickets. Both of the theories were used to firstly create a software artefact and then explain how the system should be developed based on the constructs of UTAUT. The UTAUT model has also been used to investigate the academic community and how they respond to technologies. Gruzd et al. (2012) researched the adoption of social media among academics, focusing on their information dissemination and communication behaviours. The objective of the study was mainly to investigate the ways in which scholars utilised social media to communicate information among each other, using the UTAUT model to analyse this usage behaviour. The results of the study showed that Social Influence and Performance Expectancy supported the scholars’ intention to use social media. On the other hand, the variables of Facilitating Conditions and Effort Expectancy negatively affected the academics’ intention to use social media.

In addition to this, UTAUT has been used in studies of libraries. For example, the model has been adopted in research regarding university students and their interest (or lack thereof) in using digital library systems. Rahman et al. (2011) looked into the influencing factors on intention to use digital libraries by Malaysian postgraduate students, and the findings indicated that both Effort

Expectancy and Performance Expectancy do indeed impact positively and significantly on intention to use digital libraries. However, age and gender have no significant impact on behavioural intention, and there was no difference found in the study between female and male students' behavioural intention to use digital libraries. Age also does not appear to have an effect on students' perceptions of the system, as both younger and older students perceived the online libraries as being quite hard to use.

Research carried out by Feldstein and Martin (2013) has a specific focus on the e-book context. Here, the adoption patterns exhibited by university students towards e-textbooks are examined. The UTAUT model is used to investigate the adoption process, and the study results show that gender has an impact on the students' attitudes; male students in this study were found to perceive e-textbooks as being less useful compared to the female students. The results further support the notion that UTAUT is a suitable and relevant model to use in the study of technology adoption and use.

2.6.9.5 UTAUT 2

The UTAUT2 model (Venkatesh, Thong, & Xu, 2012) is an extension of UTAUT and was developed based on findings from studies utilising UTAUT. This model encompasses seven aspects that could motivate users to accept new technologies, namely Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Price Value, and Habit. Three moderating variables are included in the UTAUT2 model: age, gender, and experience (Figure 2.14).

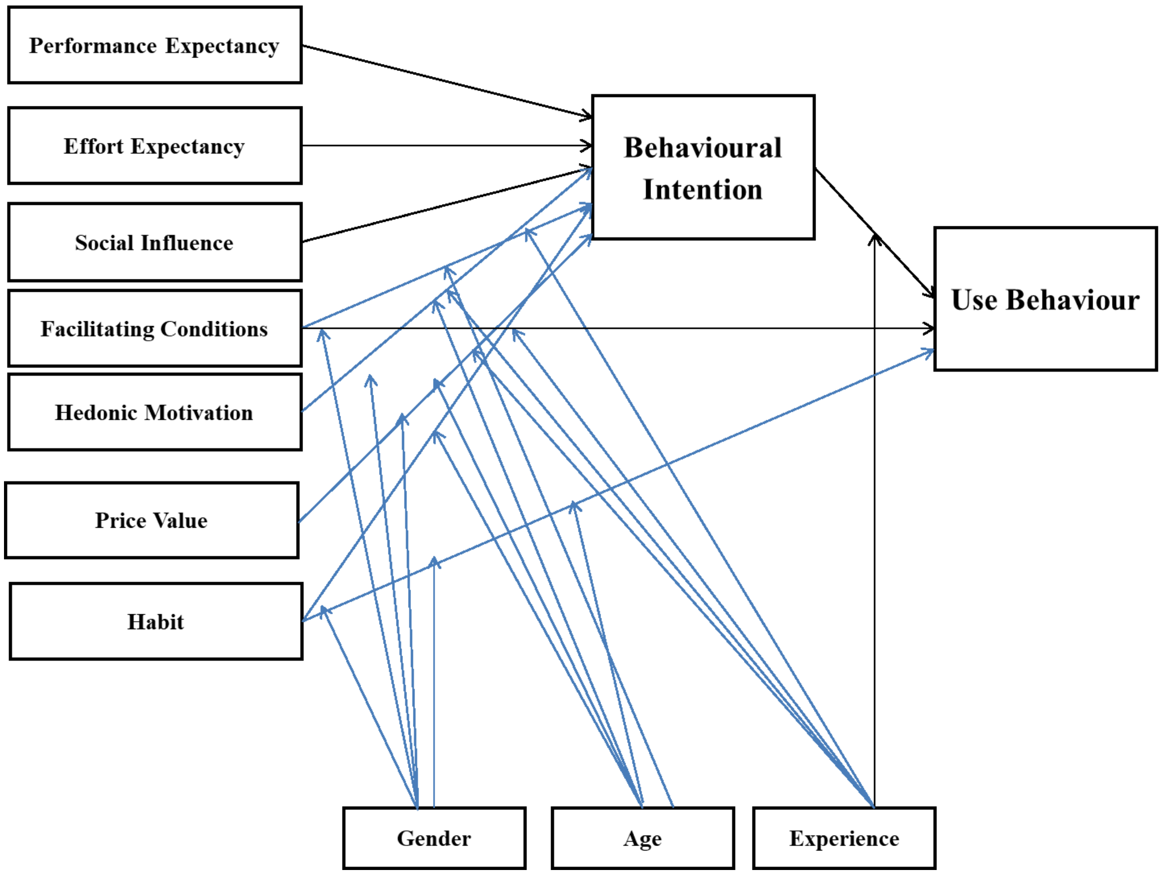


Figure 2.14 *UTAUT2*

(Source: Venkatesh et al., 2012, p.160)

2.6.10 Comparing the Theories of Technology Adoption

The preceding review of relevant literature revealed that there were a number of potentially suitable theories concerning users' acceptance of new technology. However, the four most appropriate, influential, and popular theories for investigation into information technology and information systems acceptance were found to be as follows:

- Theory of Reasoned Action (TRA): This has foundations in social psychology, and is useful for describing the relationship between an individual's attitudes and behaviour. In this theory, an individual's behavioural intention is impacted by their attitudes towards that behaviour, along with subjective norms (Fishbein & Ajzen, 1975); e.g. if someone believes that a certain system will benefit them, they will be more likely to use it (Samaradiwakara & Gunawardena, 2014).

- Technology Acceptance Model (TAM): The TAM was also derived from the TRA. The model was developed by Davis (1989) with the intention of enabling the prediction of user acceptance of IT/IS, and for gaining a deeper understanding of the reasons for users' acceptance or rejection of IT. The theory assumes two determining factors on behavioural intention to use a new IT, namely perceived ease of use and perceived usefulness.

- Theory of Planned Behaviour (TPB): This is an extension of TRA. TPB incorporates another construct – perceived behavioural control – as a variable related to behaviour and intention. A person's intentions do not always result in actual behaviour (Ajzen, 1991); therefore, the addition of this third determinant can lead to more precise explanations and predictions of human behaviour in terms of technology acceptance and use.

- The Unified Theory of Acceptance and Use of Technology (UTAUT): Venkatesh et al. (2003) developed UTAUT in order to compile a single, unified theory for use in describing technology acceptance. Eight existing models used in the technology acceptance field were reviewed and some of their concepts integrated into the new model. Concepts were used from: The Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB), the Technology Acceptance Model (TAM), the Motivational Model (MM), the Combined TAM and TPB (C-TAM-TPB), the Model of PC Utilisation (MPCU), Innovation Diffusion Theory (IDT), and Social Cognitive Theory (SCT). The resulting model, UTAUT, comprises four main constructs: Effort Expectancy, Performance Expectancy, Facilitating Conditions, and Social Influence. Each of these constructs is moderated by age, gender, experience, and voluntariness of use.

- UTAUT2: Venkatesh et al. (2012) added hedonic motivation, price value, and habit to UTAUT. These extensions were found to produce a considerable enhancement in the variance related to behavioural intention.

All of the aforementioned theories have their own unique attributes and all have the same aim of explaining and describing the phenomenon of technology acceptance among a wide range of contexts. Nevertheless, it is vital to make a comparison between them to find the most suitable theory for explaining individual technology acceptance behaviours. Such a comparison was carried out by Samaradiwakara and Gunawardena (2014), who sought to gain a clearer understanding of the theories. The authors found that UTAUT was the theory with the greatest explanatory power, suggesting that this model was better than the others in terms of explaining behavioural intention to use technology. To sum up, the UTAUT model has many fitting attributes for use in the current study. These include the fact that the theory was created after the critical review of eight other technology acceptance theories and the most appropriate constructs from each were integrated into UTAUT. Moreover, several experiments have tested UTAUT and validated it as a model. Lastly, the model has been utilised successfully in many recent studies (e.g. Awwad & Al-Majali, 2015; Chang, 2013, 2014; Morris & Venkatesh, 2000).

After the review and consideration of various studies which have used UTAUT, it is clear that this model is the most suitable for application in the present study with suitable extensions (please see the Conceptual Framework of the study in Chapter 3 for more details). An extended UTAUT will enable the researcher to obtain a rich and detailed understanding of UDL and Google Scholar use and acceptance among international postgraduate students in Manchester universities. It must be noted again that the principal objective of this study is not to identify and compare the factors which affect the adoption of these two technological systems through a scrutiny of international postgraduate students' perspectives.

2.7 Previous Research on Students' Usage of Digital Knowledge Resources

2.7.1 Information Seeking Behaviour

Information seeking behaviour has received considerable attention from researchers. However, their areas of focus varied considerably. For instance, a study by Sheeja (2010) scrutinised the information-seeking behaviour of research scholars from the scientific and social science fields from the perspectives of service effectiveness, levels of satisfaction with various kinds of resources, and different approaches utilised to remain current in their research. Sheeja (2010) found that while there were similarities in the information seeking behaviour of the research scholars, there were significant differences in their perceptions related to the adequacy of the library database and print journals. Overall, the study drew attention to the inadequacy of their university libraries in helping research scholars remain current with regard to the most recent happenings in their fields. In the context of the present study, this finding indicates the relationship between successful information seeking and perceptions of effectiveness of a library.

Jamali and Asadi (2010) provided another insight when they reported that academics (students, faculty members, and research staff) preferred to utilise search engines such as the Google search engine and web searching for information seeking. Another perspective on examining students' information seeking behaviour was found in a study of graduate students at Tehran University by Khosrowjerdi and Iranshahi (2011) who scrutinised their information seeking behaviour and previous knowledge and found that the relationships between these two variables were positive and robust. Furthermore, positive and significant associations were found between some facets of information seeking behaviour and some of previous knowledge (e.g., familiarity, proficiency, and previous experience).

A further perspective was provided by Orlu (2016) who, using a descriptor-explanatory design, attempted to understand the emotions responsible for the search for information. Orlu (2016) found that information seeking behaviour among postgraduate students was largely systematic, though random behaviour was also evident, typically in the phase of planning. Overall, the findings of this study confirmed that Kuhlthau's (1991) model was followed by many students. In other words, their search at the planning stage lacked a well-defined focus. Moreover, the study found that emotional responses to search can trigger nervousness, anxiety, and bewilderment. This perspective was further explored by Orlu, Mafo, and Tochukwu (2017) in a later study which continued with the scrutiny of emotions in the information seeking behaviour of students at Manchester Metropolitan University (MMU). Using a similar descriptor-explanatory design, the researchers found confirmation for prior observations related to the emotional reactions to the process of search in the preliminary phases. These phases are intricate due to the students' doubts related to the topic and the ambiguity of their ideas. Moreover, it is in this phase that students validate their information need, which takes place by means of the identification of the gap in research and the search for contextual information. The anxiety at this stage arises from the ambiguity concerning the non-specific information search.

The role of language in information-seeking strategies was investigated by Sabbar and Xie (2016) who reported that language has a significant role to play in the information-seeking strategies of users particularly those who depend on sources that are not in their native language. The participants of this study utilise various non-English languages across different disciplines. Sabbar and Xie (2016) identified various search strategies including formal system strategies (four), informal resource strategies (seven), interactive human strategies (four), and a hybrid strategy. Formal strategies are associated with the prescribed bibliographic devices wherein search tactics related to information retrieval are utilised together with different sources. On the other hand, information resource strategies encompass strategies conventionally associated with print sources such as citation tracing; browsing; and employing bibliographies, indexes, and search aids that are unvarying. Interactive human strategies involve consulting with individuals either as a direct resource or as an intermediary. The hybrid strategy indicated by Sabbar and Xie (2016) refers to the strategy of using an inter-library loan to request an item to be obtained from another library and may entail the filling out of a form (online or paper), sending an email, or conversing with library staff. Sabbar and Xie (2016) found that informal resource, formal systems, and interactive human strategies were frequently selected as preliminary information-seeking strategies. Informal strategies also were frequently the final strategy utilised by the subjects. Moreover, the study found that the subjects shifted between strategies in scheduled, disturbing, and challenging circumstances. Interestingly, the most common formal system strategy was using a search engine to search the Web, which is in line with the context of the present study. This would indicate that international postgraduate students demonstrate a preference to use GS to search for information.

Overall, it could be seen that research on information seeking behaviour in the context of students drew attention to the influence of discipline (e.g., Sheeja, 2010), previous knowledge of the information seeker (e.g., Khosrowjerdi & Iranshahi, 2011), the emotions underlying the search for information (e.g., Orlu, 2016; Orlu et al., 2017), and language (Sabbar & Xie, 2016), among possible others, on the information seeking behaviour of students. In the context of the present study, these factors appear to correspond to the context of the participating international postgraduate students who possibly differ in their study discipline, are at different levels of prior knowledge, are presumably subject to emotions during the information search, and are from different native language backgrounds. Moreover, there are indications that students find academic libraries to be an inadequate resource for information seeking (Sheeja, 2010) and often rely on search engines and web searches for information (Jamali & Asadi, 2010).

2.7.1.1 Student Use of E-Libraries and Web Search Engines

A study by Hirsh (2014) highlighted the mission of the e-library, suggesting that it is a provider of information services and resources, which supplement the students' effort for meeting their research objectives and learning needs while facilitating staff in their teaching practices. In the same context, Islam and Habiba's (2015) research on the e-resources at a private university in Bangladesh demonstrate that the students and faculty were satisfied, in general, with the present level of e-resources. However, significant constraints were the inadequate number of titles, problems in locating information, restricted access to computers, and sluggish download speeds. Similarly, Shuling (2007) assessed the usage of electronic resources in Shaanxi University of Science and Technology. The results of the study revealed that about 80% of the students had limited knowledge of the electronic resources. Moreover, about half of the students used both print and electronic sources. In a study of a private university in Bangladesh, Mostafa (2013) found that e-resources were commonly used in the university and that a significant proportion of the students were dependent on their usage to obtain relevant and necessary information. Mostafa (2013) also found that the existing facilities in the library pertaining to its infrastructure were inadequate for supporting optimised use of e-resources.

A study set in Ankara University by Turan and Bayram (2013) scrutinised the perceptions and habits of 280 students from three different faculties (Letters, Pharmacy, and Veterinary Medicine) to identify the purpose of usage, frequency of usage, and tools utilised with regard to the digital library. The results of the study indicated that the students utilise internet resources for their assignments. However, the digital library was not considered to be their first preference. One of the core reasons for not adopting a digital library is the paucity of awareness regarding the digital library. Another reason for the lack of adopting a digital library is that students find their own resources adequate for their understanding and research.

With regard to e-resources, a study of 182 students from Jimma University, Ethiopia, by Natarajan (2017) showed that the use of e-journals had increased due to the students' awareness of e-resources and services, but that this was accompanied by a decrease in visits to the library.

Moreover, there was a need for students to be instructed about different search strategies. Further, students' usage of e-journals could be hindered by slow downloads, leading to a need for increased availability of computer systems and enhanced internet speeds. Sohail and Ahmad (2017) conducted a comparative assessment of e-resource and services used by Fiji National University students and faculty members. In the study, the majority of the participants reported awareness of advancements in electronic resources and their appropriate usage in the fields of academia and research. The study identified users' problems in the use of e-resources and services, including insufficient IT infrastructure and website blockage. Sohail, Maksood, and Salauddin (2019) compared the use of electronic journals by postgraduate students and research scholars from the Faculties of Science of the Delhi and Jamia Millia Islamia Universities, India. This study found that the students from Delhi University were more satisfied with e-journals and e-databases in their library than those from Jamia Millia Islamia. The study also found problems with e-journals, including insufficient IT infrastructure and speed of download. It would seem, thus, that infrastructure, particularly internet speed, is a significant factor in the usage of e-resources.

In another study, Kwadzo (2015) examined the usage and awareness level of electronic databases in the University of Ghana by graduate students. The results of the study indicated that the awareness level of students towards the databases available in the universities was high. Moreover, lecturers were the primary source to direct students to the available databases. Nevertheless, the students focused on few databases. Kwadzo (2015) suggested that librarians, specifically subject librarians, must increase the publicity of the databases so as to increase their familiarity with both faculty and students and consequently their usage.

Further, Perrusso (2016) tracked changes in reported research behaviour over time to explore whether reported source selections of students were related to instructions of librarians or to the source requirements of instructors. In this regard, a longitudinal study was conducted on a cohort of 2008 freshmen over four years regarding their use of websites and library resources (journal articles and books) for their research papers at a large public university. The findings of the study revealed that the frequency of the students' use of library resources increased as they matured. That is, students' utilisation of library resources increased due to the 'maturation effect', which signifies physical or emotional features such as diligence, motivation, or intellectual development. Moreover, the study revealed that faculty source requirements and librarian instructions were both related to the enhanced usage of library resources. That is, students were more likely to use library resources if instructed by the librarian or if required by their course instructors.

Again, Aba, Beetseh, Ogban, and Umogbai (2015) studied the use of internet services for research by postgraduate students in Francis Idachaba Library, University of Agriculture, Makurdi. The study found that while only 22% of the participants utilised the internet every day, 87.41% reported that their academic performance had been greatly enhanced by digital libraries. Moreover, more than half of the students (51.11%) reported that they utilised external internet facilities principally for educational and research activities. Further, the study found that the problems encountered in the usage of the digital library included the considerable time taken to display or download web pages and an insufficient quantity of computers. Moreover, the study found that internet usage had caused a reduction in the usage of conventional library facilities and that 94% of the students were full satisfied with the internet facilities. However, the majority of the students (92.96%) indicated that suitable guidance was required in the matter of e-resources usage.

Similarly, Ozonuwe, Nwaogu, Ifijeh, and Fagbohun (2018) evaluated the use of internet search engines among the staff and students of a Nigerian university. The results of the study show that there is extensive awareness of internet search engines as well as online resources among staff and students of the university. The major challenges influencing the use of the internet and search engines in the university include insufficient internet search skills, low internet bandwidth, and information overload. The study indicates that librarians and libraries must stop considering the search engines and internet as threats that have arisen to restrict their jobs. Rather, they must observe search engines as complementary to their jobs and arrange exhaustive search skills trainings for their users.

Salehi, Du, and Ashman (2018) identified the use of web search engines and personalisation in order to search information for educational objectives. It was deemed that students are increasingly using web search for educational objectives. The authors submitted that this was a matter of concern to providers of education as the disadvantages of web search and personalised information are not offset by the advantages. The study collected data from 120 university students regarding their information-seeking behaviour for educational objectives. The study found that the participating students used the Google search engine as their primary information-seeking tool.

Moreover, they highlight that personalised search results were not as relevant or satisfactory as non-personalised search outcomes. In the context of the present study, this finding is significant as UDLs offer the option to personalise searches, whereas a web search such as Google Scholar does not.

Based on an assumption that internet use may be more prevalent amongst graduate students than library use, Kumah (2015) compared the use of library and internet among students from the University of Ghana. It was found that graduate students used the internet more than the library. Nevertheless, the results indicate that the library was not bypassed by students in order to satisfy their information requirements. Rather, the students use both the internet and the library for information searching, even though they preferred to use the internet.

The studies reviewed in this section indicate that students did demonstrate an inclination to utilise e-resources. Nevertheless, they often chose to use generic search engines available on the internet over their libraries. Regardless, their usage of e-resources was frequently constrained by poor infrastructure, such as low speed internet and inadequate computers. Another facet revealed was that librarians and the faculty had a role to play in directing students to e-resources available at their libraries. Consequently, the importance of increasing awareness to a library's resources could be seen.

2.7.1.2 The University E-library and the International Postgraduate Student

Hughes, Cooper, Flierl, Somerville, and Chaudhary (2018), through an Australian-American case study, reported that the library has an essential role to play in supporting the transition of international students to existence and study at a university. Reflecting upon the usage of the libraries in the university in the context of international students draws attention to certain difficulties which they may face, including personal or study-related challenges in terms of language variation and unfamiliarity with the social and educational practices (Hughes, 2010). Moreover, the challenges experienced by international students are typically associated with lack of familiarity with the sociocultural conditions in which they find themselves and the university's academic and library practices, rather than any insufficiency in education (Hughes et al., 2018). The parameter of the difficulties of international students links to the usage of the library and interaction with the librarian and related staff. This difficulty can be categorised into three dimensions, namely the environment, linguistic-cultural, and affective (Kubanyiova & Crookes, 2016).

In the environmental context with regard to the university academic library, international students may be unaware of the academic library environment and its related processes and technologies (Hughes, 2010). This deficiency of the conceptual awareness of library can thwart their efforts for achieving the desired information source. Other than this, students may use a different pattern for searching which can lead them to a smaller or outdated version of the resource collected, or one that is regarded as a study hall or textbook repository, which may lack direct access to its resources or the retrieved items itself. For instance, educators mainly focus on helping students with the development of online search strategies to conduct academic activities. This also helps in exploring the conceptual patterns associated with typology of searchers' perceptions of their information retrieval skills (i.e., their searcher self-concept), along with the characterisation of different searches. Additionally, the library system used at the university will be new to recently joined international students. However, even early studies such as Jackson (2005), Liao, Finn, and Lu (2007), Mehra and Bilal (2007), among others, indicate that these international students possess general familiarity with computerised tools as well as searching on the internet. Contrary to this, studies (e.g., Liao et al., 2005; Mittermeyer, 2005; Weber, Hillmert, & Rott, 2018) highlight that these international students, indeed most students, may possess a low level of familiarity with online resources for academic information such as journal databases, and may adopt approaches which are basic or uncritical.

Secondly, considering the category of the linguistic-cultural dimension, international students often face difficulties related to their adjustment with the divergent linguistic and cultural practices, variant communication styles, nonverbal behaviour as well as different learning approaches (Lange, Canuel, & Fitzgibbons, 2015; Michalak & Rysavy, 2018). The expectation of the facilitators related to their critical and independent thinking abilities and selection of impactful information in assignments as a task that goes beyond the predefined text limit can also serve as an impeding factor (Hughes, 2010). They may also be unable to communicate with the library staff given their divergent social, cultural, or linguistics capabilities. Moreover, as these students have English as their second language or additional language, they may be reluctant to seek answers to their queries because of a lack of confidence or fear of embarrassment (Bennett, 2007). This also impacts their ability to, or frequency of, use of online information. The ambiguousness related to the librarian's role in terms of seeking information or believing that it is confined to the staff only and not students hinders their ability to interact, which eventually affects their information search. The change in the structure of language also causes difficulties for international students navigating through the library. For instance, students who are familiar with reading information from right to left or in the form of columns or in a different script may face difficulty when the library information source follows left to right structure, shelving arrangement or a different classification system, or might use numbers in Roman form or follow alphabetical sequencing (Mehra & Bilal, 2007).

The third dimension, affective, is related to the interconnectivity with the other dimensions such as environmental and cultural-linguistic. It encompasses the different size of the university library, unfamiliar practices, and technology (Hughes, 2010). This difficulty in accessing the library gives rise to a feeling of confusion, frustration, and anxiety (Noori, Tareen, & Mashwani, 2017).

2.7.1.3 Studies Using/Extending Wilson's Model of Information Seeking Behaviour

It can be seen that of the different models of information-seeking described in Section 2.4, one model stood out due to its emphasis on the individual in the context: Wilson's model of information-seeking behaviour. As will be discussed in Section 4.12, this model appeared, to the researcher, to be a suitable perspective to explore international postgraduate students' information seeking behaviour which potentially could influence their decision to utilise one of the technology systems being considered in this study – that is, UDLs and Google Scholar. Accordingly, this section scrutinises prior research which has used or extended Wilson's model to gain insights regarding the model's usefulness for the present study.

Laplante (2008) attempted to develop a deeper awareness of the music information-seeking behaviour in daily existence of young adults (aged 18-29 years). The most significant objective with regard to this study was the study's endeavour to reveal the tactics and resources utilised by young adults to uncover new types of music or new artists and the factors that motivate this population to become involved in information-seeking. Using a qualitative approach, Laplante (2008) created a revised version of Wilson's model of information behaviour (Figure 2.15) and this was utilised to direct the collection and analysis of data. Overall, the study's participants revealed a strong inclination for informal channels (for instance, friends, relatives, and colleagues) over experts (for instance, music store staff, reviewers, and librarians). Moreover, it emerged that passive behaviour was frequently the cause of music discoveries. On the other hand, active music seeking behaviour was rarely accompanied by a goal. Rather, the pleasure in the activity (the hedonic product) was often the stimulus to search for music instead of any definite need for information. Unsurprisingly then, browsing was a strategy very commonly used by the participants, indicating their preference for information seeking which was not driven by a goal.

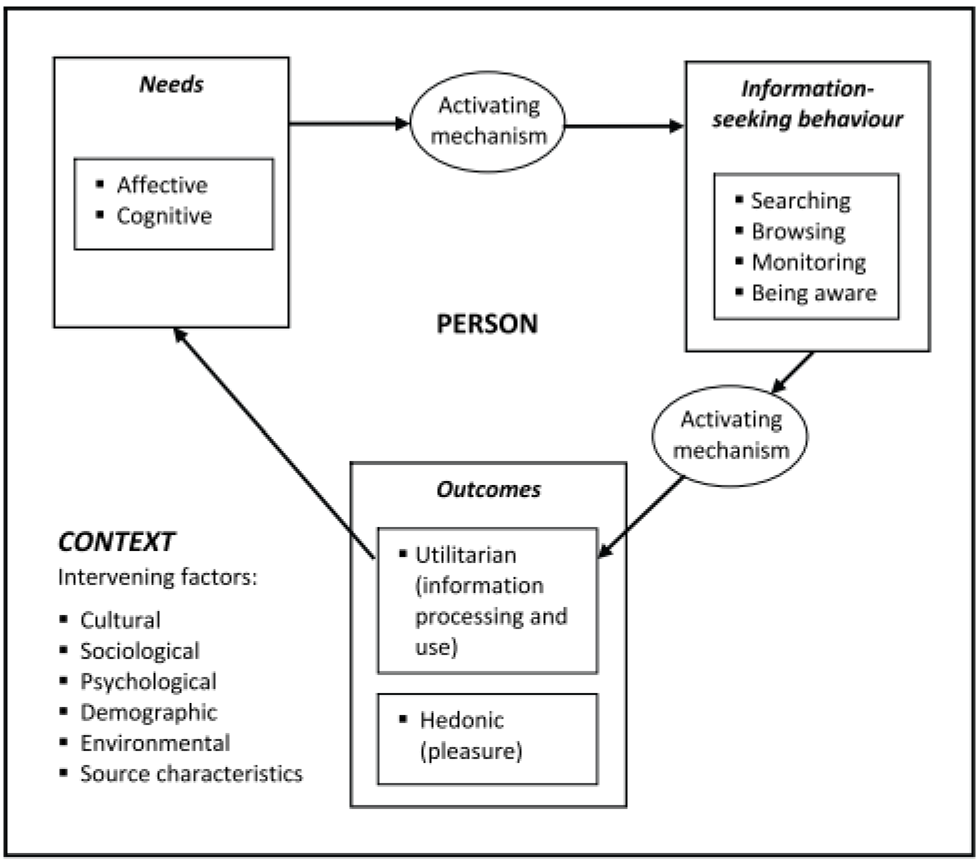


Figure 2.15 *Laplante's Revised Version of Wilson's Model of Information Seeking Behaviour (Source: Laplante, 2008, p.91)*

Laplante's study modifies Wilson's model by inserting an 'activating mechanisms' component between the information-seeking behaviour and the utilitarian outcomes stages of the model. Moreover, the intervening variables have been renamed as intervening factors and now comprise the context of the individual. A sociological factor replaces the role-related factor which is appropriate in the context of this study which is centred on international postgraduate students.

Further, the modes of information-seeking behaviour proposed by Wilson have been replaced by Bates' (2002) active/directed/passive/undirected modes of information seeking (Figure 2.16). 'Directed/Undirected' in the figure refers to whether or not an individual seeks definite information. On the other hand, 'Active/Passive' signifies whether anything is done actively by the individual to obtain information, or whether he/she absorbs information by being 'passively available' (Bates, 2002, p.4). The individual is placed at the centre of the model to re-emphasise that the information behaviour is considered from their perspective.

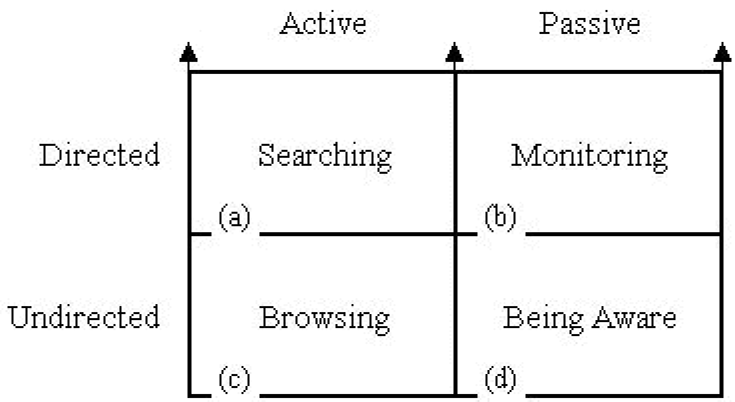


Figure 2.16 *Modes of Information Seeking*

(Source: Bates, 2002)

A quantitative study by Azadeh and Ghasemi (2016) aimed to investigate the information seeking behaviour of faculty members in an Iranian university (Payame Noor University – PNU) by using Wilson's model of information seeking behaviour without extension or modification. The model was believed to offer a "useful framework for thinking about the process of data collection in the field of research" (Azadeh & Ghasemi, 2016, p.30). Using quantitative data, the study found that, for faculty members, publishing a scientific paper was the most significant goal. In contrast, updating technical information was their least significant goal. Moreover, the participants were found to commonly utilise internet-based resources to satisfy their needs for information as the majority (57.7%) used online search engines (for instance, Yahoo, Google) to locate information resources. Moreover, Azadeh & Ghasemi (2016) concluded that proficiency in English, academic rank, and work experience were significantly related to the faculty members' information-seeking behaviour.

Another study by Majyambere (2015) set in the KwaZulu-Natal Province, South Africa, scrutinised the information-seeking behaviour of international (from different countries in Africa) postgraduate students (Humanities/Arts) from three public universities in the region and was informed by Wilson's model of information seeking behaviour. This study differed from the previous two studies scrutinised in this section in that it utilised a mixed approach incorporating qualitative and quantitative approaches. Majyambere (2015) found that the information needs of international postgraduate students were both personal and academic. Moreover, the principal information needs of the students were associated with the process of registration; purposes of education and research according to the university protocols; competency in English language as a medium of instruction; and computer skills and information literacy. A significant personal need was accommodation and this could impact the academic studies of international students who were not staying in the campus, as this limited their access both to library facilities and the usage of the campus internet services. On the other hand, the various information sources utilised by the participating students to meet their information needs included library resources and services, and the internet. Moreover, in line with Wilson's model, the students' information-seeking behaviour was both active and passive. However, their choice of behaviour varied with their needs. For instance, they engaged in actively consulting with supervisors and subject librarians for guidance related to their research projects and assistance in searching for information, respectively. On the other hand, they had received information passively from colleagues during interactions and also from the internet.

Since the present study also is related to international postgraduate students, Majyambere's (2015) study provides a few additional insights that are relevant to this study. For instance, this study draws attention to the issues concerning English proficiency of international students, their lack of information literacy and computer experience, poor awareness of university services, and insufficient policy documents concerning them. It must be noted, however, that Wilson's model was acknowledged by this study to be very broad and consequently Savolainen's (2010) model was also incorporated to include aspects of the needs and information-seeking actions associated with daily existence. Moreover, while Wilson's model was useful in identifying the usage of different information systems and various resources, Majyambere proposed a model where formal and informal sources are distinguished with the objective of highlighting the connections between these (Figure 2.17).

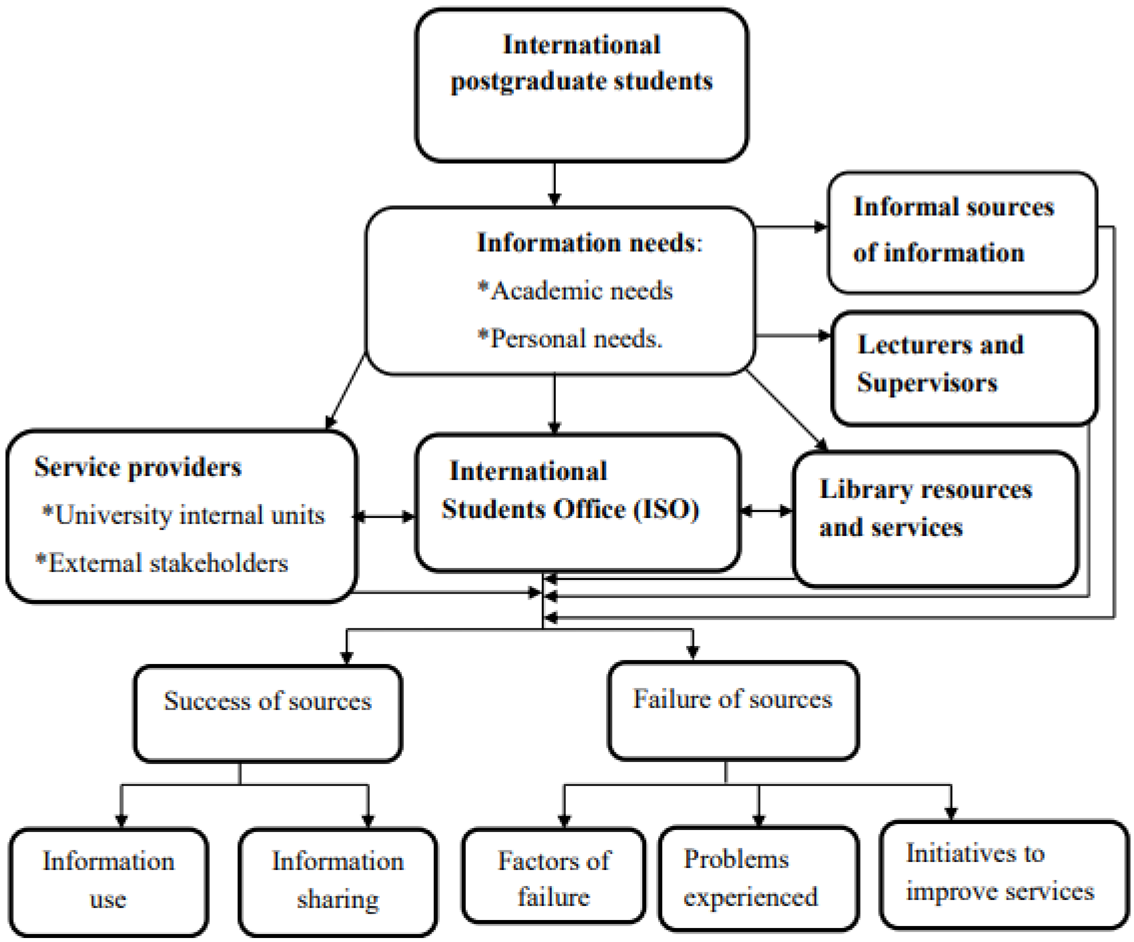


Figure 2.17 *Majyambere's model of information seeking of international postgraduate students (Source: Majyambere, 2015, p.350)*

Mowbray's (2018) study also explored information behaviour, but from the perspective of networking for job search among young adults (aged 16-24 years) in Scotland and the part played in this process by social media platforms such as LinkedIn, Twitter, and Facebook. This study also employed a mixed methods research design. While the findings of the study revealed that the participants collect various kinds of information from their social networks, the key contribution of Mowbray's study, in the context of the present study, is the usage of Wilson's model to broadly explain the participants' information behaviour (Figure 2.18). In other words, Mowbray's findings demonstrated that the context of information need must be considered when studying information behaviour – in this case, job search networking. Moreover, Mowbray (2018) created a revised version of Wilson's model that incorporates the factors associated with job search networking. This model indicates that the context of the information seeker, their goals, and their information needs influence their actual information behaviour. Further, the intervening variables (depicted by dashed lines) may arise from the contextual facets and enable or prevent awareness of the information needs.

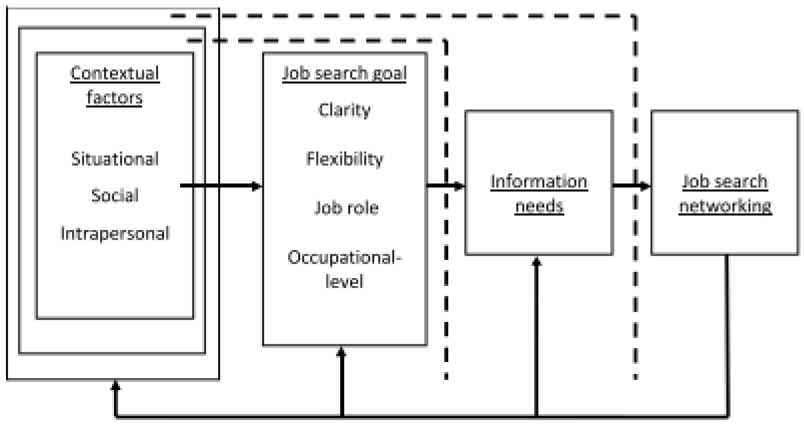


Figure 2.18 *Mowbray's (2018) Revised Version of Wilson's Model*
(Source: Mowbray, 2018, p.226)

An older study by Al-Daihani (2003) used Wilson's model as the underlying theoretical basis for his scrutiny of the information behaviour of legal professionals in Kuwait. This study was included by the researcher, despite its age, because it provided insights regarding the use of Wilson's model which were of use to the current study. The study's participants included a vast array of persons who might be associated with seeking of legal information, such as legal academics, legal practitioners (for instance, state and private lawyers, and prosecutors), legal publishers, law librarians, and producers of legal databases. Al-Daihani (2003) found that most of the participating legal professionals preferred to utilise their personal collections. Moreover, electronic sources (for example, the internet and legal databases) and law libraries were not utilised by a considerable proportion of them. Furthermore, the participants seemed to require support to obtain information; were not trained to use information sources; and depended on internal, rather than external, communication for exchange of information. Additionally, they did not seem to adequately utilise legal journals. The recognition of the problems related to information seeking resulted in the design of a prototype Kuwaiti Legal Information System (KLIS) interface, the aim of which was to offer appropriate and current information along with links to other sources of information and services. This study adopted Wilson's model since it included all patterns of information that could contribute to information acquisition in the work environment of the users (such as active/passive search, ongoing search, and passive attention) (Figure 2.6). Further, the cyclic depiction of information behaviour in Wilson's model was submitted as another reason for its use along with its pragmatism and realism.

From Figure 2.19, it can be seen that Al-Daihani (2003) added a further component of delegation behaviour to Wilson's model. This behaviour has been revealed to be a component of legal professionals' information seeking behaviour and indicates the usage of intermediaries. Overall, the model contains legal professionals in their context of tasks and work responsibilities; their information needs; the usage of intermediaries; verification and filtering of the information provided to the lawyers through delegation to confirm that it is up-to-date, correct, and appropriate; and their information seeking behaviour.

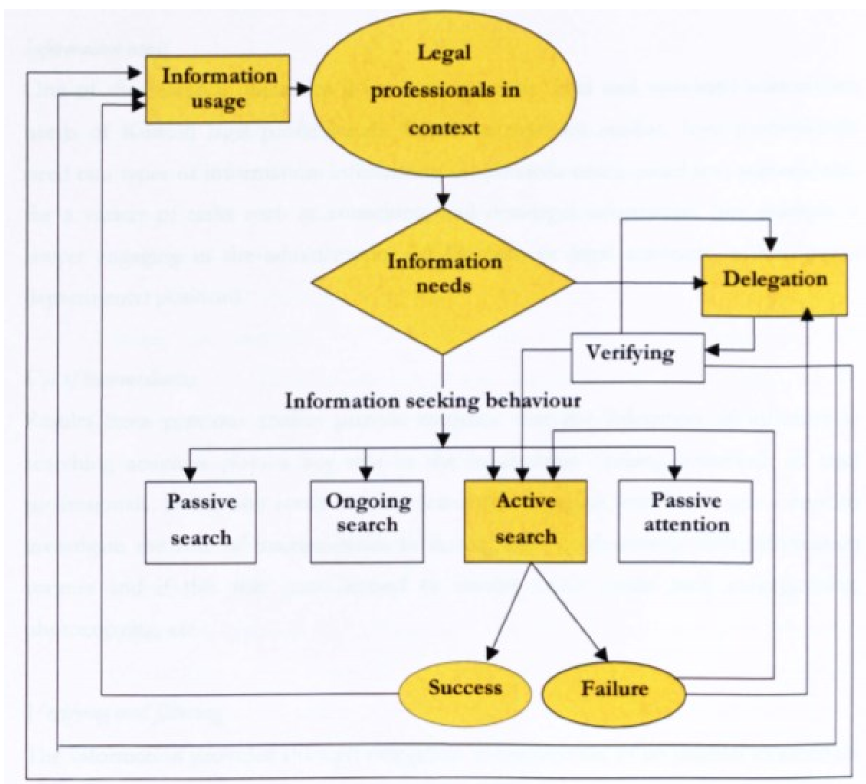


Figure 2.19 *Information behaviour of legal professionals in Kuwait*

(Source: Al-Daihani, 2003, p.70)

Another study of the information seeking behaviour in a legal context by Abbas (2018) examined the behaviours of law students. The context of the study was the usage of mobile technologies to search for and obtain legal information for academic purposes. Abbas (2018) proposed and refined a model of information seeking behaviour for law students (LSISBM) that plots the information seeking journey of law students as they use the different technologies available at hand to look for legal information (Figure 2.20). Principal themes occurring throughout the study included the abstract nature of digital resources when compared to the concrete nature of paper-based content, along with the apparent dependence on legal research instruments which are digitally-based. It could be noted that in contrast to Al-Daihani's (2003) study, present day law students placed a greater emphasis on electronic sources over printed resources. Nevertheless, with regard to their information seeking behaviour it would appear that legal professionals and law students are influenced by their context to seek information in different ways.

Table 2.3 provides a summary of the studies reviewed in this section.

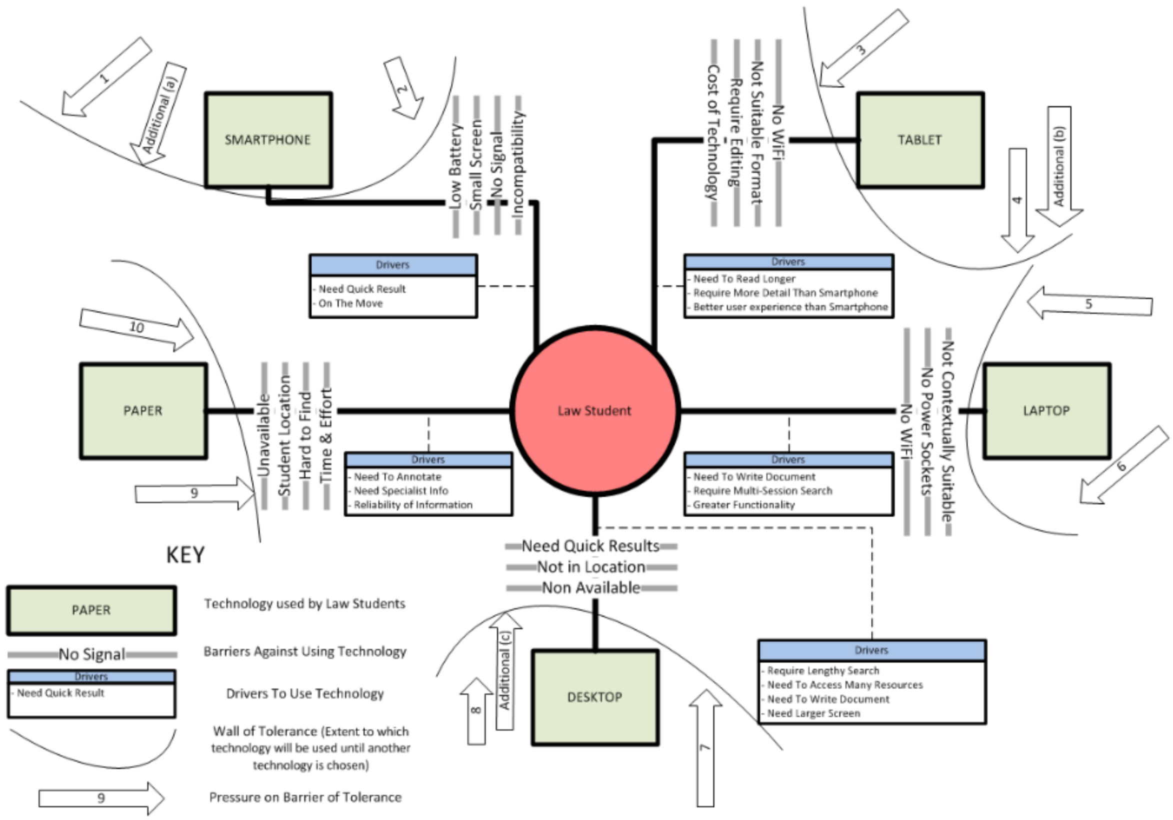


Figure 2.20 *Refined Model of Law Students' Information Seeking Behaviour*

(Source: Abbas, 2018, p.464)

Table 2.3 *Summary of Studies Using/Extending Wilson's Model*

Author(s)	**Aim of the Study**	**Where the research was conducted**	**Sample size**	**Type of respondents**	**Type of Study (instrument)**
Laplante (2008)	To understand the music information-seeking behaviour of young adults in everyday existence	Canada	15	Young adults (18 to 29 years old)	Qualitative (semi-structured interviews)
Azadeh & Ghasemi (2016)	To examine the effect of using internet on information seeking behaviour	Iran	97	Faculty members of Payame Noor University (PNU)	Quantitative (information-seeking behaviour inventory)
Majyambere (2015)	To investigate the information seeking behaviour of international postgraduate students	KwaZulu-Natal Province, South Africa	218	Humanities/Arts international postgraduate students in public universities, Heads of International Students Office (HISOs)	Mixed methods (self-administered questionnaire, focus group discussion, and semi-structured interviews.)
Mowbray (2018)	To develop new knowledge on job search networking as an operational concept	Scotland	921	Youth labour market (i.e. aged 16-24 years)	Mixed methods (self-administered questionnaire, focus group discussion, and semi-structured interviews.)
Al-Daihani (2003)	To investigate the information behaviour and the information needs of Kuwaiti legal professionals, and examine whether the existing legal information sources and services meet their needs	Kuwait	142	Legal professionals	Mixed methods (self-administered questionnaire and semi-structured interviews.)
Abbas (2018)	To examine the information seeking behaviours of law students; in the context of using mobile technologies to search for and retrieve academic legal information.	United Kingdom	93	Law librarians and Law students	Mixed methods (Interviews and multiple survey instruments)

Overall, the studies scrutinised in this section utilised Wilson's model with or without modification. It could be seen that the individual was at the centre of the models with their information seeking context influencing their information seeking behaviour. For instance, the studies of Laplante (2008) and Mowbray (2018) had young adults at the centre of the model, whereas Azadeh and Ghasemi (2016) had faculty members at the centre. On the other hand, Majyambere (2015) had international postgraduate students, while Abbas (2018) had law students at the centre of their models. In contrast, Al-Daihani (2003) had legal professionals at the centre. Nevertheless, regardless of the individual at the centre of the model, it was evident that the use of Wilson's model had helped the researchers to model and attempt to explain information seeking behaviour in different contexts.

2.7.2 Technology Adoption

2.7.2.1 Adoption and Use of Electronic Library Resources

Demographics often yield important clues as to what factors contribute to postgraduate students' use of electronic resources. Waldman's (2003) study tried to determine students' demographic characteristics that would lead them to use the library's electronic resources. Through a survey administered to a class of freshmen, Waldman found that while age and gender were not related to use of electronic libraries, self-efficacy was. Self-efficacy, the belief in one's capacity to act to achieve one's goals, was related in this research to a higher use of both the library and of electronic resources. Another study by Yan, Zha, and Xiao (2013) explored and compared the perceptions of university library users regarding conventional electronic resources and unconventional electronic resources, inside and outside the library respectively, from the perspectives of ease of use, usefulness, and usage. The objective of this study was to help Chinese university librarians to understand the information needs of their users more specifically and thus provide personalised services for them more appropriately. The study's findings indicated that the role of unconventional electronic resources was to complement conventional resources, not provide an alternative for them. Moreover, ease of use and usefulness were found to predict usage of both forms of electronic resources. Furthermore, the study found that gender did not influence the frequency of and the quantity of time involved in the use of either conventional or unconventional resources. However, age was found to influence the users' perceptions of ease of use and usage of electronic resources such as electronic journals, web pages, search engines and portals, online databases, and online library catalogues.

Apart from demographics, other facets have also been utilised in attempts to explain the adoption of electronic library resources. For example, a comparison of international graduate students and their American counterparts by Liao, Finn, and Lu (2007) revealed that students found electronic libraries to be preferable to other information sources and that all graduate students valued accessibility and convenience of access as the most important factors when seeking information sources. In addition, the study also showed that the most important aspects when students were searching for information were convenience of access and accessibility.

Whilst in the above study convenience is termed as a major factor that influences the use of electronic libraries, further research, such as that of Barhoumi (2016), has identified that user acceptance of the e-information resources are influenced by facets such as user satisfaction, information architecture, content richness, the publisher's quality, policies and rules of online resources, the self-efficacy and the task technology fit. Barhoumi's study extended the TAM model by including user satisfaction, information architecture, free access, content richness, publishers' quality, system self-efficacy, policies and rules, and task technology fit. Chen, Chang, Kao, and Huang (2016) while conducting research on a Taiwanese digital meta-library explored variables including information quality, system quality, service quality, perceived ease of use, perceived usefulness, user satisfaction, attitude, usage behaviour and personal net benefits through a new technology information assessment model, TISSM (Technology Information System Success Model) which integrated TAM with the information systems success model (ISSM). The study found that the greater the user's perceptions of ease of use and perceived usefulness, the more favourable their attitude towards the digital library.

Another study by Zha, Wang, Yan, Zhang, and Zha (2015) also used TAM, this time with flow experience to explore the antecedents of information seeking in digital libraries and found that information seeking in digital libraries is largely influenced by flow experience. Flow experience indicates an ideal and pleasant experience. The study found that the effects of ease of use and usefulness on information seeking in digital libraries are fully mediated by flow experience. Further, users who spend considerable time seeking information in digital libraries would obtain favourable outcomes such as self-efficacy in obtaining information and hence individual performance.

Overall, these studies indicate that personal demographics of individuals (e.g., age, gender) and their perceptions of the usefulness of an electronic library were the key facets that influenced the adoption of electronic library resources. Further, the TAM model appeared to be used quite commonly to investigate factors that influenced adoption which could lead us to infer that perceived usefulness and ease of use are critical aspects of the adoption of library systems.

The UTAUT and UTAUT2 models have also been utilised to investigate the factors that influence the usage of electronic library resources. For instance, a study by Moorthy and colleagues (2018) attempted to scrutinise the factors that influence the behavioural intention of undergraduates to utilise digital libraries. The framework utilised by the study combined Unified Theory of Acceptance and Use of Technology 2 (UTAUT 2) and Information Systems Success Model (ISSM). Using a sample of 391 undergraduates from Malaysian private universities, this study found that behavioural intention was positively and significantly influenced by performance expectancy, hedonic motivation, facilitating conditions, social influence, habit, and information quality, but not by effort expectancy. This study utilised Multiple Linear Regression to evaluate the model and found that 56.18% of the BI of undergraduates toward digital library could be explained by all the seven independent variables in the research model.

Another study by Chang, Lou, Cheng, and Lin (2015) integrated the UTAUT and website service quality to compile a usage behavioural model for university library electronic resources. Using data obtained from 1089 fourth-year university students and second-year master's students from six public and private universities in Taiwan, the study verified the fit of the model using structural equation modelling. Overall, Chang and colleagues (2015) found that website service quality was significantly associated with students' behavioural intention and use behaviour of electronic resources. Further, the findings confirm that the UTAUT model continues to be valid for use behaviour of university library electronic resources. Moreover, the study found that BI and use behaviour can be effectively predicted by PE, SI, website service quality, and FC. However, the different dimensions are not moderated by the variables gender and class background.

A modified version of the UTAUT model was utilised by Rahman, Jamaludin, and Mahmud (2011) to investigate the factors anticipated to influence postgraduate students' intention to use digital libraries. The modified UTAUT included various latent variables such as performance expectancy (PE), effort expectancy (EE), information quality (IQ) and service quality (SQ). The moderating effects of gender, age, and experience in utilising digital library were also tested. The findings of the study revealed that PE, EE, and IQ are positively associated with the intention to utilise the digital library. On the other hand, SQ is negatively associated with the intention to utilise the digital library. That is, perceptions of students regarding the quality of the services provided by the digital library influenced their intention to use the library. Further, while gender and age did not demonstrate moderating effects, experience in using the digital library was found to significantly interact with EE and intention to utilise the digital library. Thus, this study drew attention to the moderating influence of experience on the intention of the user to utilise a digital library.

The use of UTAUT in the library context has also been the focus of academic studies. For instance, a study by Tibenderana et al. (2010) used UTAUT as the basis to design a model for evaluating the extent of the acceptance and usage of e-library services by users in university settings in Uganda. Four independent constructs were included the designed model, namely performance expectance, relevance, social influence and facilitating conditions. Moreover, four moderator variables of gender, age, experience, and awareness were scrutinised for their influence on the dependent constructs of 'behaviour intentions,' 'usage behaviour,' and 'expected benefits.' The study's outcomes demonstrate that the intention to utilise e-library services exist in university communities. Moreover, end-users' behaviour intentions and usage behaviour in the context of e-libraries were significantly determined by relevance, social influence and facilitating conditions.

In another academic study, Ayele and Sreenivasarao (2013) described a service-oriented UTAUT (SO-UTAUT) in a library context. This study found performance expectancy to be the most significant determinant of the students' behavioural intention to utilise e-library services. Further, behavioural intention was found to be the critical factor determining their actual usage behaviour. On the other hand, awareness was found to moderate the relationship between relevancy and facilitating conditions. The SO-UTAUT was found suitable in the Ethiopian context as it could explain the variance on behavioural intention (22.2%), behavioural usage (29.9%), and expected benefits of e-library services (52.2%) on the acceptance and usage behaviours of users with regard to the services.

Taking the existence of varied groups of users with varying usage behaviour into account, Orji and colleagues (2010) developed and validated a model based on the UTAUT to explain the acceptance of each user group of Electronic Library Systems (ELS). This model, a nationality-based Unified Theory of Acceptance and Use of Technology (NUTAUT), introduces nationality as a moderator variable as the authors posited that the impact of the UTAUT independent variables on acceptance and usage would differ when moderated by nationality. Data for the study were obtained from a sample of 116 student participants (including international students) from the Middle East Technical University in Turkey and offered support for NUTAUT by indicating that different degrees of influence were exerted by the different UTAUT constructs. Overall, the study found that FC, EE, PE, and SI (listed in diminishing sequence of relevance) were the crucial elements impacting the acceptance and usage of ELSs by students. Further, the study confirmed the robustness of NUTAUT in predicting technology acceptance of both groups of students (91% of national students and 98% of international students). Moreover, it determined the significance of each independent construct in influencing acceptance in each group. For international students, Orji and colleagues (2010) found that PE and SI were significant factors. On the other hand, EE and FC were significant factors for both groups. This study helped highlight that different users of different technologies have differing usage behaviours. Moreover, the various constructs of the UTAUT can have different impacts on users. This study is of considerable interest in the context of the present study as an extended UTAUT model was developed and compared across two populations of students (national and international). However, this study considered the usage of a single system in contrast to the present scrutiny of UDLs and Google Scholar.

It can be seen that TAM and UTAUT/UTAUT2 have been utilised effectively in investigations regarding the factors which influence the usage of electronic library resources. The studies discussed in this section placed emphasis on intention to use digital libraries and often extended TAM or combined UTAUT/UTAUT2 with another model to create conceptual models that could explain the intention of users to utilise the libraries. For instance, Barhoumi (2016), Chen and colleagues (2016), and Zha and colleagues (2015) extended the TAM model, whereas the study of Moorthy and colleagues (2018) integrated ISSM with UTAUT2 and introduced information quality as an independent variable in the research model. Again, Chang and colleagues (2015) utilised website service quality along with UTAUT and included website service quality in the scrutiny of the usage intention and behaviour of students. The study by Rahman and colleagues (2011) also included service quality in their scrutiny, while Ayele and Sreenivasarao (2013) include a service-oriented perspective. Nevertheless, it can be seen that such studies place great emphasis on the independent variables and the effects of moderating variables (such as age, gender, class background), and while tested, did not demonstrate considerable impacts except in the case of experience in using the digital library (Rahman et al., 2011). Also, it can be seen that most studies, apart from Liao and colleagues (2007) and Orji and colleagues (2010), did not perform comparisons of the perceptions of different groups of users. Further, most studies, apart from Yan and colleagues (2013) who compared conventional and unconventional electronic resources inside and outside the library, scrutinised a single technology system which is in contrast to the present study's attempts to compare perceptions regarding Google Scholar and UDLs.

Table 2.3 summarises the studies reviewed in this section.

Table 2.3 *Summary of Studies Related to Adoption and Use of Electronic Library Resources*

Author(s)	**Country**	**Sample**	**Respondents**	**Constructs scrutinised**	**Explanatory power of the model**	**Model Fit**	**Moderating variables considered**
Waldman (2003)	USA	340	Students	Computer and internet use, library use, use of electronic resources	NA	NA	Age, gender, ethnicity, status, grade point average, yearly income
Yan, Zha, & Xiao (2013)	China	278	Library users	Ease of Use of Electronic Resources inside Library; Ease of Use of Electronic Resources outside Library; Usefulness of Electronic Resources inside Library; Usefulness of Electronic Resources outside Library; Use of Electronic Resources inside Library; Use of Electronic Resources outside Library	NA	NA	Gender, age, current position, field, experience with library electronic resources (year)

Author(s)	**Country**	**Sample**	**Respondents**	**Constructs scrutinised**	**Explanatory power of the model**	**Model Fit**	**Moderating variables considered**
Liao, Finn, & Lu (2007)	USA	315	International and American Graduate students	General Information-Seeking Behaviour, initial information channels, information-seeking methods, web searching tools, useful information sources, difficulty level of using library services/resources	NA	NA	English proficiency
Barhoumi (2016)	Saudi Arabia	214	Researchers	User satisfaction, free access, information architecture, content richness, publisher's quality, policies and rules, self-efficacy, task technology fit	NA	NA	NA
Chen, Chang, Kao, & Huang (2016)	Taiwan	264	Teachers and PhD students	Information quality, system quality, service quality, intention to use, user satisfaction, use, net benefits	Perceived usefulness, perceived ease of use, and user satisfaction significantly and positively affected attitude toward	Acceptable	NA

Author(s)	Country	Sample	Respondents	Constructs scrutinised	Explanatory power of the model	Model Fit	Moderating variables considered
					using digital library services		
Zha, Wang, Yan, Zhang, & Zha (2015)	China	285	Teachers and students (undergraduate, master, doctoral, foreign)	Flow experience, individual performance, self-efficacy	Ease of use and usefulness of digital libraries significantly influence flow experience in digital libraries. Flow experience, self-efficacy in getting information, and individual performance are significantly related to information seeking in digital libraries.	Acceptable	Gender, age, field, position

Author(s)	Country	Sample	Respondents	Constructs scrutinised	Explanatory power of the model	Model Fit	Moderating variables considered
Moorthy et al. (2018)	Malaysia	391	Undergraduate students	Information Quality	56.18% of the BI of undergraduates toward digital library could be explained by all the seven independent variables in the research model.	NA	Age, gender, experience
Chang et al. (2015)	Taiwan	1089	Fourth-year university students and second-year Master's students	Website Quality	Model is valid for "use behaviour" for university library electronic resources in universities in Taiwan.	Good	Gender, class, public or private, school type
Rahman et al. (2011)	Malaysia	534	Postgraduate students (Masters and Doctorate)	Information Quality, Service Quality	38.3% of the Intention to Use Digital Library (IUDL) of postgraduate students could be explained by all the five independent variables in the research model.	NA	Age, gender, experience

Author(s)	Country	Sample	Respondents	Constructs scrutinised	Explanatory power of the model	Model Fit	Moderating variables considered
Tibenderana et al. (2010)	Uganda	445	Students and faculty	Expected Benefits, Relevance	End-users' behaviour intentions and usage behaviour were significantly determined by relevance, social influence and facilitating conditions	Good	Gender, Age, Experience, Awareness
Ayele and Sreenivasarao (2013)	Ethiopia	311	Postgraduate students and academic staffs of the two universities (Addis Ababa and Adama Universities)	Expected Benefits, Relevance	The model constructs account for a significant percentage of the variance explained on the user intention to use electronic library services.	Good	Gender, Age, Experience, Awareness
Orji et al. (2010)	Turkey	116	International and National Graduate students	Nationality	FC condition is the most important predictor of acceptance for the two groups	Good	Nationality, voluntariness, age, gender, experience

2.7.2.2 Other Investigations of Technology Adoption Using/Extending UTAUT/UTAUT2

This section scrutinises other investigations of technology adoption using/extending UTAUT/UTAUT2 since there seems to be limited studies investigating their usage in the digital library context. Moreover, since this study, to the researcher's best understanding, is among the first to compare the perceptions of students regarding two technology systems, further scrutiny was deemed to be required. Accordingly, the studies in this section examine different domains where UTAUT/UTAUT2 have been utilised. For instance, an early study by Al-Qeisi (2009) proposed an extension of the UTAUT model that explains online usage behaviour with regard to the discretionary usage of internet banking by individuals. The model was tested on a sample from two different countries (Jordan and the UK). The study found that the included construct, perceptions of website quality, affected usage behaviour in both countries. Overall, this construct was found to be the most significant factor influencing usage behaviour in both countries followed by performance expectancy. In contrast, social influence did not influence usage behaviour in the model for either country. Al-Qeisi (2009) highlighted that this facet confirmed prior research that suggests that the role of social influence decreases when the usage is discretionary and experience with the system increases. Moreover, both countries' models demonstrated support for the moderating role of performance expectancy in line with research on the TAM model. Furthermore, gender was not found to have a moderating effect in either model which was again highlighted by Al-Qeisi (2009) to confirm prior research that suggests that the role of gender decreases when the usage is discretionary and experience with the system increases. The UK model was found to be moderated by education and income. It must be noted that the two models developed by the study, while similar in configuration in the matter of model specifications, differed in terms of the explanatory power for usage behaviour. Specifically, the explanatory power of the UK model was greater than that of the Jordan model. It can be seen that this study is of considerable interest in the context of the present study as models were developed and compared across two sample populations. However, it must be noted that the usage of a single system was in consideration which contrasts with the present scrutiny of UDLs and Google Scholar.

In another study, Nirban (2014) utilised the UTAUT model to gain awareness of a learning management system's (LMS) acceptance by students of an institute of higher education. Using regression analysis, the study found that PE and SI significantly influence the students' BI to utilise the LMS, whereas EE does not. Moreover, while BI significantly determines the actual usage of the LMS, FC does not. Further, gender was not found to be a moderating influence on the associations between PE and SI and BI and actual usage. Nevertheless, voluntariness of use appeared to impact the BI and actual usage of the LMS. Further, a study by Arif, Ameen, and Rafiq (2018) utilised the UTAUT model to investigate the factors influencing master's students' usage of the web-based services in the Allama Iqbal Open University (AIOU) distance education programme. The study found that Effort Expectancy, Performance Expectancy, and Social Influence significantly predicted the behavioural intention of students to utilise AIOU web-based services. However, Facilitating Conditions and Behavioural Intention of the students influenced the students' actual usage of the services. The moderating variables scrutinised by the study, namely age, gender, and experience, were not found to influence the students' actual usage of the services. Nevertheless, the research model utilised by the study significantly measured 62.1% of the students' actual usage of AIOU web-based services. It must be noted that the web-based services considered in the study were subject to voluntary rather than mandatory use, which is similar to the present-day norms concerning UDLs.

The researcher found that there were some recent doctoral studies that utilised UTAUT/UTAUT2 to examine the factors that influenced the adoption of various technology systems by their intended users. It must be noted, however, that these studies typically examined the adoption of a single technology system by a single population. Nevertheless, they are included for scrutiny since they provide insights regarding the testing of the variables in the model which are of relevance to the present study. In one such study, Alrawashdeh (2011) used an extended UTAUT model in the context of computer-based distance training system (CBDTS) among public sector employees in Jordan. The study's primary objective was to identify the factors that result in the acceptance of a CBDTS among public sector employees. A further objective was to offer a model of technology acceptance in this context. The data obtained from 386 public sector employees was analysed using structure equation modelling (SEM). Alrawashdeh (2011) found that the intention of employees to utilise the CBDTS was significantly influenced by PE, EE, flexibility of the system, enjoyment of the system, SI, and FC. EE was significantly determined by interactivity of the system, enjoyment of the system, computer anxiety, FC, and computer self-efficacy. On the other hand, PE was significantly determined by interactivity of the system, enjoyment of the system, computer anxiety, and EE.

A further doctoral study by Alshehri (2012) investigated the factors influencing the acceptance of e-government services in Saudi Arabia. Using an extended version of the UTAUT model as its theoretical basis, this study scrutinised the data obtained from 686 participants. Six independent scales were utilised to examine the proposed UTAUT model: trust (TR), performance expectancy (PE), effort expectancy (EE), social influence (SI), website quality (WQ), and facilitating conditions (FC). Moreover, two dependent scales (behaviour intention [BI] and use behaviour [USE]) and three moderator variables (age, gender, and internet experiences) were utilised. TR, PE, EE, WQ, and FC were found to significantly influence the BI of users to accept and utilise e-government services, while SI did not. Moreover, USE of e-government services was significantly influenced by BI. Also, the three moderator variables were found to impact the influence of the key factors with respect to USE.

In another study, Huang (2018) used UTAUT2 along with social constructivism and connectivism to scrutinise the usage of social media in mainland China. Although utilised across the world to enable innovative education, people in China cannot use social media due to government restrictions. Nevertheless, this study explored the impact of six UTAUT2 predictors on the intention of users to use social media and the impact of this intention on actual usage behaviour. Huang (2018) investigated a sample of 197 undergraduate students and 54 faculty from two public universities in Guangzhou, China, and found that the intention to use social media was significantly influenced by PE, EE, SI, FC, hedonic motivation, and habit. Further, social media use behaviour was significantly impacted by the intention to use social media. The relationship between FC and use intention was moderated by age, whereas the relationship between habit and use intention was moderated by gender.

This section highlights the effectiveness of UTAUT/UTAUT2 in examining the factors that influence technology adoption in different domains. Again, it can be seen that most of the studies place emphasis on the constructs of the model, and the effects of the moderating variables (age, gender, experience) were typically not found to be significant except in the case of Nirban (2014) who found that voluntariness of use influenced BI and actual usage; Alshehri (2012) who found that age, gender, and internet experience exhibited a moderating influence on key factors with regard to use behaviour; and Huang (2018) who found that age moderated the relationship between FC and use intention and gender moderated the relationship between habit and use intention. Further, comparisons of different systems or different groups of users were not performed except for the case of Al-Qeisi (2009), who compared the perceptions of two groups of users.

Table 2.4 summarises the studies reviewed in this section.

Table 2.4 Summary of Other Investigations of Technology Adoption Using/Extending UTAUT/UTAUT2

Author(s)	**Country**	**Sample**	**Respondents**	**Constructs added**	**Model's Explanatory power**	**Model Fit**	**Moderating variables considered**
Al-Qeisi (2009)	UK, Jordan	224 (Jordan); 205 (UK)	NA	Website Quality Perceptions and Dimensions	The models' differed in their explanatory power for usage behaviour	Acceptable	Gender, Education, Income, Age
Nirban (2014)	India	71	Undergraduate students	No	PE and SI significantly influence the students' BI to utilise the LMS, whereas EE does not.	NA	Age, gender, experience, Voluntariness of Use
Arif et al. (2018)	Pakistan	388	Master's students	No	PE, EE and SI accounted for 46.2 per cent variation in the behavioural intention of students to utilise the Web services	NA	Age, gender, experience
Alrawashdeh (2011)	Jordan	386	Public sector employees	System Enjoyment, System Flexibility, System Interactivity	PE, FC, SI, and system flexibility have direct effect on the employees' intention to use web based training system, while EE, system enjoyment and system interactivity have	Good	Age, gender, experience

Author(s)	Country	Sample	Respondents	Constructs added	Model's Explanatory power	Model Fit	Moderating variables considered
					indirect effect on employees' intention to use the system.		
Alshehri (2012)	Saudi Arabia	878	IT staff, Saudi citizens	Trust, Website Quality	TR, PE, EE, WQ, and FC were found to significantly the BI of users to accept and utilise e-government services, while SI did not.	Good	Age, Gender, and Internet Experiences
Huang (2018)	Mainland China	197 students; 54 faculty	Undergraduate students and faculty	No	PE, EE, SI, FC, hedonic motivation, and habit significantly influenced social media use intention, and social media use intention significantly influenced social media use behaviour.	NA	Age, gender, experience

2.7.3 Technology Adoption of Google Scholar

A study set in Taiwan by Wu and Chen (2014) examined the perceptions and usage of Google Scholar by graduate students. The authors conducted interviews with 32 graduate students from National Taiwan University and found that Google Scholar's usability was a significant factor in students choosing to use it over library databases. Nevertheless, the study also found that the students' preference could vary depending on their field of study. For instance, students of science and technology seemed to prefer Google Scholar more than those studying the humanities or social sciences. It must be noted that this study did not use any of the models of technology acceptance or adoption discussed in Section 2.4.

In another study set in the University of Minnesota, Cothran (2011) examined graduate students' acceptance and use of Google Scholar. This study extended the TAM through the addition of two external variables namely, satisfaction and loyalty. The extended model was utilised to scrutinise the extent to which Google Scholar was perceived by graduate students to be useful and simple to use. Cothran (2011) surveyed 1141 graduate students and found that perceived usefulness of the system was a more robust predictor of intended use than its perceived ease of use. Moreover, this study found that TAM is appropriate for forecasting usage of GS by graduate students, which can facilitate academic librarians' understanding of acceptance of novel sources of information by graduate students. This study also investigated the extent to which the students distinguish Google Scholar as a reliable source to be used. Moreover, the results provided insights for librarians to aid them in promoting the use of GS and other library resources (Cothran, 2011).

This study highlights that Google Scholar has been evaluated as a technology system from the perspective of adoption by different studies. However, the most frequent model utilised was the TAM, which indicates that the present study is possibly the first to utilise the UTAUT model to scrutinise Google Scholar. Moreover, the studies highlighted the ease of use and accessibility of Google Scholar as being the most significant factors influencing its adoption and usage by students. Further, the role of librarians in promoting the use of technology systems could be recognised (Cothran, 2011).

2.8 Chapter Summary and Research Gap

This chapter examined the basic concepts and definitions of digital libraries, including a scrutiny of digital libraries in the university context and factors influencing students' decisions to use digital libraries. Subsequently, an examination of Google Scholar and its popularity was provided, followed by an introduction to student information seeking/searching behaviour. With the intent of building a conceptual framework for the study (please see Chapter 4 for details), theories related to information seeking/searching and technology acceptance and adoption were examined in detail. Finally, previous research on students' usage of digital knowledge resources was scrutinised including information seeking behaviour and technology adoption. Research examined in connection with information seeking behaviour included student use of e-libraries and web search engines, as well as international postgraduate students' use of the university e-library. Technology adoption literature scrutinised pertained to adoption and use of electronic library resources, use/extension of the UTAUT/UTAUT2 models, and studies examining Google Scholar as a technology for adoption.

It was evident that student use of e-libraries and web search engines has been the matter of research scrutiny (e.g., Aba et al., 2015; Hirsh, 2014; Islam & Habiba, 2015; Kumah, 2015; Kwadzo, 2015; Mostafa, 2013; Natarajan, 2017; Ozonuwe et al., 2018; Perrusso, 2016; Salehi et al., 2018; Shuling, 2007; Sohail & Ahmad, 2017; Sohail et al., 2019; Turan & Bayram, 2013). These studies, however, serve to highlight that the digital library is often not the first choice of students and instead they prefer internet search engines over their libraries.

In the context of international postgraduate students, it can be seen that environmental, linguistic-cultural, and affective dimensions influence their usage of the university e-library. For instance, they could be unaware of the library and its associated processes and technologies. Moreover, they may not be very familiar with online resources and may use fundamental or non-critical approaches while searching for information. From the linguistic-cultural perspective, international students could be constrained by divergent linguistic and cultural practices, variant communication styles, nonverbal behaviour as well as different learning approaches (Lange et al., 2015; Michalak & Rysavy, 2018). The final dimension, affective, encompasses the emotional aspects which may result from difficulties in accessing the library (Noori et al., 2017).

Further, several studies use/extend Wilson's model of information seeking behaviour and it can be seen that the information seeking context influences the information seeking behaviour of individuals. From the perspective of technology adoption, it was evident that different models of technology acceptance (TAM, UTAUT, and UTAUT2) have been utilised to investigate the factors that resulted in the usage of electronic library resources and other technology systems. However, it was seen that except in a few cases, comparisons of perceptions between groups of users (e.g., Al-Qeisi, 2009; Liao et al., 2007; Orji et al., 2010) and different technology systems (Yan et al., 2013) were not undertaken. Further, investigations of Google Scholar as a technology system which could be adopted and used were rare (e.g., Cothran, 2011; Wu & Chen, 2014) and the TAM seemed to be the model of choice when these were undertaken (Cothran, 2011).

Overall, it is apparent that there is extensive literature providing a review of the factual data related to the use of digital libraries and their users. Researchers have placed emphasis on the factors influencing students' decision to utilise libraries. However, while most of these investigations have utilised a theoretical lens to explain these factors or their impact on each other, these investigations do not compare the intention to use a digital library with any other technology system such as Google Scholar. Many studies have investigated the use of Google Scholar and acknowledge; that it is predominantly the first recourse for students seeking information. Nevertheless, again there is limited scrutiny in terms of which factors precisely influence its popularity and usage. Again, while there is considerable theoretical (e.g., Bates, 1989; Belkin et al., 1993; Ellis, 1989; Kuhklthau, 1991; Wilson, 1981; Marchionini, 1995; etc.) and empirical attention (Jamali & Asadi, 2010; Khosrowjerdi & Iranshahi, 2011; Orlu, 2016; Sabar & Xie, 2016; Sheeja, 2010) regarding information seeking behaviour in general. And of students, there seems to be a lack of research related to the association between such behaviour and the information providing technologies such as UDLs and Google Scholar in the context of the present study.

Moreover, the review of literature revealed the lack of scrutiny related to the usage of UDLs and Google Scholar as technology systems. Further, a comparison of the factors driving usage of these two technologies could not be identified although earlier studies have compared the perceptions of two groups of users with regard to the same technology system. Consequently, this study intends to provide insight into the key factors that influence international postgraduate students' acceptance and usage of University Digital Libraries (UDL) and Google Scholar by developing and evaluating a conceptual model based on the UTAUT model. Further, the information seeking behaviour of international postgraduate students, which may influence their inclination to adopt one technology system over another, will also be investigated by extending Wilson's Model of Information Seeking Behaviour.

Chapter 3: Methodology

3.1 Introduction

As mentioned in the introduction to this thesis, this study seeks to contribute to knowledge regarding the factors that affect international postgraduate students' use decisions regarding Google Scholar versus their University Digital Libraries (UDL). The purpose of this chapter is to describe the methodology utilised in the present study. In the context of research, the term 'methodology' pertains to the methods and processes implemented by a researcher to undertake a study in keeping with their proposed aims and specified research objectives (Kumar, 2019). Further, research methodology relates to the processes centred on completing data gathering, analysis, interpretation and reporting in the case of research studies (Fidel, 2008). Moreover, Denscombe (2014) observed that there is a need for researchers to gather valid data through the application of reliable methods to ensure the maintenance of accuracy. In mind of ensuring accountability, there is a need for researchers to provide clear explanations and rationales for the choice of the methodology implemented. This chapter describes the research philosophy adopted by the study after scrutinising different research paradigms, research approaches, strategies, and methods. Further, the resultant research design is described along with the development of the instrument for data collection, sampling techniques, methods of data collection and analysis, and ethical considerations for the study. The conceptual framework for the study will also be discussed, and the research hypotheses will be developed in this regard.

3.2 Research Paradigms

In general, a group of shared assumptions or approaches to thinking about certain facets of the universe is termed a paradigm or philosophy (Oates, 2019). A research paradigm or philosophy involves assumptions relating to the way in which an individual considers the world and their viewpoint in this regard. Such assumptions provide support for the research strategy and methods selected (Saunders, Lewis, & Thornhill, 2019). Easterby-Smith, Thorpe, and Jackson (2012) observe that a robust understanding of the paradigms can facilitate recognition of the overall process and components of a study to be undertaken. Further, this helps a researcher recognise and develop a suitable research design.

Moreover, it has been suggested that the beliefs underpinning research paradigms can be determined by obtaining answers to three relevant questions, i.e., ontological, epistemological and methodological (Guba & Lincoln, 1994; Locke, Silverman, & Spirduso, 2010; Silverman, 2015). These assumptions establish the restrictions, which ultimately improve an inquiry's overall validity and logic. Assumptions may also be valuable in giving researchers an outline and framework, enabling them to monitor the development of their study. Table 3.1 provides an overview of the questions to be posed when establishing inquiry paradigms.

Table 3.1 *Questions to determine inquiry paradigms (Guba & 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 (and 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).

Typically, studies in the social or natural sciences are related to one of three philosophical paradigms: critical, interpretive, and positivist (Denscombe, 2014; Myers, 2019; Oates, 2006). Each of these approaches characterises several ways to perceive the universe with the intention of observing, assessing, and comprehending social reality (Myers, 2019). While these three paradigms are theoretically well defined, practically the distinctions are often ambiguous. Consequently, there is a tendency among researchers to mix up the elements of the paradigms (Neuman, 2010). These philosophies are briefly described in the following sub-sections to highlight their significance and usage.

3.2.1 The Critical Paradigm

The emphasis of the critical paradigm is on gaining awareness of the past construction of contexts and situations and how the situation can or cannot be impacted by individuals. Researchers using the critical paradigm believe social reality is constructed in the past and created and replicated by individuals and endeavour to challenge existing views, principles, and notions. Moreover, almost all critical research is motivated by a definite ethical basis. Consequently, ethical values such as comparable opportunity, unrestricted equality, and sustainability of the environment are promoted by critical researchers (Myers, 2019). Further, critical research is oriented towards the conflicts, false or unjustified beliefs, and contradictions in modern society and perceives itself to be an emancipator of persons from these. Additionally, it is believed by critical researchers that individuals can purposefully transform their societal and financial conditions, but that society, culture, and politics limit their actions (Myers, 2019).

Critical research utilises analytical approaches to locate individuals at the centre of consideration and to scrutinise the shared outlooks of participants of societal units. It is suitable when the objective of the researcher is to mediate in the research setting and contrast it with the past or initial situation under scrutiny. However, it lacks established criteria for validity and correctness and is neither repeatable nor generalisable. Nevertheless, the chief features of the critical paradigm are a motivation to convert awareness into action and the conviction that research is never value free or purely objective (Neuman, 2010). Since the current study is related to obtaining insights regarding the perceptions of international postgraduate students in connection with the factors that determine their usage of GS or their UDL, it would appear that this paradigm is not relevant in this context.

3.2.2 The Interpretive Paradigm

The basis of the interpretive paradigm is an approach of social science which perceives reality as being socially constructed. In other words, reality, in this paradigm, is believed to be founded on shared meanings resulting from experiences (Neuman, 2010). Reality is assumed to be subjective by interpretive researchers and their studies, in general, attempt to gain awareness of phenomena through the meanings ascribed to them by individuals (Myers, 2019). Moreover, their objective is to be capable of using theory as a clarifying device with which to view the world, instead of as a method of confirming theory. In general, an interpretive approach is suitable where there are no previously defined variables, either independent or dependent, and where the point of interest is the intricacy of individual sense-making as the phenomenon unfolds. That is, the interpretive approach is suitable for obtaining a profound awareness and investigating the setting and social exchanges of the study participants (Klein & Myers, 1999). In the context of Information Sciences (IS), the objective of interpretive research approaches is to create and understand the information system's context, and the manner in which the context influences and is influenced by the system (Myers, 2019).

3.2.3 The Positivist Paradigm

Positivism was defined by Neuman (2010) as "an organised method for combining deductive logic with precise empirical observations of individual behaviour in order to discover and confirm a set of probabilistic causal laws that can be used to predict general patterns of human activity" (p.58). The chief objective of positivist research is to discover universal laws and fundamental associations in societal and natural happenings (Myers, 2019). Moreover, positivist research utilises variables with measurable extents and extends outcomes from a sample to develop interpretations for a specified population with regard to a phenomenon. In other words, positivist researchers use approaches that depend on facts and objectivity to explain underlying associations (Carson, Gilmore, Perry, & Gronhaug, 2001). The testing of hypotheses is also a principal element of positivism, a facet that is closely related to quantitative data since outcomes that are absolute and definite can be forthcoming from statistical analysis (Collis & Hussey, 2013).

Essentially, the positivist research philosophy believes in value-free and objective research. Proponents of this approach discredit the interpretivist philosophy by asserting that it limits the possibility of the researcher seeing beyond one's personal biases and experiences. This contradicts the interpretivism philosophical underpinning, which emphasises that knowledge is socially constructed. This implies that it is neither value-free nor objective. Consequently, proponents of this philosophy argue that it is impossible to make predictions about the social world or even causal factors based on the positivist approach. Table 3.2 compares the positivist and interpretive paradigms.

Table 3.2 *Comparing the Positivist and Interpretive Paradigms (adapted from Alharthi, 2017; Carson et al., 2001; Tadajewski & Brownlie, 2008)*

	Positivist	**Interpretive**
Chief objective	To use objective truths to explain societal phenomena	To use the interpretation of participants to understand the meaning of societal phenomena
Ontology	Separates the research from the researcher. Researcher is objective so as to restrict observer bias	The research is inseparable from the research (real life events). The researcher participates in the research to work closely together with the data
Epistemology	Research is unbiased and frequently exists in the domain of numerical discussion	Reality is biased and formed socially from actual experiences
Method	Descriptive. Data are measured and used for testing of hypotheses or theories. Organised and driven by outcomes. Appropriate for quantitative approaches.	Explanative. Qualitative, non-numeric data Data are used to formulate hypotheses or theories. Unstructured. Emphasis on process. Appropriate for qualitative approaches.
Association between concepts and theories	Inferential, deductive	Emergent, inductive
Character of data	Data are inflexible and reliable Accurate assessment of reality Outcomes can be replicated	Data are plentiful and profound Subjective Outcomes cannot be easily replicated

3.3 Research Approaches

Research strategies and processes that encompass wide conjectures to exhaustive approaches of data gathering, scrutiny, and understanding are termed research approaches (Creswell, 2014). The research paradigms described in the previous section have both overlaps and distinctions; consequently, an understanding of research approaches is necessary to help a researcher determine the philosophical assumptions with which to progress in his/her study. In general, there are two principal approaches to research: deductive and inductive (Saunders et al., 2019).

Typically, deductive research entails a search for fundamental associations between variables, hypotheses testing, and the usage of an extremely structured methodology, which ensures the validity and reliability of the research (Saunders et al., 2019). Deductive research involves the creation of a hypothesis by the researcher based on deduction. Moreover, it assumes from the perspective of past awareness and notions that the research process is independent of the researcher, and vice versa, while data is being collected to test such past awareness or notions (Saunders et al., 2019). To ensure that the derived facts can be quantitatively assessed and generalised requires that deductive theories be operationalised appropriately (Saunders et al., 2019). Deductive research is envisaged as progressing through the following stages: firstly, a hypothesis is formulated from the developed theory. Secondly, the hypothesis is expressed in operational terms, which suggests an association between separate variables or concepts; thirdly, this operational hypothesis is tested; fourthly, the outcome of the investigation is scrutinised; and finally, if necessary the theory is modified in the light of the findings (Robson, 2002). The deductive approach is thus a top-down approach.

On the other hand, an inductive approach entails making sense of what is taking place in a particular setting, firm, procedure, or phenomenon to improve understanding of the character of the situation. This requires a researcher to firstly observe the situation and analyse the data obtained through the observation. This is followed by the submission of a theory based on the analysis (Saunders et al., 2019). Approaches based on inductive data progress to the general from the specific. This helps in the observation of specific instances. These are then integrated into a broad statement or larger whole (Elo & Kyngäs, 2008). The inductive approach has encountered criticism for its descriptive nature and the possibility of incorrect inferences (Saunders et al., 2019). Moreover, as the researcher is part of the process of data collection there is a greater likelihood of subjectivity in contrast to a deductive approach. In contrast to the deductive approach, the inductive approach is a bottom-up approach wherein theory is developed. It is utilised when there is insufficient or fragmented knowledge about a subject (Elo & Kyngäs, 2008).

Overall, the two approaches differ in their consideration of theories as inductive approaches involve building of theories, whereas deductive approaches entail testing of theories. Table 3.3 provides a summary of the differences between the two research approaches.

Table 3.3 *Comparing the deductive and inductive approaches to research (Adapted from Saunders et al., 2019, p.153)*

Deductive	**Inductive**
Progresses from theory to data	Progresses from data to theory
Quantitative data is collected	Qualitative data is collected
Ensures data validity by applying restrictions	Utilises a more flexible structure to allow modifications to the emphasis of the research over the course of the research
Generalises to the specific from the general	Generalises to the general from the specific
Collection of data is utilised to test hypotheses or propositions associated with an prevailing theory	Collection of data is utilised to investigate an event, recognise patterns and themes, and develop a conceptual framework.
Verification or contradiction of a theory	Generates and builds theories
The conclusion is necessarily true when the hypotheses are true in a deductive inference.	Untested conditions are generated using known hypotheses in an inductive inference.

3.4 Research Strategy

The comprehensive method through which a researcher proposes to answer a set of research questions is termed the research strategy. In other words, a research strategy is the overall scheme for answering the questions. Consequently, it encompasses the definite objectives resulting from the questions, refers to the sources from where the data will be obtained, and any probable restrictions that may obstruct the course of the research (Saunders et al., 2016, 2019). Factors such as data accessibility or availability, the period for data collection, places, economic considerations, and any other ethical matters associated with the research, must be identified by a research strategy. Accordingly, several types of research strategies exist, the most common being descriptive, exploratory, and explanatory (Saunders et al., 2016, 2019).

3.4.1 Descriptive Research

Descriptive research attempts to offer a comprehensive narrative of observations of conditions or activity without investigating the underlying associations entailed (Saunders et al., 2019). It has been suggested that the objective of descriptive research is to accurately depict a summary of individuals, happenings, or circumstances. Thus, descriptive research necessitates clear understanding about the phenomenon regarding which the data is to be collected before the actual data collection (Saunders et al., 2019).

3.4.2 Exploratory Research

The use of exploratory research is appropriate when there are not instruments or measures, variables are unidentified, or where there is no prior theory or knowledge available (Creswell, 2018). Creswell and Clark (2017) submit that exploratory research is most effective when the researcher desires to generalise, measure, or evaluate qualitative exploratory outcomes to check whether they can be generalised to a population or a sample. Moreover, exploratory research can help reveal what is taking place; to search for novel understandings; to inquire; and to evaluate phenomena from a fresh perspective (Robson, 2002). A researcher undertaking exploratory research should be accommodating and prepared to alter the course of the study in the event of fresh evidence (Saunders et al., 2019). Three common approaches for performing exploratory research are a literature review, discussions with subject experts and focus groups, and interviews.

3.4.3 Explanatory Research

The third strategy, explanatory research, attempts through hypotheses testing using statistical methods to clarify the underlying associations between variables (Saunders et al., 2019). This strategy is most effective when the researcher wants to use quantitative data to assess patterns and associations. Moreover, the researcher also desires to describe the process or rationale triggering the trends (Creswell & Clark, 2011). Common approaches for performing explanatory research include experiments (Saunders et al., 2019); surveys (Saunders et al., 2019); case study (Robson, 2002; Saunders et al., 2019; Yin, 2013); action research (Saunders et al., 2019); grounded theory (Saunders et al., 2019); ethnography (Saunders et al., 2019); and desk research (Saunders et al., 2019).

3.5 Research Methods

A research method indicates an approach that offers a setting wherein appropriate strategies and approaches can be selected and established to accomplish the overall objectives of a study (Maxwell, 2012). Quantitative and qualitative research methods are recognised as two distinct, wide-ranging research methods, commonly applied in social science (Palys, 1997). In the case of the former, quantitative research may be referenced as being "a research strategy that emphasizes quantification in the collection and analysis of data" (Bryman, 2016, p.22).

In the case of a quantitative approach, variables or conceptual constructs undergo measurement through the application of different tools, with analysis then carried out on the emergent numerical data through the adoption of statistical tests. In this regard, the quantitative methodology may be seen to apply a deductive approach to the relationship between research and theory, as recognised by Bryman (2016); in other words, hypotheses are devised in line with theories, which then undergo empirical examination. Those researchers opting to implement a quantitative approach hold assumptions in relation to completing deductive testing on theories, ensuring bias is prevented, controlling for other explanations, and ensuring study findings can be both replicated and generalised (Creswell, 2017). Methods utilised to obtain quantitative data include participant observation; structured interviews; surveys; and tests and measures (Easterby-Smith et al., 2012).

As opposed to the quantitative research approaches, qualitative research approaches are not concerned with the numerical representation but with a deeper understanding of the phenomena. In a qualitative research approach, the researcher is both the subject to be studied and the object. According to Flick (2014, p.542), "Qualitative research is interested in analysing subjective meaning or the social production of issues, events, or practices by collecting non-standardised data and analysing texts and images rather than number and statistics." This definition emphasises how people understand the world in which they live. In essence, it implies that the qualitative research approach is associated with multiple approaches. Flick (2015) affirms that the qualitative approach involves an interpretive, naturalistic and multi-method approach to the study of a given phenomenon. Thus, it is apparent that the qualitative approach focuses on multiple perspectives. It is an array of interpretive techniques that seek to decode, translate, and describe a subject. The goal of the qualitative approach is to offer a piece of in-depth and illustrative information to understand the diverse dimension of the problem under investigation. As Maxwell (2012) says, the purpose of a qualitative approach is to comprehend and explain the dynamics of social relations and unearth aspects of reality that cannot be recognised. Methods utilised to obtain qualitative data include action research (Creswell, 2018), case study research (Yin, 2017), ethnography research (Creswell, 2018), grounded theory (Corbin & Strauss, 1990), focus groups (Neuman, 2006), and documentary research (Yin, 2017).

Both quantitative and qualitative approaches have advantages and disadvantages. For example, the quantitative approach entails larger samples, which make conclusions from such research generalisable. In addition, statistical methods mean that the analysis is reliable. However, it is important to note that quantitative approaches do not illustrate the full complexity of human perceptions or human experience. While they explore what or to what extent, this approach does not often tell why and how. As a result, it can give a false impression of homogeneity of a sample. The qualitative approaches also have advantages and disadvantages. First, the qualitative research approach provides a description of the participants' opinions, feelings, and experiences. Secondly, Denzin and Lincoln (2002) argue that it understands human experience within some specific setting. Based on an epistemological position, people's experiences cannot be separated from their culture and context. Thirdly, in the qualitative research approach, methods such as unstructured interviews, participant-observation and direct observation are often used (Cohen, Manion & Morrison, 2017). In the data collection, such methods allow the researcher to interact with the participants directly, hence leading to a more subjective and detailed study. However, the qualitative approaches often leave out contextual sensitivities and emphasise experiences and meanings (Silverman, 2010). For instance, the phenomenological approach seeks to uncover interpret and comprehend the experience of the participants (Wilson, 2014). In addition, accusations of unreliability are regular and the conclusions of such a study have to be carefully qualified. Table 3.4 compares the quantitative and qualitative approaches.

Table 3.4 *Comparing the quantitative and qualitative approaches (adapted from Creswell, 2018)*

Quantitative	**Qualitative**
Closed questions utilised	Open-ended questions utilised
Entails fixed methods	Entails emerging methods
Entails numeric data	Entails usage of text or images
Assesses or validates theories or explanations	Gathers participant meaning
Identifies variables to scrutinise	Places emphasis on a specific idea or happening
Associates variables with hypotheses or question	Places greater emphasis on validity
Utilises standards of reliability and validity	Personal value may be brought into the study
Information is observed and assessed numerically	Formulates a plan for reform or transformation
Utilises objective methods	Works together with participants

3.6 Methodological Decisions for the Present Study

As previously stated, the aim of the present study is to gain awareness of the factors that affect international postgraduate students' use decisions regarding Google Scholar versus their University Digital Libraries (UDL) by utilising the UTAUT model. Moreover, the fundamental associations among the constructs of the model are also proposed to be investigated. In addition, it is proposed to utilise Wilson's model (1999) of information-seeking behaviour to scrutinise the information seeking behaviour of students and understand whether this seeks to influence their intention to adopt a certain technology. The researcher believes that these aims can be achieved by obtaining considerable data regarding the perceptions of international postgraduate students. Consequently, this research will adopt a positivist, explanatory approach and utilise quantitative methods to obtain data. The following subsections provide the justification for these decisions.

3.6.1 Justification for Selecting a Positivist, Explanatory Approach

The positivist paradigm stresses the significance of quantitative research such as the use of quantitative surveys to uncover trends such as the link between variables or get an overview. As a scientific approach to research, the use of this philosophical underpinning permits one to gain objective, trustworthy, and generalisable data, which is beneficial for knowledge development. The other advantage of this paradigm is that it follows a well-defined structure. It is believed that if there are set laws and rules, there is minimum room for errors. In addition, the structure also allows minimum room for drastic variable changes and variance, hence rendering such a study more accurate (Saunders et al., 2016).

Overall, the positivist paradigm seemed most appropriate for the present study since relatively large quantities of data are necessitated for the testing of the proposed UTAUT model and the associated hypotheses. Accordingly, the study is explanatory due to its quantitative focus.

3.6.2 Justification for Selecting a Quantitative Approach

For this research, a quantitative approach is adopted as the study relies on numerical results. By using a survey in this research, it is aiming to measure the levels of students' usage of the libraries in their postgraduate study. The results in the form of numerical data will show the factors impacting the usage of GS and UDLs of the postgraduate students and help answer the study's research questions.

The researcher has adopted a quantitative research approach for diverse reasons. First, it enables an in-depth study of the subject and permits the researcher to conduct an objective assessment that will help examine the link between the variables. In the view of Israel (2014), a quantitative approach involves seeking out knowledge with the ability to explain phenomena in the real-world context. In this regard, the degree to which the quantitative approach's constructive objectives seek to determine the links between measurable variables is highlighted by Creswell (2018), who recognises that the quantitative research approach is able to improve the gathering of representative and objective results that are not influenced by the researcher. Nonetheless, there are limitations and disadvantages associated with quantitative methods, recognised when considering that the complicated information gathered can be eradicated through decreasing results to summative findings. Furthermore, one of the most prominent drawbacks of quantitative studies is that it is commonly unsuccessful in providing data that can be synthesised so as to create a valuable overview. Such aspects can lead to more minute details being neglected or dismissed, as well as failure in suitably recognising and measuring the behaviour of the subjects (Israel, 2014).

3.7 Instrument for Data Collection – Questionnaire

In line with the quantitative nature of the study, the key approach for gathering data was a survey, based on a questionnaire. In terms of definition, a survey may be explained as being a number of different self-report measures, which are applied through a written questionnaire or interview (Stangor, 2014; p.103). Through such a strategy, the researcher determines a sample, gathers quantitative data through the adoption of interviews or questionnaires, and subsequently completes a statistical analysis across the data with a view to presenting findings relating to hypotheses or research questions, with conclusions drawn as a result and suggestions made about the population under examination (Creswell, 2018). Such a design is commonly applied in order to review a wide field of issues, populations and programmes to explain and/or garner insights into or otherwise measure generalised features (Cohen, Manion & Morrison, 2017, p.206).

The questionnaire is a quantitative data research and collection tool designed to gather data from many people. It is a flexible tool of highly specific questions, designed in advance to organise questions and receive responses in such a way that an interview with the respondent is unnecessary (Rugg & Petre, 2006; Walliman, 2015). Questionnaires feature mostly in quantitative research in situations where, for instance, the researcher wishes to sample the distribution within different age groups when counting the behaviour, opinions, attitudes, experiences, processes and prediction frequency (Rowley, 2014).

This study used questionnaires to collect data from the participants about their perceptions underlying the usefulness of both Google Scholar and Manchester universities' library websites among international postgraduate students. A questionnaire was preferred as the researcher intended to collect data for this research from international postgraduate students in different Manchester universities including the University of Manchester, Manchester Metropolitan University and the University of Salford. Questionnaires are useful since they have the ability to support the collection of large volumes of data from significant populations without incurring economic disadvantages. One key advantage of using questionnaires for the study is that they have a standardised format, which makes them objective. In addition, it is relatively faster to collect information using questionnaires. The other advantage is that information can be gathered from a relatively large sample. The researcher can improve the response rate by ensuring that the questionnaires are delivered and responded to in time.

Besides the advantages that the use of questionnaires has for the study, there are disadvantages tied to this method of data collection. First, the questions are standardised, meaning that there is no room for the researcher to explain any questions that might be misinterpreted by the participant.

This problem is solved through a pilot study to evaluate the clarity and appropriateness of the questions. In addition, questionnaires can be time-consuming to design and utilise. Consequently, participants may answer superficially if the questionnaire takes a lot of time to complete. In order to avoid this, the questionnaire for this study is designed to be brief, clear, and it takes only a few minutes to answer all the questions. If open-ended questions are used, large amounts of data can be generated which takes a long time to process and analyse. One way that the study has attempted to limit this in the design of the questionnaire is by limiting the number of such questions. By doing so, the researcher has adequate data to be processed and analysed in order to meet the objectives of the study, consequently saving considerable time (Oppenheim, 2005).

The questionnaire can be designed at a time that is convenient for the researcher, which encourages well-considered and accurate answers. A well-designed questionnaire can also be constructed in a manner that facilitates the collection of a large amount of relevant quantitative data over a short period of time. In addition, the methodology should allow for both the ease of collection and analysis (Connaway & Powell, 2010). The ability to generalise more effectively is also facilitated by the ability to collect a large number of responses from a large number of respondents (Rowley, 2014).

When carefully constructed, the questionnaire has the potential to eliminate bias, which is often a concern in interviews. This method of data allows and encourages respondents to give frank answers, and guarantees their anonymity (Judd et al., 2007). Overall, Connaway and Powell (2010) consider the questionnaire to be an effective tool for collecting quantitative data and researching attitudes.

In summary, questionnaires are effective and appropriate when the objective of the research is based upon surveying and profiling a specific situation and pattern. They are more effective when sufficient information is already known about the study focus in order to determine and formulate questions that are clear, concise and meaningful for the questionnaire. It is important that time is spent on determining those respondents who are in a position to provide meaningful information about the topic under scrutiny. Questionnaires should be appropriate to the respondents as well as the researcher (Rowley, 2014).

3.7.1 Questionnaire Design

For this research, two versions of a questionnaire were used for collecting the data – one related to use of Google Scholar and the other to use of a UDL. The questionnaires primarily consisted of two parts. The first part deals with the factors associated with the usage of the electronic library or Google Scholar whereas the second part deals with the demographic details of the postgraduate students.

The questions in the two versions of the questionnaire were similar as the researcher aims to investigate the similarity of user perceptions on the two e-resources under consideration. The questions contained in the questionnaire aim to discover how international postgraduate students view Google Scholar and Manchester universities' libraries websites. With this goal in mind, the first part of the questionnaire was constructed as follows. This part of the questionnaire contains twelve constructs, each dealing with the participants' usage of Google Scholar or their UDL.

The construction of the questions was based on factors mentioned in literature review (sections 2.5 and 2.6). Primarily some factors were considered as critical to information search, while others were considered as vital to the behaviour of the individual searching for information. In section 2.6, it was possible to review the factors influencing the technology enablers that make it possible for the creation of a workable university library platform. Using these factors, consideration was also given to the style of the questions as it plays a fundamental part in maximising the number of participants that will undertake the questionnaire (see Figure 4.5). The opening question needs to capture the attention of people in order for them to commit to completing the whole survey (Dillman, 2007). With that in mind, Dillman (2007) provides some idea of what the first section of a survey should look like in order to keep the interest of as wide a spectrum of respondents as possible. It should be succinct and give the impression that the survey will not require too much time and effort to complete. It should engage the interest of the person reading it and be relevant to the survey aim that was contained in the introductory part. Questions in this section should ideally be closed, requiring simple, short answers. Table 3.5 summarises the different constructs, their definition, and the questionnaire items associated with them. It was vital that constructs were generated from factors raised in literature (Chapters 2) and that the codes given to them are useful in the analysis of responses from the survey (Chapter 4).

Table 3.5 *Constructs included in the Questionnaire (both versions)*

Construct	**Construct definition**	**Items**	**Adapted from**
Performance Expectancy (PE)	The degree to which an individual believes that using a system will help him or her attain gains in job performance.	- Improves my study performance. - Enables me to achieve study/research task. - Helps me accomplish my study more quickly. - Increases my productivity. - Is beneficial to my study	Awwad & Al-Majali (2015)
Effort Expectancy (EE)	The extent of convenience perceived for using a system.	- It is easy for me to become more skilful in using it. - I will continue to find it easy to use. - Learning to use it does not require much effort. - My interaction with it will continue to be clear and understandable.	Awwad & Al-Majali (2015)
Social Influence (SI)	The degree to which an individual perceives how important others believe is it that he/she should use the technology.	- People whose opinions I value prefer that I use it. - People who are important to me at my university think that I should use it. - People who influence my study think I should use it - I am encouraged to use it by people who assess my work. - I use it because people around me do. - Not using it makes me feel I am falling behind others.	Awwad & Al-Majali (2015)
Facilitating Conditions (FC)	The degree to which an individual believed that an organisational and technical infrastructure existed to support technology use.	- It is suitable for the way I study. - I can get help when I have difficulty. - The help can direct me to the information I need. - The help supports me in my tasks/research study. - Other students show me how to use it. - I have been trained to use it.	Jeong (2011)

Construct	Construct definition	Items	Adapted from
Computer Self-Efficacy (SE)	An individual's perceptions of his or her ability to use computers to accomplish a task	- I feel confident in my ability to use it. - I can use it even if there is no one around me to show me. - I don't need a lot of time to complete my task using it. - I often find it difficult to use it for my studies. - I am confident in using it.	Park, Roman, Lee, & Chung (2009)
Accessibility (AC)	The degree of convenience with which an individual access an information system	- I find it easy to navigate. - I am able to use it whenever I need it. - I find it easy to get access to. - It is easily accessible. - I can locate the resources I need.	Park, Roman, Lee, & Chung (2009)
Visibility (VI)	The degree to which a system is observable or apparent in an organisation.	- People at my university know that it exists. - People know where to look to find it. - I find that it is always available.	Hong, Thong, Wong, & Tam (2002)
Relevance (RE)	The degree to which the system matches tasks as carried out in the current environment and as specified in the task analysis	- It has resources that relate to my area of interest. - It has enough resources for my study. - It provides current information in my area of interest. - It is a very efficient study tool. - It is limited in its coverage of my area of interest.	Hong, Thong, Wong, & Tam (2002)
Behavioural Intention (BI)	Individual intention to use a particular technology that directly affects actual usage.	- I intend to use Google Scholar/University library website for my study in the future. - I intend to increase my use of Google Scholar/ University library website in the future. - I predict I will use Google Scholar/ University library website in the future. - I plan to use Google Scholar/ University library website in the future	Davis, Bagozzi, & Warshaw (1989)
Motivation (MO)	The fun or pleasure derived from using a technology	- Helps me achieve in my studies.	Sumayyah & Patel (2012)

Construct	Construct definition	Items	Adapted from
		- Really encourages me in developing my areas of interest - I feel I am working within a community of scholars in my area. - Helps even when the task is challenging. - I don't always feel in control of the outcome. - Makes me feel really involved in my studies.	
Domain Knowledge (DK)	The person's knowledge of a particular discipline, domain, or area that is relevant to the search	- I am familiar with the subject domain that I search for. - I am knowledgeable in the topic to search for. - I have previous experience searching in this subject domain. - I have the domain knowledge that it necessary to search for what I want to find	Abdullah, Ward, & Ahmed (2016)
Computer Experience (CS)	The amount and type of computer skills a person has acquired over time	- I am confident in using computers. - I think I am efficient in the use of a computer to complete my task. - I can use a computer even if there is no one around to show me. - I am happier if there is someone around to ask for help.	Abdullah, Ward, & Ahmed (2016)

A scale of 1-5, representing responses of 'strongly disagree' to 'strongly agree' respectively, was used to measure answers in this section. This simple method of recording responses has been utilised in previous studies in the same subject area (Awwad, & Al-Majali, 2015; Jeong, 2011). This type of '1-5' scale is a Likert scale and is commonly and widely used by questionnaire designers due to its simplicity and the way in which it enables respondents to express their level of agreement to a certain point (Saunders et al., 2016). Using a five-point scale also has its advantages to the researcher during the examination of the results as it simplifies the establishment of a middle point, allows for the weighted mean to be worked out simply, and provides a common point for comparing responses. Table 3.6 below shows the Likert scale design which garners a response telling how much the participant agrees with the statement. It was also used to show how often participants responded in the same way to other questions.

Table 3.6 *Likert scale utilised in the study*

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

The second section of the questionnaire comprised five close-ended questions. The close-ended questions left no offer of expansion on the given choice of answers and asked for the respondents' age, gender, university, current educational status, and a preference of search engine between Google Scholar and their university library website. This type of question requires only a quick, short response and restricts the need for much handwriting, thus eliminating problems arising with the legibility of long responses, which can occur in non-professional questionnaires (Dillman & Christian, 2005).

Saunders et al. (2016) state that there should be a mutual understanding of the questions, by both researcher and respondent, in the way that they each intended their counterpart to understand them. After considering these aspects of the questionnaire, there is another important factor that can capture the interest of the potential respondent and encourage them to complete the whole survey, namely the visual layout (Dillman, 2007). Features such as logos, symbols, numbers, and graphics (and their variations in size, boldness, and shape among other things) have a crucial part to play in helping respondents decide whether or not to fully participate in the survey. Participants have historically favoured an extra page over a page that has too much writing squeezed on to it. The visual appearance of a questionnaire plays as much a role in gaining meaningful responses as the wording of the questions (Dillman & Christian, 2005). Based on this, the two-page questionnaire in this research was created to be simple to understand, visually pleasing, and require only short answers. It is a commonly held belief that more succinct questionnaires have a better rate of response than the lengthier designs. However, it is important to strike a balance so that respondents do not think that a short survey indicates a lack of importance in the study, therefore inciting a less than comprehensive response, but conversely a long survey may seem too tedious and will probably not get completed at all (Saunders et al., 2016).

A third section was also created for the questionnaire and this contained a single open-ended question asking the students to justify their choice of preferred tool for information search. This questionnaire section was not distributed to all students, as the researcher wanted to limit the number of participants who answered this question as he believed that an open-ended question would help in obtaining in-depth information that could be analysed using a qualitative method of data analysis.

3.8 Sampling

A sample, in the view of Fink (2003), may be recognised as "a portion or subset of a larger group called a population" (p.1). In quantitative studies, larger samples are more widely recommended than smaller ones. Accordingly, there is the need for a statistical analysis tool that can examine large numbers of observations and provide reliable results; this is achieved through various solutions, namely factor analysis, structural equation modelling (SEM), and multiple regression analysis (Cohen et al., 2017). Moreover, Gorard (2010) further emphasises the value related to a large sample owing to the fact that "cases in the sample will be lost at several stages" (p.60). It is possible for this to occur as a result of unintelligible answers or otherwise a lack of response to a question. As such, the sample needs to be adequate in size so as to ensure the research objectives can be achieved. According to Taherdoost (2016, p19) the selection of the sampling method for a research should take a step-by step process where the researcher could (i) clearly define the target population. (ii) Select the sampling frame, (iii) choose the sampling techniques; (iv) determine the sample size; (v) collect data and (vi) assess the response from the data collected. In the event that the "sampling frame" is unclear or not available, the research would have to deduce a convenience sampling method that could reflect true parameters of the population, argued Bujang et al., (2012). The research should therefore state a plan that can be used to collect data from the sample of a given population (Jawale, 2012). In addition, the research could use either probability sampling or non-probability sampling technique (Jawale, 2012). In other words, sampling may be either probability or purposive, where the former relates to "selecting a relatively large number of units from a population, or from specific subgroups (strata) of a population, in a random manner where the probability of inclusion for every member of the population is determinable" (Tashakkori &

Teddlie, 2003, p.713). The objective of probability samples is to achieve "representativeness" – that is, the extent to which the whole population is accurately represented by the sample (Teddlie & Yu, 2007). In this work, however, purposive sampling was utilised. This type of sampling places emphasis on choosing groups (e.g., individuals, institutions, sets of individuals) on the basis of definite objectives related to answering a study's research questions. Further, purposive sampling has been defined by Maxwell (1997) as a kind of sampling wherein "particular settings, persons, or events are deliberately selected for the important information they can provide that cannot be gotten as well from other choices" (p.87).

The rationale for choosing the purposive sampling strategy for a principally quantitative study was that the researcher could not obtain access to the list of all international postgraduate students studying in the universities in the Manchester area. Moreover, he was constrained by their accessibility and availability on the campus (Ghauri & Gronhaug, 2005).

3.8.1 Sampling for the Main Study

This research's population comprised of international postgraduate students from Manchester universities. A total of 400 international postgraduate students at Manchester universities participated. Overall, it may be held that a greater volume of data leads to better validity; in this vein, a sample size of 400 is viewed as being optimal. The postgraduate students were recruited using the purposive sampling technique to accomplish comparability or representativeness. That is, the researcher tried to find international postgraduate students who were typical or representative of users of GS or UDLs.

The rationale behind selection of 400 participants in the study is based on the findings of Fugard and Potts (2015), who emphasise that a larger sample size is crucial as it allows deriving more accurate values, allows replication of the findings **o**n the smaller size of the sample, and also decreases the possibility of extracting inaccurate findings. For this research, convenience sampling technique was the ideal form of sampling technique useable at the time of designing the data collection strategy. Elfil and Negida (2017) define convenience sampling as a non-probability sampling method where researchers make a sample in accordance with the availability and accessibility of the participants. The critical driver of convenience sampling tends to be the speed, reduced costs as well as convenience to access a particular sample, which would otherwise not be easily accessible due to various circumstances (Etikan et al., 2016; Farrokhi and Mahmoudi-Hamidabad 2012). The justification for choosing a convenience sampling approach was because the technique allows the researcher to select participants within a particular stratum possible (Jannink et al., 1995). The nature of the sampling frame dictates the use of convenience sampling technique, argues Sedgwick (2013). For example, a research whose sampling frame are "tourists" would use convenience sampling technique because the target population has been known to be "tourists"; hence, the target sampling technique would be convenience (Chen et al., 2011).

Therefore, 40 students were conveniently sampled for the open-ended question. The selection of 40 students was based on the general rule of thumb (Connelly, 2008), i.e., 10% of the actual study sample (n = 400). The preference to these students was given based on their use, acceptance, and attitude towards either GS or UDLs. The reason for using an open-ended question was to gain additional insight about their use towards either technology system; that is, it helped discover any other aspects affecting their acceptance and intention to use GS or UDLs which had not been included in the UTAUT model.

3.8.2 Sampling for the Pilot Study

A pilot test was also performed using a sample consisting of 20 students before collecting the data from the study sample. These students were selected based on their preference of using either Google Scholar or a University Library Website. They were asked an open-ended question as discussed in the previous section. Therefore, 10 students were provided with the Google Scholar survey questionnaire and rest of the students were provided with the University Library Website questionnaire based on their preference and use. The rationale for conducting a pilot study was based on the suggestion of van Teijlingen and Hundley (2001) who affirmed that pilot studies are feasibility studies that increase the likelihood of success and are, therefore, considered to be a particularly useful pre-testing research instrument.

Regarding the decision on the sample size for the pilot study, previous researchers have discussed its selection based on different 'rules of thumb'. For instance, a general flat rule has been proposed by Browne (1995) that at least 30 subjects or more can be used to measure the parameter. Similarly, a minimum sample size of 12 subjects per treatment arm was proposed by Julious (2016). In addition, a pilot trial sample size of 70 has been recommended by Teare, Dimairo, Shephard, Hayman, Whitehead, and Walters (2014) for reducing the imprecision around the standard deviation estimation. However, Kieser and Wassmer (1996) have actually described the method of setting the pilot trial sample for minimising the size of the pilot and the actual sample of the study. An 80% upper confidence limit (UCL) approach was applied by the researchers to reduce the overall sample size for a main study based on a pilot trial sample size of 20 and 40 and a main study sample size of 80-1571, corresponding to standardised effect sizes of 0.1 and 0.3 (for 80% power based on a standard sample size calculation) (Figure 3.1). Therefore, based on the aforementioned discussion on the pilot trial sample size, the study selected a sample size of 20 participants (10 each from Google Scholar and UWL survey) for the pilot test.

Standardized difference, d^a	80% powered main trial		90% powered main trial	
	Pilot N per arm	Main trial N per arm	Pilot N per arm	Main trial N per arm
Extra small ($d<0.1$)	50	>1571	75	>2103
Small ($0.1\leq d<0.3$)	20	176–1571	25	235–2103
Medium ($0.3\leq d<0.7$)	10	34–176	15	44–235
Large ($d\geq 0.7$)	10	≤34	10	≤44

Figure 3.1 *Sample size justification based on 80% and 90% powered main trial*

(Whitehead et al., 1993)

3.9 Process of Data Collection

The questionnaires were administered amongst international postgraduate students in three universities in Manchester. Despite the fact that the mail questionnaire is recognised as having been the preferred form of data collection used in Library and Information Science studies (Palmquist & Kim, 1998), in the current work, the researcher made the decision to 'directly-administer' questionnaires, which is recognised as very effective when a group of people is assembled in one place (e.g. a classroom) (Ary et al., 2018). Accordingly, the completed questionnaires were administered and collected by the researcher by attending individual classrooms, libraries and administration buildings across the three universities. In the view of Ary et al. (2018):

> *It [is] easy to reach a large sample of students in a variety of disciplines by administering the survey in classrooms (with permission of professors). The main advantage of the direct*

administration of questionnaires is the high response rate, which typically reaches 100 percent. Other advantages are the low cost and the fact the researcher is present to provide assistance or answer questions. (p.437)

It is recognised that, when applying a directly administered survey questionnaire, there are two key disadvantages: namely restrictions relating to the location and the limited generalisability across the population. As has been noted by Ary et al. (2018), it is common for the researcher to be restricted in regards to where and when the administration of the questionnaire can take place. Furthermore, owing to the fact that the sample tends to be very particular, i.e. post-graduate students at a specified university, the findings can only be generalised to the population presented by the sample (*ibid*., p.437).

Nonetheless, in the case of the current work, the researcher was able to control for the two aforementioned disadvantages by distributing and gathering the questionnaires on the same occasion – notably during the course of a lecture – which therefore facilitated a high response rate, as well as the ability to provide clarification as and when needed.

3.10 Process of Data Analysis

In specific regards to this research, quantitative and natural data gathered through the application of a questionnaire underwent analysis with the use of the Statistical Package for the Social Sciences (SPSS) v24. Punch (2013) proposes that there are three major guidelines that can be used to analyse quantitative data; these are creating variables, distributing the variables within the sample, and creating relationships. In order to facilitate this, the SPPS software was used for this study because of its reliability in creating links within different datasets.

3.10.1 Data Coding and Cleaning

The data analysis stage started with data coding and cleaning of raw data. This entailed checking for missing data and potential error (Pallant, 2010). SPSS is a statistical software package with the ability to analyse data. It is able to arrange research data into different statistical formats so as to facilitate the identification of the relevance of those variables linked to the study topic. In this study, the researcher keyed in the data in the SPSS software, assigned codes to the data and then manipulated it using diverse statistical tests to generate graphs and tables for analysis.

3.10.2 Data Analysis

As mentioned earlier, SPSS (v24) was utilised to analyse the quantitative data obtained from the questionnaire. The analysis of the responses to the open-ended question was performed in stages, using a combination of deductive and inductive coding (also called 'hybrid' coding; Fereday & Muir-Cochrane, 2006).

The different statistical tests utilised in the study were: (i) normality testing; (ii) descriptive statistics; (iii) Kruskal-Wallis test and Mann-Whitney U test; (iv) correlation analysis; (v) multiple regression analysis; (vi) reliability analysis; (vii) factor analysis; and (viii) structural equation modelling (SEM). A brief description of the different tests follows:

i) Normality testing:

Since the study compares the perceptions of two groups of international postgraduate students, the normality testing of the data was required. The Kolmogorov-Smirnov statistic, with Lilliefors significance level and the Shapiro-Wilk statistic, skewness, and kurtosis (Ghasemi & Zahediasl, 2012) were utilised to test the normality of the data in this study.

ii) Descriptive statistics

Descriptive statistics, or summary statistics or summary measures, are utilised to encapsulate a set of data with the objective of communicating a considerable amount of information as clearly as possible. This study utilised measures of frequency, mean and standard deviation as the statistical tests in this regard.

iii) Kruskal-Wallis test and Mann-Whitney U test

The non-parametric Mann-Whitney U and Kruskal-Wallis tests were utilised to compare the effect of the moderating variables on students' perceptions across the different measured and derived constructs utilised in the study.

iv) Correlation analysis

Spearman's rho correlation test was utilised to explore the correlation between the perceptions of the students across the study's variables. This test is a non-parametric statistic and was selected for use due to the non-normal distribution of data. The robustness and direction of the relationship in existence between two variables is measured by this test.

v) Multiple regression analysis

Multiple regression models were utilised to facilitate scrutiny of the nature and extent of the relationship between the different constructs in the study.

vi) Reliability analysis

The reliability of the questionnaires utilised in the study were analysed using Cronbach's alpha (Ritchie & Lewis, 2003).

vii) Factor analysis

Exploratory Factor Analysis (EFA) using Varimax rotation was utilised to examine the satisfactoriness of the scales employed in assessing the study constructs. The factor loading values for each item were considered and their accountability confirmed. The study considered factor loading values nearing 1 to indicate a robust influence of the item whereas values nearing 0 were regarded as weak (Straub, 1989). Moreover, factor loading values >0.40 with Eigen value=1 were considered to signify adequate validity (Comrey & Lee, 2013).

Prior to performing the factor analysis, the KMO (Kaiser-Meyer-Olkin) test was utilised to assess the adequacy of the sample size. The minimum acceptable score for this test was found to be 0.5 (Kaiser, 1974). Further, Bartlett's test of sphericity (1950) was performed to validate whether the correlations between the variables were 0, i.e., the correlation matrix is an identity matrix. The Bartlett's test is required to a significant outcome to ensure the suitability of the principal component analysis (PCA).

Confirmatory factor analysis (CFA) was also utilised to check whether a dataset fits a measurement model (Janssens, 2008). Carrying out CFA on the variables associated with each factor ensures that the items are sufficiently loaded, as well as checking that all variables satisfactorily fit with the confirmatory model.

viii) Structural equation modelling (SEM)

Structural equation modelling (SEM) is a statistical approach to scrutinise and compare structural models using standardised coefficients. This is achieved by evaluating a model's goodness-of-fit indices. SEM is commonly used by social science researchers who seek to assess the relationships among a study's variables (Hair, Anderson, Tatham, & Black, 2008). SEM can be utilised in large samples, measures the path relationships between variables explaining errors in measurement and is appropriate for studies where latent constructs with various items are utilised, as in the case of the present study (Hair et al., 2008; Luna-Arocas & Camps, 2007).

Another reason for using SEM in the present study is that it combines measurement and structural model through the use of CFA and regression analysis (Malhotra & Dash, 2011; Widaman & Thompson, 2003). In addition, SEM analysis can facilitate the measurement of validity of a research instrument and consequent improving of the factors (Graver & Mentzer, 1999).

3.11 Ethical Considerations

Research ethics may be defined as relating to the researcher's responsibility to ensure honesty and respect amongst all subjects potentially affected by the research or their reports of the studies' results (Gravetter & Forzano, 2018, p.98). It is noted by Denscombe (2017), who agrees with the view of Bryman and Bell (2015), that research should be guided by morals, and performed as ethically as possible. In line with this principle, the subjects involved in this work were all well informed and advised that the information provided would remain both confidential and anonymous. Moreover, there was no need for the subjects to give their names or any data that could lead to their identification. This is in line with the recommendation presented by Bryman and Bell (2015) in relation to informed consent and the need to ensure deception and misrepresentation are avoided.

Gravetter and Forzano (2018) hold the view that there is a need for the researcher to ensure all information pertaining to the study is given to the individuals involved. Accordingly, the research purpose was explained to the participating students throughout the administrative process. Furthermore, the questionnaires also included a cover sheet providing a brief introduction to the study purpose (please refer to Appendix 1 for the questionnaires utilised in the study). Moreover, the participants were informed that all of the data gathered throughout the course of the research study would be destroyed upon the finalisation of the work.

3.12 Conceptual Framework of the Study

The conceptual framework of the study is composed of two distinct elements which will be scrutinised separately to achieve the outcomes of the study. The first pertains to students' information seeking behaviour and the second element is related to the extended UTAUT model proposed by the present study to explain the technology adoption of the two systems under consideration. The next subsection describes the conceptual framework for information seeking behaviour.

3.12.1 Adapted Model of Information Seeking Behaviour

The theoretical framework of the study (please see Chapter 2 for details) described several models related to information seeking behaviour. Overall, it could be seen that four principal types of skills are associated with information seeking behaviour: retrieving, assessing, categorising, and exchanging, a skill set also termed information 'literacy' (Azadeh & Ghasemi, 2016). Moreover, persons who develop information seeking behaviour also develop the competence to search for information autonomously, thus easily meeting their information requirements (Azadeh & Ghasemi, 2016). Further, the factors that impact the information seeking behaviour of individuals can be categorised into individual factors, factors related to the capacity of the information system, environmental or societal factors, and factors related to the information itself (Azadeh & Ghasemi, 2016).

Although the models of information-seeking do not directly explain why a certain technological tool is used by students for information-seeking (as discussed in Chapter 2), one model stood out due to its emphasis on the individual in the context – namely Wilson's model of information-seeking behaviour. Supporting this, intervening variables such as emotional, demographic, interpersonal, role-associated, environmental, and source features could have a critical role to play in assisting or hindering the process of information seeking (Wilson, 1999). To the researcher, this seemed to be an appropriate outlook in the context of international postgraduate students' information seeking behaviour which could in turn affect their inclination and hence decision to make use of one of the technology systems in consideration in this study, namely UDLs and Google Scholar.

Figure 3.2 depicts the adaptation of Wilson's model for this research. Inspiration was drawn from Mowbray's (2018) model, which used Wilson's model as the basis for explaining information behaviour in the context of job search networking. Mowbray's model considered situational, social, and intrapersonal contextual factors whereas the present study considers the individual context with facets such as, individual features, system features, social facets, and motivation. Moreover, the goals of information search are updated to suit the student context.

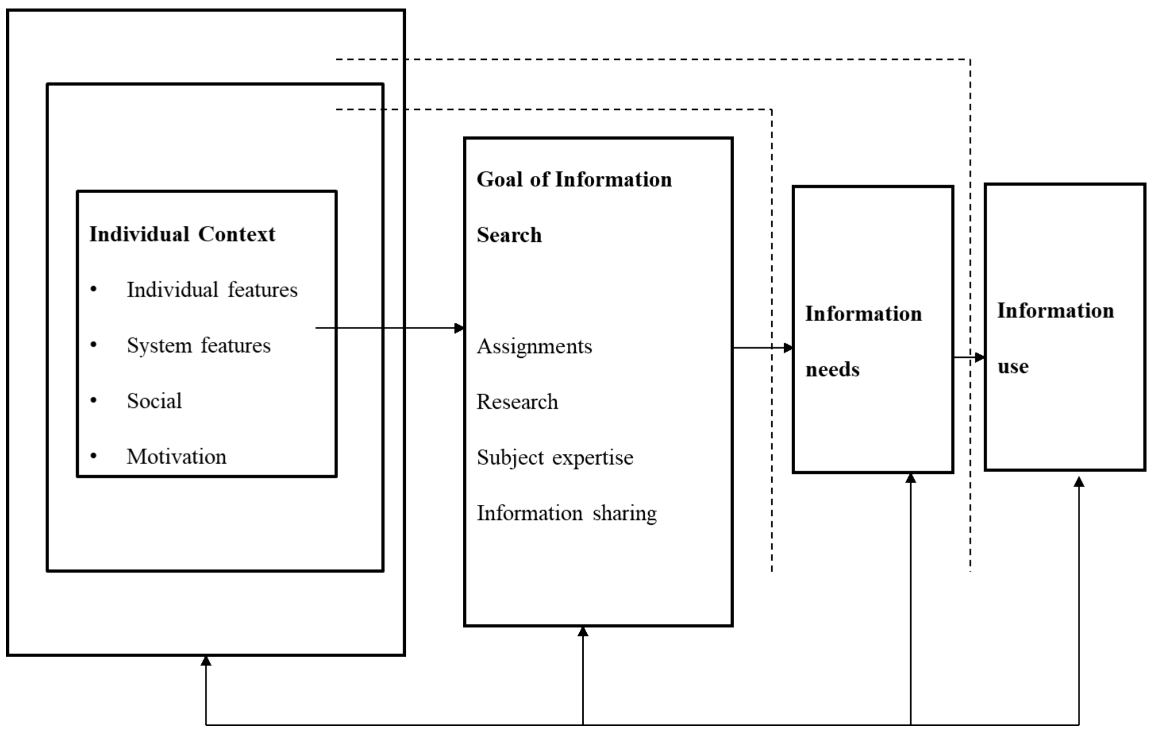


Figure 3.2 *An adapted version of Wilson's model based on Mowbray (2018)*

It may be noted that no hypotheses were proposed using this model but the qualitative data from the open-ended question were scrutinised using this model.

3.12.2 Extended UTAUT Model

As described in the theoretical framework of the study (see Chapter 2 for details), the second element of the theoretical framework for the present study is the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003). Consequently, the technology adoption conceptual framework of this study was derived utilising this theory as basis. Accordingly, the different constructs associated with the UTAUT were incorporated into the model, namely Performance Expectancy, Effort Expectancy, Facilitating Conditions, and Social Influence. Moderator variables included in the model are Gender, Age, Educational Status, University of Study, and Preferred Tool for Information Search (Figure 3.3).

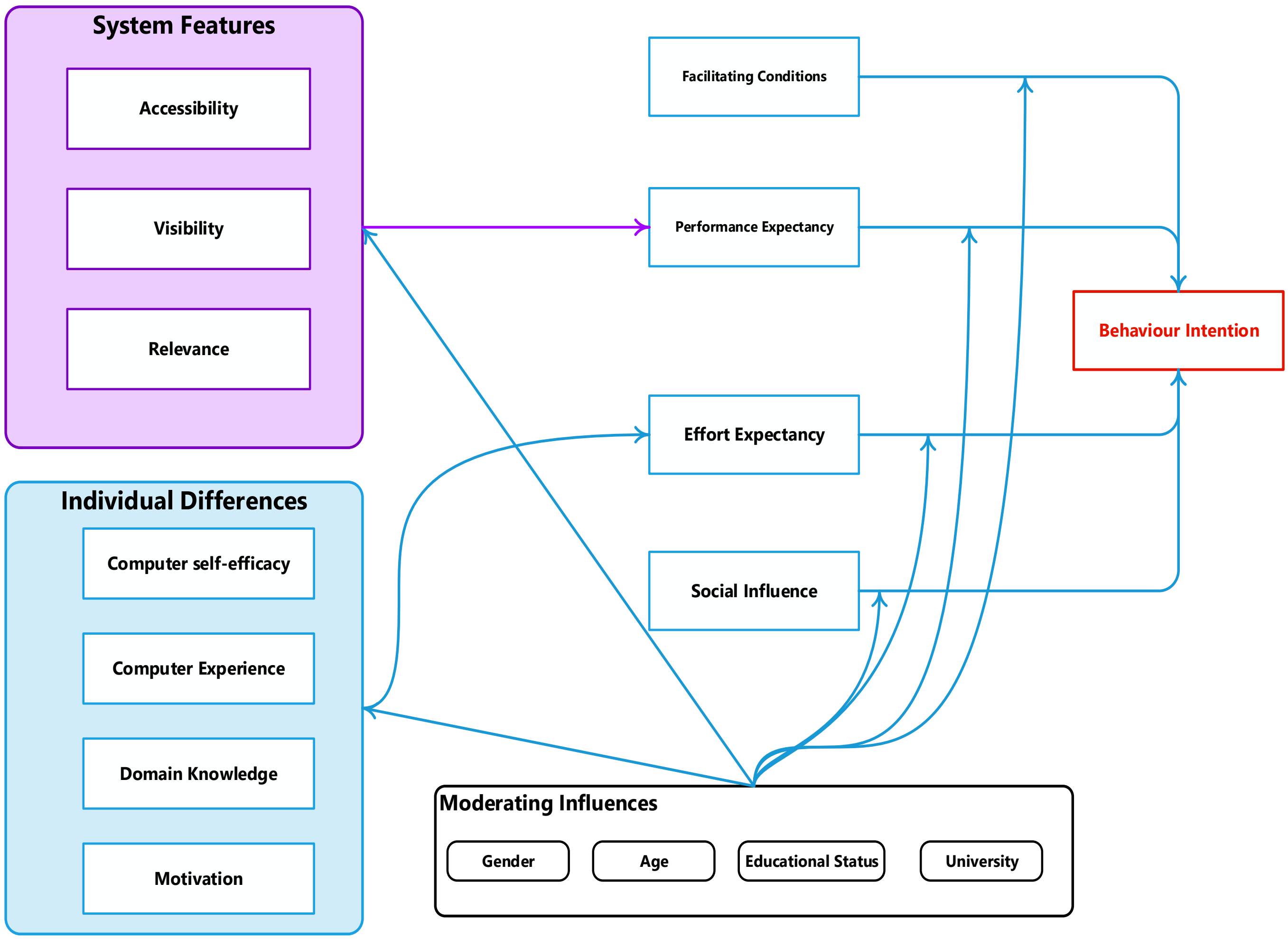


Figure 3.3 *Conceptual Framework for Technology Adoption*

It can be seen that apart from the fundamental constructs of the UTAUT, other constructs were included in the conceptual framework (Table 3.7; Table 3.5 also lists these variables in the context of the questionnaire). In other words, the researcher used the UTAUT model as the basis of the conceptual framework and included other constructs which were perceived to be relevant to the context of international postgraduate students. The researcher's supposition was that features of a system and the differences in individuals could influence their expectancy with regard to the system's performance and their own effort, respectively. Moreover, the outcome of the different constructs was posited to be the actual intention to utilise a system (that is, Behavioural Intention). This was in line with previous research related to e-libraries (e.g., Buchanan & Salako, 2009; Goh & Liew, 2009; Hong et al., 2002; Jeong, 2011; Park et al., 2009; Ramayah, 2006a, 2006b; Ramayah & Aafaqi, 2004; Thong et al., 2002; Yusoff, Muhammad, Zahari, Pasah, & Robert, 2009) which also scrutinised the intentions of users, current and prospective, to utilise e-library systems.

Overall, the proposed conceptual model comprises multiple independent and latent/belief variables, and a single dependent variable. Two of the independent variables are directly taken from the UTAUT model: Facilitating Conditions and Social Influence. The remaining independent variables, seven in total, are grouped into two encompassing variables or constructs: Individual Differences and System Features. Individual Differences consist of Domain Knowledge, Computer Experience, Computer Self-Efficacy, and Motivation. On the other hand, System Features include Accessibility, Visibility, and Relevance of a system. The belief variables associated with the independent variables are Performance Expectancy and Effort Expectancy and are directly taken from the UTAUT model. The dependent variable is the Behavioural Intention of users (see section 2.5.9 for the description of the variables in the UTAUT model).

Table 3.7 *Additional Constructs Included in the Conceptual Framework*

Construct	Sub-Construct	Construct definition	Adapted from
Individual Differences	Domain Knowledge (DK)	The person's knowledge of a particular discipline, domain, or area that is relevant to the search	Abdullah, Ward, & Ahmed, 2016
	Computer Self-efficacy (CS)	An individual's perceptions of his or her ability to use computers to accomplish a task	Park, Roman, Lee, & Chung, 2009; Jeong, 2011
	Computer Experience (CE)	The amount and type of computer skills a person acquires over time	Abdullah, Ward, & Ahmed, 2016
	Motivation (MO)	A combination of Extrinsic, Intrinsic, and Hedonic motivation. Extrinsic motivation is the "perception that users will want to perform an activity	Venkatesh, Thong, & Xu, 2012; Venkatesh et al., 2003

Construct	Sub-Construct	Construct definition	Adapted from
		‘because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions’" (Venkatesh et al., 2003, p. 428). Intrinsic Motivation is the “perception that users will want to perform an activity ‘for no apparent reinforcement other than the process of performing the activity per se’” (Venkatesh et al., 2003, p. 428). Hedonic motivation is defined as “the fun or pleasure derived from using a technology, and it has been shown to play an important role in determining technology acceptance and use” (Venkatesh et al., 2012, p. 161)	
System Features	Accessibility (AC)	The degree of convenience with which an individual access an information system	Park, Roman, Lee, & Chung, 2009
	Visibility (VI)	The degree to which a system is observable or apparent in an organisation.	Hong, Thong, Wong, & Tam, 2002
	Relevance (RE)	The degree to which the system matches tasks as carried out in the current environment and as specified in the task analysis	Hong, Thong, Wong, & Tam, 2002

The non-UTAUT constructs included in the extended conceptual model are described in the following subsections. It may be noted that these constructs originate from the technology acceptance model (TAM) (Hong et al., 2002).

3.12.2.1 Domain Knowledge

Domain knowledge is a factor that can favourably impact the perceived ease with which a digital library system can be utilised. For instance, studies by Hong and colleagues (2002) found that participants with greater familiarity with the domain in which they navigate perceived greater ease of use. Further, as highlighted by Hong and colleagues (2002), digital libraries do not provide an environment where consultations can take place. Consequently, a person's background knowledge of the domain can enable significantly simpler interaction with the library systems.

3.12.2.2 Computer Experience

Computer experience was included as one of the additional constructs as it has been posited that the earlier computer-associated experiences of an individual can be anticipated to influence the judgment of the person regarding the level of ease with which a new system can be utilised (Park et al., 2009).

3.12.2.3 Computer Self-Efficacy

The notion of computer self-efficacy originates from social cognitive theory and relates to an individual's judgment of his/her capability to utilise a technology to achieve a specific task or job (Venkatesh et al., 2003).

3.12.2.4 Motivation

Motivation (or hedonic motivation) pertains to the pleasure or fun resulting from the use of a technology and its significance in determining the acceptance and usage of a technology has been demonstrated (Brown & Venkatesh, 2005).

3.12.2.5 Accessibility

Ratnasari and Hendriyani (2019) define accessibility as the extent to which an information system can be conveniently accessed by an individual. In the context of the present study, it would appear that accessibility to a UDL is a basic necessity for its use. Thong and colleagues (2002) reported that accessibility had a favourable impact on perceived ease of use. However, the favourable impact of accessibility on perceived usefulness could not be confirmed.

3.12.2.6 Visibility

The extent to which a system is evident or noticeable in an organisation is its visibility. In the context of libraries, prospective users may be unaware of a library's existence if it is not visible to them. The greater the visibility of a system, the greater the likelihood that it will be perceived to be accessible and effective (Thong et al., 2002). Moreover, the probability that the visibility of a new system will guide prospective users to adopt it is great (Moore & Benbasat, 1991). In other words, it can be anticipated that the greater the visibility of a digital library system, the greater the perception that it is useful, and consequently the greater the intention of users to utilise the system.

3.12.2.7 Relevance

Ratnasari and Hendriyani (2019) describe relevance as the connection between a digital library system's content and the information needs of users. That is, it is the extent to which the system effectively provides the users with their requested information (Park et al., 2009). Relevance, as a concept, is related closely to the assessments of a system's usefulness by users (Thong et al., 2002; Venkatesh & Davis, 2000). In other words, the more information found in the system by users which is relevant to their tasks, the greater the probability that the system will be perceived by them to be useful (Ratnasari & Hendriyani, 2019).

The next section discusses the hypotheses derived from the theoretical constructs discussed in the previous sections.

3.12.3 Research Hypotheses based on the Extended UTAUT Model

Based on the review of the original and extended UTAUT models, it appeared that a set of hypotheses which connect the different constructs could be proposed and tested. As seen in the preceding section, the proposed model for the research contains nine independent variables, two belief variables, and a single dependent variable. Moreover, of the nine independent variables, seven were grouped into two constructs based on their association with the individual and with the system in consideration. It may be noted that some of the hypotheses are related to the key constructs of the model, the remaining test the effect of the moderating variables on the independent variables.

3.12.3.1 Hypotheses related to the key constructs

Table 3.8 summarises the key constructs hypotheses which depict the direct relationships between the constructs in the extended UTAUT model (Figure 3.3):

Table 3.8 *Key constructs hypotheses*

Hypothesis	Hypothesis Statement	Associated Research Question
H1	Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions directly influences students' Behavioural Intention	This hypothesis is related to RQ2: What are the key factors that influence international postgraduate students' acceptance and usage of University

Hypothesis	Hypothesis Statement	Associated Research Question
		Digital Libraries (UDL) and Google Scholar in universities at Manchester?
H2	System Features (Accessibility, Visibility and Relevance of the System) directly influence students' Performance Expectancy	This hypothesis is related to RQ2: a) To what extent can individual differences and **system features** increase use of UDLs? b) To what extent can individual differences and **system features** increase use of Google Scholar?
H3	Individual Differences (Computer Self-Efficacy, Computer Experience, Domain Knowledge and Motivation) directly influences students' Effort Expectancy	This hypothesis is related to RQ2: a) To what extent can **individual differences** and system features increase use of UDLs? b) To what extent can **individual differences** and system features increase use of Google Scholar?
H4	Performance Expectancy (PE) directly influences students' Behavioural Intention (BI). H4a: Performance Expectancy (PE) directly influences students' Behavioural Intention (BI) to use Google Scholar. H4b: Performance Expectancy (PE) directly influences students' Behavioural Intention (BI) to use the University Digital Library (UDL).	These hypotheses are related to RQ4: What are the factors that affect the acceptance and use of University Digital Libraries (UDL) and Google scholar in universities at Manchester? a. How effectively does a modified UTAUT model evaluate the use of UDLs by international post graduate students in universities at Manchester? b. How effectively does a modified UTAUT model evaluate the use of Google Scholar by international post graduate students in universities at Manchester?
H5	Effort Expectancy (EE) directly influences students' Behavioural Intention (BI). H5a: Effort Expectancy (EE) directly influences students' Behavioural Intention (BI) to use Google Scholar. H5b: Effort Expectancy (EE) directly influences students' Behavioural Intention (BI) to use the University Digital Library (UDL)	

Hypothesis	Hypothesis Statement	Associated Research Question
H6	Social Influence (SI) directly influences students' Behavioural Intention (BI). H6a: Social Influence (SI) directly influences students' Behavioural Intention (BI) to use Google Scholar. H6b: Social Influence (SI) directly influences students' Behavioural Intention (BI) to use the University Digital Library (UDL).	
H7	Facilitating Conditions (FC) directly influence students' Behavioural Intention (BI). H7a: Facilitating Conditions (FC) directly influence students' Behavioural Intention (BI) to use Google Scholar. H7b: Facilitating Conditions (FC) directly influence students' Behavioural Intention (BI) to use the University Digital Library (UDL).	
H8	System Features directly influence students' Performance Expectancy (PE). H8a: System Features directly influence students' Performance Expectancy (PE) regarding Google Scholar. H8b: System Features directly influence students' Performance Expectancy (PE) regarding University Digital Library (UDL).	
H9	Individual Differences directly influence students' Effort Expectancy (PE). H9a: Individual Differences directly influence students' Effort Expectancy (PE) regarding Google Scholar. H9b: Individual Differences directly influence students' Effort Expectancy (PE) regarding University Digital Library (UDL).	

It must be noted that although Hypotheses 2, 3, 8 and 9 appear to be similar, they will be assessed using different statistical tests.

One implicit hypothesis that will be assessed is that the behavioural intention to utilise Google Scholar or a UDL also directly and positively influence the usage behaviour associated with these systems (Venkatesh & Brown, 2001; Venkatesh et al., 2003).

3.12.3.2 Hypotheses with the moderating variables

As can be seen in Figure 3.3, the moderating variables included in this study are: Gender, Age, Educational Status, University of Study, and Preferred Tool for Information Search. Accordingly, the present study will investigate the impact of these moderators on the seven principal constructs, namely Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences.

H10: Gender affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences.

> H10a: Gender affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of the University Digital Library (UDL) users.
>
> H10b: Gender affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of Google Scholar users.

H11: Age affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences.

> H11a: Age affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of the University Digital Library (UDL) users.

H11b: Age affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of Google Scholar users.

H12: Educational Status affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences.

H12a: Educational Status affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of the University Digital Library (UDL) users.

H12b: Educational Status affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of Google Scholar users.

H13: University of study affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences.

H13a: University of study affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of the University Digital Library (UDL) users.

H13b: University of study affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of Google Scholar users.

H14: Preferred Tool for Information Search affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences.

H14a: Preferred Tool for Information Search affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort

Expectancy, Social Influence, System Features, and Individual Differences of the University Digital Library (UDL) users.

H14b: Preferred Tool for Information Search affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of Google Scholar users.

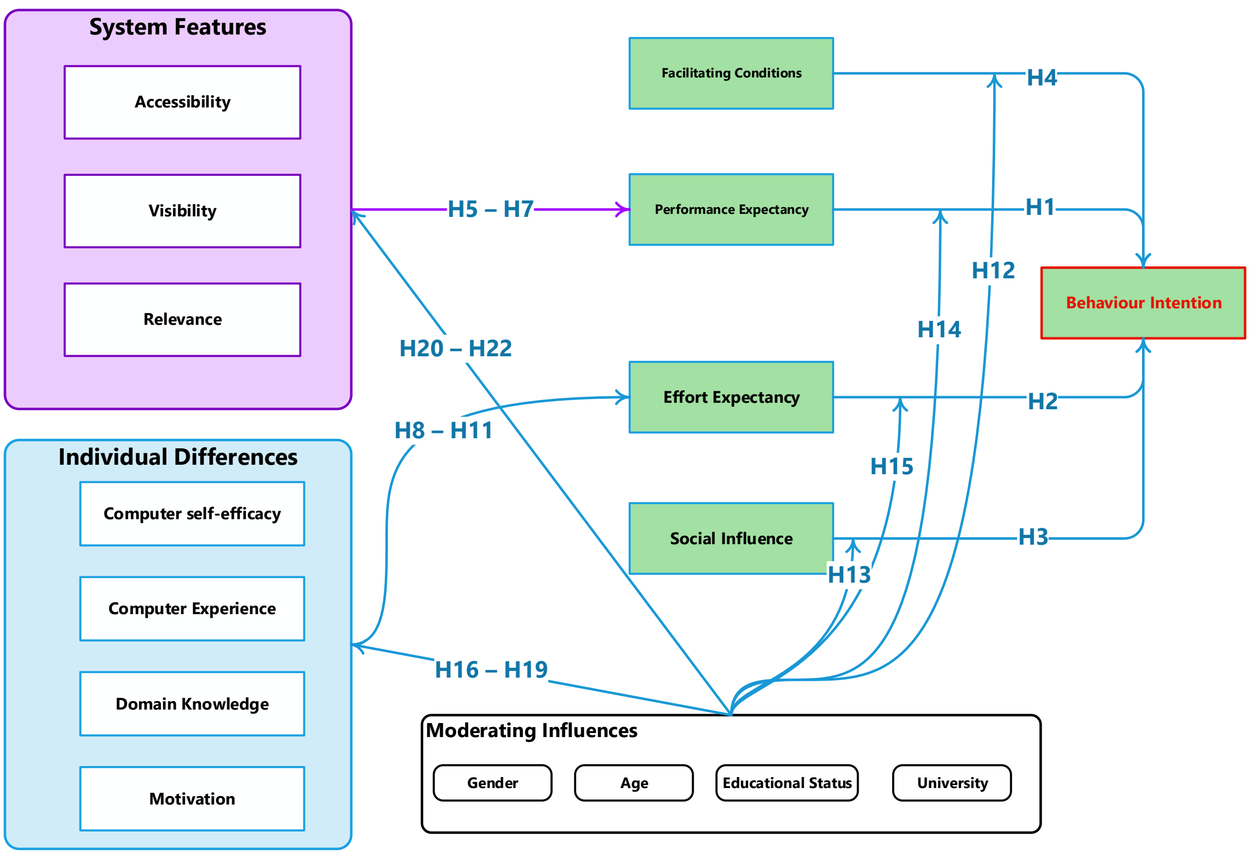


Figure 3.4 *Research constructs used as hypotheses*

3.13 Chapter Summary

This chapter described the research philosophy adopted by the study after scrutinising different research paradigms, research approaches, strategies, and methods.

Further, the resultant research design is described along with the development of the instrument for data collection, sampling techniques, methods of data collection and analysis, and ethical consideration for the study.

The consideration of different research paradigms, approaches, strategies, and methods, helped the researcher determine that the most appropriate approach for the study would be a positivist, explanatory, quantitative one.

Consequently, the design of the two versions of the questionnaire for the study was described drawing attention to the various constructs included for scrutiny. The methods of data collection and analysis were also described.

Moreover, the conceptual framework for the study was discussed drawing attention to the two aspects requiring scrutiny in the context of the study namely, the information seeking behaviour of students and the factors affecting their technology adoption. Research hypotheses were also developed in this regard.

The next section discusses the findings from the research.

Chapter 4: Research Findings

4.1 Introduction

For the research to, objectively, compare the perceptions of international postgraduate students regarding Google Scholar and university libraries websites, it was critical to collect as much primary data as possible to use it in the analysis of the research problem. It would be difficult to examine international students' perspectives on the factors that affect their use of Google Scholar and UDLs using only a literature review. This chapter examines the primary information obtained from the survey, using descriptive statistics and other forms of statistical analysis techniques that were considered critical in the identification of factors influencing the choice between UDLs and Google Scholar. The chapter is organised into several sections for ease of navigation. The first section describes the normality testing of the data. The second section provides the findings from the analysis of the students' demographic data and summarises the findings from the descriptive analysis of the students' perceptions regarding the studied constructs. The third section presents the findings related to the effect of the moderating variables (i.e., demographic variables) on the students' perceptions and the status of the hypotheses tested on these.

The fourth section presents the correlation analysis of the data. The fifth section describes the multiple regression analyses performed on the data. The seventh section describes the measurement scale analyses, which include the reliability and factor analyses (exploratory and confirmatory) of the questionnaire and the use of structural equation modelling (SEM) to assess the robustness of the conceptual extended UTAUT model developed for this study. The eighth section summarises the outcomes of the testing of the study's hypotheses related to the key constructs of the extended UTAUT model. The final section describes the findings from the open-ended question.

The chapter concludes that there is clear evidence of factors that have been linked to behavioural influence of information seekers and their choices for the platforms to use. The findings, therefore, provided the research with robust raw information that could be used to undertake detailed discussion and create a clear pattern for the research.

4.2 Normality Testing of the Data

Several inferential statistical tests assume the normality – normal distribution – of data. The term 'normal' is utilised to designate a balanced, bell shaped curve, with the middle containing the highest frequency of scores and the extremes containing the smaller frequencies (Gravetter & Wallnau, 2016, p.52). Many statistical tests are available to evaluate normality, such as the Kolmogorov-Smirnov statistic, with Lilliefors significance level and the Shapiro-Wilk statistic, skewness, and kurtosis (Ghasemi & Zahediasl, 2012). In this study, the normality was assessed using these two tests. The null hypothesis for both of these tests submits that data are taken from a normal distributed population. When $p > 0.05$, the null hypothesis is accepted and the data are labelled as normally distributed (Mishra, Pandey, Singh, Gupta, Sahu, & Keshri, 2019).

It can be seen from Table 4.1, the p-value is <0.05 in the case of both the tests, signifying that the population is not normally distributed. In the context of the present study, this impacted the selection of the tests for the testing of the study's hypotheses; that is, nonparametric tests which do not assume normality were chosen as the data are not normal. The responses from both the datasets were utilised for these tests resulting. That is, the combined dataset of 400 responses were utilised for these tests.

Table 4.1 *Normality test for the constructs used in the study*

Construct	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Domain Knowledge	0.163	400	0.000	0.921	400	0.000
Computer Experience	0.194	400	0.000	0.906	400	0.000
Computer Self-efficacy	0.077	400	0.000	0.978	400	0.000
Motivation	0.078	400	0.000	0.982	400	0.000
Relevance	0.112	400	0.000	0.972	400	0.000
Accessibility	0.144	400	0.000	0.941	400	0.000
Visibility	0.143	400	0.000	0.920	400	0.000
Facilitating Conditions	0.100	400	0.000	0.963	400	0.000
Effort Expectancy	0.144	400	0.000	0.922	400	0.000
Performance Expectancy	0.144	400	0.000	0.938	400	0.000
Social Influence	0.088	400	0.000	0.982	400	0.000
Behavioural Intention	0.146	400	0.000	0.921	400	0.000

[a] *Lilliefors Significance Correction*

The non-parametric Mann-Whitney U test was utilised to compare the students' perceptions across the two independent datasets (UDL and Google Scholar datasets). From Table 4.2 it can be seen that the distribution of opinions in the two datasets were significantly different (p-value < 0.05) across all the measured constructs/variables. Moreover, it was evident that the perceptions of Domain Knowledge (U = 1409.500, p = .000), Computer Experience (U = 6214.5, p = .000), Computer Self-efficacy (U = 8951.500, p = .000), Motivation (U = 9084.500, p = .000), Relevance (U = 8340.500, p = .000), Accessibility (U = 4123.000, p = .000), Visibility (U = 5823.000, p = .000), Facilitating Conditions (U = 6839.000, p = .000), Effort Expectancy (U = 3201.000, p = .000), Performance Expectancy (U = 6340.500, p = .000), Social Influence (U = 12779.000, p = .000), and Behavioural Intention (U = 848.500, p = .000) in the Google Scholar dataset were statistically significantly higher than the UDL dataset

4.3 Descriptive Statistics

This section presents the descriptive statistical data of the different constructs of the questionnaire. The first sub-section provides the findings from the analysis of the students' demographic data.

4.3.1 Demographic Information of Respondents

This section describes the demographic information collected from the study participants. In general, scrutiny of the demographic information of respondents helps a researcher to assess their suitability to participate in the study. Further, the demographic distribution of the respondents helps establish the accuracy with which the population of a study is replicated in the sample.

The questionnaire was administered to 400 international postgraduate students in Manchester. Two questionnaires were created: one for international postgraduate students' views of using the library website provided by their university (UDL) and one for international postgraduate students' views of using Google Scholar. The researcher distributed 200 copies of the questionnaire to each group.

In general, descriptive statistics, or summary statistics or summary measures, are utilised to encapsulate a set of data with the objective of communicating a considerable amount of information as clearly as possible. One form of descriptive statistics is measures of frequency which has been utilised here to present the demographic data obtained from the participants.

Demographic details gathered about the students included: gender, age, university of study, current status; and preferred tool for information search. Age and gender were included for consideration in the present study due to their presence in the UTAUT (Venkatesh et al., 2003) and UTAUT2 (Venkatesh et al., 2012) as moderating variables. University of study and current status were included to examine whether any differences in perception could be discerned due to the students' university or current educational status. The preferred tool for information search was anticipated to provide insights regarding the students' intent to use their UDL or GS. However, it must be noted that the moderating effects of these variables were not tested in the study as the study placed emphasis on comparing the perceptions of international postgraduate students with regard to the use of UDLs or GS.

Table 4.3 summarises the demographic details of the two groups of participants. It can be seen that the majority of the participating students were male (64% from the UDL dataset, and 59% from the Google Scholar dataset), aged between 24 and 30 years (59% from the UDL dataset, and 70.5%

from the Google Scholar dataset), and were master's students (78% from the UDL dataset, and 86.5% from the Google Scholar dataset) from Manchester Metropolitan University (60% from the UDL dataset, and 58% from the Google Scholar dataset). Moreover, the majority of the students from both groups preferred to use Google Scholar (71% from the Google Scholar dataset, and 66% from the UDL dataset) rather than their UDL (29% from the Google Scholar dataset, and 34% from the UDL dataset).

Table 4.2 *Participants' Demographics*

Dataset	**UDL Dataset**		**GS Dataset**	
Demographic Variable	**Frequency**	**%**	**Frequency**	**%**
Gender				
Male	128	64%	118	59%
Female	72	36%	82	41%
Age				
Under 23 years	12	6%	8	4%
24-30 years	118	59%	141	70.5%
31-40 years	48	24%	38	19%
41 years or older	22	11%	12	5%
University of study				
Manchester Metropolitan University	120	60%	116	58%
The University of Manchester	56	28%	70	35%
Other	24	12%	14	7%
Current Educational status				
Master's student	156	78%	173	86.5%
Doctoral student	44	22%	27	13.5%
Preferred Tool for Information Search				
Google Scholar	132	66%	142	71%
University Library Website	68	34%	58	29%

Prior studies have also been found to include a scrutiny of gender and age and their impacts on technology acceptance. For instance, Venkatesh and colleagues (2003) suggested that age and gender may moderate the relationship between Behavioural Intention and Performance

Expectancy. Further, as highlighted by Minton and Schneider (1980), in comparison to women, men are more inclined to quick acceptance of a new technology. Moreover, although age has been found to have no significant impact in IT usage (Burton-Jones & Hubona, 2005), it has been suggested that age be included if the moderating influence of gender is also being considered (Levy, 1988). Moreover, Venkatesh and colleagues (2003) found again that while Behavioural Intention is influenced by Effort Expectancy, this is moderated by experience, gender, and age. In addition, gender and age along with experience and voluntariness have been found to moderate the influence of society on behavioural intention. This has been found to be significant, particularly among older women and in the preliminary stages of experience (Venkatesh et al., 2003), which does not correspond to the present study's exploration of students of both genders who are predominantly aged <30 years.

Relatedly, Arif, Ameen, and Rafiq (2018) included gender and age as a moderating variables in their investigation of the factors affecting use of the web-based services provided by Allama Iqbal Open University (AIOU) by distance education students in Pakistan. Another study by Al-Qeisi (2009) also tested the moderating influence of gender and age in his investigation of the usefulness of the UTAUT Model in explaining Internet Banking Adoption behaviour in two countries (Jordan and UK). This study reported that gender and age had a non-moderating effect in both the scrutinised samples. Further, a study by Huang (2018) utilised age and gender as moderating variables when investigating the applicability of the UTAUT2 model with regard to the social media usage of college teachers and students in China. In this study, both age and gender were found to have some moderating effects: age in the case of the association between facilitating conditions and intent to utilise social media, and gender in the case of the association between habit and intent to utilise social media. Alshehri (2012) also utilised gender and age as moderators in an investigation of usage behaviour in the context of e-government services.

In a context similar to the present study, Tibenderana et al (2010) utilised age and gender as moderator variables along with experience and awareness to develop a model to measure the extent to which end-users accept and use hybrid library services. Other studies which have included gender and age as moderating factors in investigations of different aspects of technology acceptance include Shin (2011); Xu and Du (2018); and Khosrowjerdi and Iranshahi (2011), Waldman (2003), and Yan, Zha, and Xiao (2013), among others.

Since one of the objectives of the present study was to compare the perceptions of students from different universities, it was an obvious decision to include the university of study as a moderating variable. Prior studies (e.g., Feldstein & Martin, 2013; Rahman et al., 2011) have investigated the technology adoption patterns of university students in the context of the UTAUT model. Ayele and Sreenivasarao (2013) studied technology acceptance and usage of e-libraries by the staff and postgraduate students of the Addis Ababa and Adama Universities in Ethiopia. However, this study did not assess the moderating influence of the university of study. Similarly, the study by Samadi and Masrek (2015) to assess the effectiveness of digital libraries in different universities in Iran obtained data from students from these universities but did not use the university of study as a moderating variable. Thus, it would appear that the current study is among the first to scrutinise the moderating effect of university of study on technology acceptance and adoption by university students in general, and by international postgraduate students in particular.

Further, the population of the study was in keeping with the emphasis of the present study which is related to the perceptions of international postgraduate students. A study by Kim (2010) related to the adoption of UDL resources obtained data from three groups of library users, namely undergraduate, master, and doctoral student/faculty groups and found that the different users had different purposes for accessing UDL resources. However, it must be noted that this made use of an extended TAM model rather than the UTAUT model extended by the present study. Another study by Oshlyansky and colleagues (2007) also collected data from undergraduate and postgraduate students in an attempt to confirm the applicability of the UTAUT model across cultures. However, this study did not evaluate the moderating effects of the educational status on the constructs of the model. More generally, Vezzosi (2009) found that doctoral students have limited requirements from libraries, as they utilised only a few library services. On the other hand, they placed greater emphasis on the use of internet resources or other people. In other words, such students seemed to indicate great dependence on Google Scholar. Further, Drachen and colleages (2011) found that PhD students frequently utilised Google Scholar. Wu and Chen (2014) found that graduate students drew attention to the usability of Google Scholar. Other studies that scrutinised postgraduate students' use of libraries and found it to be inadequate include Ganaie and Rather (2014), Uwakwe and colleagues (2016), and Khan and colleagues (2014).

With regard to the Preferred Tool for Information Search, the findings of the study were consistent with the findings of Jamali and Asadi (2010) who indicated that academics prefer to use Google-type search tools. On the other hand, Connaway and Dickey (2010) indicated that persons who are looking for information know the difference between basic content on the internet and more formal research literature. Again, Sadeh (2008), in contrast, highlighted that users may prefer to search in academic information stores since the quality of the resources has been verified and confirmed by their inclusion in the information store. The moderating influence of this variable in the context of technology acceptance and adoption, however, has not been assessed previously to the researcher's best knowledge.

The measures of central tendency (mean and standard deviation) are presented for the individual constructs in the following sub-sections.

4.3.2 Domain Knowledge

As mentioned earlier, this study understands domain knowledge to be a person's knowledge of a particular discipline, domain, or area that is relevant to the search. The descriptive statistics for the participants' perceptions of Domain Knowledge, summarised herein, show mean scores of the students in the UDL. The dataset indicated that their opinions with regard to the different facets of Domain Knowledge scrutinised in the study varied between disagreement and neutrality as the mean scores for their responses were <3 (2.58±0.740 – 2.65±0.735). In direct contrast, the mean scores of the students in the Google Scholar dataset indicated that their opinions with regard to the different facets of Domain Knowledge scrutinised in the study varied between agreement and strong agreement as the mean scores for their responses were >4 (4.25±0.878 – 4.4±0.715). This great disparity in mean scores between the datasets indicates that the postgraduate students, when thinking about using GS, considered themselves to be familiar and experienced in the subject domain in contrast to the perceived subject knowledge of those thinking about searching on the UDL.

4.3.3 Computer Experience

Computer experience is defined in this study as the amount and type of computer skills acquired by a person over time. The descriptive statistics for the participants' perceptions of Computer

Experience are summarised as follows. The perceptions of the participants across both datasets indicated they agreed or strongly agreed with the given statements. For the UDL dataset, the highest mean score was seen for the statement "*I am happier if there is someone around to ask for help*" (4.39±0.843) whereas the lowest mean score was seen for "*I think I am efficient in the use of a computer to complete my task*" (4.23±0.837). On the other hand, the highest mean score for the Google Scholar dataset was seen for the statement "*I think I am efficient in the use of a computer to complete my task*" (4.48±0.501) and the lowest mean score for "*I am happier if there is someone around to ask for help*" (4.07±1.037). The high mean scores indicate that the overall level of computer experience present in the students is high which is not unusual in the current day. Nevertheless, slight areas of variance could be observed as students in the UDL dataset seemed to indicate that they prefer having assistance at hand, which is in direct contrast to the perceptions of the students in the Google Scholar dataset.

4.3.4 Computer Self-Efficacy

Computer self-efficacy is defined in this research as an individual's perceptions of his or her ability to use computers to accomplish a task. The descriptive statistics for the participants' perceptions of computer self-efficacy are summarised herein. The mean scores, in general, of the students in the UDL dataset were low (between 2.14±1.298 and 2.84±1.313) although the high standard deviations indicate that the responses were widely spread – that is, ranging from strong disagreement to neutrality. On the other hand, the mean scores of the students in the Google Scholar dataset indicated that their opinions with regard to their computer self-efficacy varied between neutrality and agreement as the mean scores for their responses were mostly >3, except in the case of the statement "*I often find it difficult to use it for my studies*" where the majority of the responses indicated strong disagreement. Overall, the perceptions of the students in the Google Scholar dataset appeared to indicate a trend to agreement with the different statements related to computer self-efficacy (2.80±1.524 – 3.81±1.153). However, the high standard deviations again indicate that the responses were widely spread. The low to moderate mean scores with high standard deviations indicate that the students' perceptions of their computer self-efficacy ranged from disagreement to agreement. Nevertheless, the opinions of the UDL dataset seemed to trend towards disagreement, whereas those of the students in the Google Scholar dataset seemed to trend to agreement, as in the case of the Relevance construct. It must be noted that the responses for the negative statements in this section of the questionnaire ("*I don't need a lot of time to complete my task using it*"; "*I often find it difficult to use it for my studies*") were reversed prior to obtaining the mean.

4.3.5 Motivation

Motivation is understood in this research as a combination of extrinsic, intrinsic, and hedonic motivation. In other words, it encompasses the desire to perform an activity due to its contribution to achievements that are unconnected with the activity itself, such as enhanced academic performance (extrinsic motivation); the desire to perform an activity for its own sake; and the fun or pleasure derived from using a technology (hedonic motivation). The descriptive statistics for the participants' perceptions of Motivation are herein summarised. The mean scores, in general, of the students in the UDL dataset were low (between 2.30±1.299 and 2.88±1.215) although the high standard deviations indicate that the responses were widely spread, that is ranging from strong disagreement to neutrality. On the other hand, the mean scores of the students in the Google Scholar dataset indicated that their opinions with regard to their Motivation to use Google Scholar varied between neutrality and agreement as the mean scores for their responses were >3. Overall, the perceptions of the students in the Google Scholar dataset appeared to indicate a trend to agreement with the different statements related to Motivation (3.09±1.464 – 3.93±1.165). Nevertheless, the high standard deviations again indicate that the responses were widely spread. The low to moderate mean scores with high standard deviations indicate that the students' perceptions of their motivation ranged from disagreement to agreement. Nevertheless, the opinions of the UDL dataset seemed to trend towards disagreement, whereas those of the students in the Google Scholar dataset seemed to trend to agreement, as in the case of the Relevance and Computer Self-efficacy constructs. Again, it must be noted that the responses for the negative statement in this section of the questionnaire ("*I don't always feel in control of the outcome*") were reversed prior to obtaining the mean.

4.3.6 Relevance

The descriptive statistics for the participants' perceptions of the Relevance of their UDL and Google Scholar are summarised herein. In this study, relevance pertains to the degree to which the system matches tasks carried out in the current environment and as specified in the task analysis. The mean scores, in general, of the students in the UDL dataset were low (between 2.81±1.086 and 3.03±1.538) although the high standard deviations indicate that the responses were widely spread. On the other hand, the mean scores of the students in the Google Scholar dataset indicated that their opinions with regard to the different facets of Relevance scrutinised in the study varied between neutrality and agreement as the mean scores for their responses were >3 (3.30±1.219 – 3.92±1.048). Again, the high standard deviations indicate that the responses were widely spread. The low to moderate mean scores with high standard deviations indicate that the students' perceptions of the relevance of UDL and Google Scholar with regard to their tasks varied from disagreement to agreement. Nevertheless, the opinions of the UDL dataset seemed to trend towards disagreement, whereas those of the students in the Google Scholar dataset seemed to trend to agreement.

4.3.7 Accessibility

Accessibility is defined in this research as the degree of convenience with which an individual accesses an information system. The descriptive statistics for the participants' perceptions of the Accessibility of their UDL and Google Scholar are summarised herein. The mean scores of the students in the UDL dataset indicated that their opinions with regard to the different statements related to Accessibility varied between disagreement and neutrality as the mean scores for their responses were <3 (2.60±0.863 – 2.74±0.983). In direct contrast, the mean scores of the students in the Google Scholar dataset indicated that their opinions with regard to the different statements related to Accessibility varied between agreement and strong agreement, as the mean scores for their responses were >4 (4.14±0.998 – 4.20±0.874). This great disparity in mean scores between the datasets indicates that the students from the UDL dataset were not very familiar with access to or accessing their UDL, whereas it was otherwise with those in the Google Scholar dataset.

4.3.8 Visibility

In this study, Visibility is defined as the degree to which a system is observable or apparent in an organisation. As with Accessibility, the mean scores of the students in the UDL dataset indicated that their opinions with regard to the different statements related to Visibility varied between disagreement and neutrality as the mean scores for their responses were <3 (2.74±0.936 – 2.95±1.104). In direct contrast, the mean scores of the students in the Google Scholar dataset indicated that their opinions with regard to the different statements related to Visibility varied between agreement and strong agreement as the mean scores for their responses were >4 (4.05±0.855 – 4.23±0.788). This great disparity in mean scores between the datasets indicates that the students from the UDL dataset believed that their UDL was not very visible, whereas it was otherwise, perhaps obviously, with those in the Google Scholar dataset.

4.3.9 Effort Expectancy

Effort Expectancy is defined in this research as the extent of convenience perceived when using a system. The descriptive statistics for the participants' perceptions of the Effort Expectancy in using their UDL and Google Scholar is as follows. Accessibility, the mean scores of the students in the UDL dataset indicated that their opinions with regard to the different statements related to Effort Expectancy varied between disagreement and neutrality as the mean scores for their responses were <3 (2.70±0.757 – 2.96±0.953). In direct contrast, the mean scores of the students in the Google Scholar dataset indicated that their opinions with regard to the different statements related to Effort Expectancy varied between agreement and strong agreement as the mean scores for their responses were >4 (4.19±0.773 – 4.39±0.647). This great disparity in mean scores between the datasets indicates that the students from the UDL dataset believed that their UDL required greater effort to use it whereas those in the Google Scholar dataset believed otherwise.

4.3.10 Performance Expectancy

Performance Expectancy is defined in this research as the degree to which an individual believes that using a system will help him or her attain gains in job performance. A summary of the descriptive statistics for the participants' perceptions of the Performance Expectancy in using their

UDL and Google Scholar is presented herein. As with Accessibility, the mean scores of the students in the UDL dataset indicated that their opinions with regard to the different statements related to Performance Expectancy varied between disagreement and neutrality as the mean scores for their responses were <3 (2.86±0.880 – 2.95±10.099). In direct contrast, the mean scores of the students in the Google Scholar dataset indicated that their opinions with regard to the different statements related to Performance Expectancy varied between agreement and strong agreement as the mean scores for their responses were >4 (3.95±1.038 – 4.29±0.732). This great disparity in mean scores between the datasets indicates that the students from the UDL dataset believed less in the performance forthcoming from the use of their UDL, whereas those in the Google Scholar dataset believed otherwise.

4.3.11 Facilitating Conditions

This study understands Facilitating Conditions as the extent to which an individual believes that an organisational and technical infrastructure exists to support use of technology. The descriptive statistics for the Facilitating Conditions construct are summarised in this section. Overall, it appears that the opinions of the students in the UDL dataset vary between disagreement and neutrality (2.68±0.977 – 3.12±1.052), whereas those of the students in the Google Scholar dataset vary between neutrality and agreement (3.86±1.052 – 4.03±1.068). Nevertheless, the high standard deviations observed indicate that the data were widely spread. In other words, the opinions ranged from strong disagreement to neutrality in the case of the UDL dataset, whereas the opinions ranged from neutrality to strong agreement in the case of the Google Scholar dataset. This variance would seem to indicate that the students in the Google Scholar dataset were favourably disposed towards the statements related to aspects that facilitated their use of Google Scholar. On the other hand, the students in the UDL dataset can be seen to be less favourably disposed.

4.3.12 Social Influence

Social Influence is defined in this research as the degree to which an individual perceives how important others believe is it that he/she should use the technology. The descriptive statistics for the Social Influence construct are summarised in this section. It can be seen that the opinions of the students in the UDL dataset varied between disagreement and neutrality (2.49±0.1374 –

3.27±1.205), whereas those of the students in the Google Scholar dataset vary between neutrality and agreement (3.17±1.415 – 3.69±1.141). However, the high standard deviations observed indicate that the data were widely spread. In other words, the opinions ranged from strong disagreement to neutrality in the case of the UDL dataset, whereas the opinions ranged from neutrality to strong agreement in the case of the Google Scholar dataset. This variance would seem to indicate that the students in the Google Scholar dataset agreed with the statements related to Social Influence that impacted their use of Google Scholar. On the other hand, the students in the UDL dataset would seem to disagree with the statements, though the disagreement did not seem to be very strong but rather trending to neutrality.

4.3.13 Behavioural Intention

Behavioural Intention is defined in this research as an individual's intention to use a particular technology that directly affects actual usage. This section summarises the descriptive statistics for the participants' perceptions of their Behavioural Intention with regard to use of their UDL and Google Scholar. As with some of the earlier constructs such as Accessibility, the mean scores of the students in the UDL dataset indicated that their opinions with regard to the different statements related to Behavioural Intention varied between disagreement and neutrality as the mean scores for their responses were <3 (2.55±0.556 – 2.72±0.688). In direct contrast, the mean scores of the students in the Google Scholar dataset indicated that their opinions with regard to the different statements related to Behavioural Intention varied between agreement and strong agreement as the mean scores for their responses were >4 (4.20±0.908 – 4.46±0.557). This wide disparity in mean scores between the datasets indicates that the students from the UDL dataset disagreed or were neutral regarding their intention to use their UDL, whereas those in the Google Scholar dataset indicated otherwise.

4.4 Effect of Moderating Variables on Students' Perceptions

The non-parametric Mann-Whitney U and Kruskal-Wallis tests were utilised to compare the effect of the moderating variables on students' perceptions across the different measured and derived constructs utilised in the study. The seven constructs included by the study were organised into two encompassing constructs for ease of analysis (please refer to section 3.12 – Conceptual

Framework of the study for more details). Accordingly, Individual Differences was used to designate Domain Knowledge, Computer Experience, Computer Self-Efficacy, and Motivation. On the other hand, System Features encompassed Relevance, Accessibility, and Visibility.

Overall, it can be seen that the students in each dataset had similar perceptions regarding the different constructs regardless of their age, preferred tool for information search, and current education status. However, it was evident that gender could be an influence on their perceptions of the features they expected from a system and that the social environment in the university of study could serve as to influence the students' intention to use a system.

The outcomes for the UDL dataset are presented in the following subsection.

4.4.1 UDL Dataset

The outcomes of the Kruskal-Wallis test to assess the effect of age on the perceptions of participants in the UDL dataset are summarised in Table 4.4. The outcomes indicate that there was no statistically significant difference in the participants' perceptions of the different constructs by age. Thus, hypothesis H11, *Age affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of the University Digital Library (UDL) users*, is rejected.

***Table 4.3** Outcome of Kruskal-Wallis by Age – UDL Dataset*

Age		N	Mean Rank	Chi-Square	Sig.
Behavioural Intention	Under 23	12	107.38	1.609	0.657
	24-30 years	118	103.64		
	31-40 years	48	95.64		
	41 or older	22	90.50		
Facilitating Conditions	Under 23	12	80.92	2.773	0.428
	24-30 years	118	102.14		
	31-40 years	48	95.82		
	41 or older	22	112.57		
Effort Expectancy	Under 23	12	94.00	0.629	0.890
	24-30 years	118	98.94		
	31-40 years	48	103.03		
	41 or older	22	106.91		
Performance Expectancy	Under 23	12	104.75	1.166	0.761

Age		N	Mean Rank	Chi-Square	Sig.
	24-30 years	118	102.99		
	31-40 years	48	92.83		
	41 or older	22	101.57		
Social Influence	Under 23	12	103.00	5.798	0.122
	24-30 years	118	96.16		
	31-40 years	48	97.95		
	41 or older	22	128.00		
System Features	Under 23	12	82.13	2.104	0.551
	24-30 years	118	98.97		
	31-40 years	48	104.56		
	41 or older	22	109.84		
Individual Differences	Under 23	12	100.33	1.080	0.782
	24-30 years	118	99.63		
	31-40 years	48	97.30		
	41 or older	22	112.25		

The outcomes of the Kruskal-Wallis test to assess the effect of university on the perceptions of participants in the UDL dataset are summarised in Table 4.5. The outcomes indicate that there was a statistically significant difference in the participants' perceptions of the Social Influence construct by university. However, overall there was no statistically significant difference in the participants' perceptions of the other constructs by university. In other words, hypothesis H13a, *University of study affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of the University Digital Library (UDL) users*, is partially accepted.

Table 4.4 *Outcome of Kruskal-Wallis by University – UDL Dataset*

University		N	Mean Rank	Chi-Square	Sig.
Behavioural Intention	Manchester Metropolitan University	120	101.63	0.632	0.729
	The University of Manchester	56	101.75		
	Other	24	91.96		
Facilitating Conditions	Manchester Metropolitan University	120	96.74	2.964	0.227
	The University of Manchester	56	111.60		
	Other	24	93.40		
Effort Expectancy	Manchester Metropolitan University	120	99.80	1.691	0.429

University		N	Mean Rank	Chi-Square	Sig.
	The University of Manchester	56	96.25		
	Other	24	113.92		
Performance Expectancy	Manchester Metropolitan University	120	98.45	2.211	0.331
	The University of Manchester	56	97.94		
	Other	24	116.73		
Social Influence	Manchester Metropolitan University	120	98.83	11.110	0.004
	The University of Manchester	56	89.12		
	Other	24	135.44		
System Features	Manchester Metropolitan University	120	97.26	2.057	0.358
	The University of Manchester	56	100.89		
	Other	24	115.79		
Individual Differences	Manchester Metropolitan University	120	100.55	0.016	0.992
	The University of Manchester	56	100.96		
	Other	24	99.19		

The outcomes of the Mann-Whitney U test to assess the effect of Preferred Tool for Information Search on the perceptions of participants in the UDL dataset are summarised in Table 4.6. The outcomes indicate that there was no statistically significant difference in the participants' perceptions of the different constructs by Preferred Tool for Information Search. Consequently, hypothesis H14b, *Preferred Tool for Information Search affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of the University Digital Library (UDL) users*, is also rejected.

Table 4.5 *Outcome of Mann-Whitney U Test by Preferred Tool for Information Search – UDL Dataset*

Preferred Tool for Information Search		N	Mean Rank	Sum of Ranks	Mann-Whitney U	Sig.
Behavioural Intention	University Library Website	68	95.34	6483.00	4137.000	0.351
	Google Scholar	132	103.16	13617.00		
Facilitating Conditions	University Library Website	68	99.47	6764.00	4418.000	0.856
	Google Scholar	132	101.03	13336.00		
	University Library Website	68	95.46	6491.00	4145.000	0.365

Preferred Tool for Information Search		N	Mean Rank	Sum of Ranks	Mann-Whitney U	Sig.
Effort Expectancy	Google Scholar	132	103.10	13609.00		
Performance Expectancy	University Library Website	68	104.83	7128.50	4193.500	0.441
	Google Scholar	132	98.27	12971.50		
Social Influence	University Library Website	68	98.64	6707.50	4361.500	0.743
	Google Scholar	132	101.46	13392.50		
System Features	University Library Website	68	91.18	6200.50	3854.500	0.102
	Google Scholar	132	105.30	13899.50		
Individual Differences	University Library Website	68	95.83	6516.50	4170.500	0.413
	Google Scholar	132	102.91	13583.50		

The outcomes of the Mann-Whitney U test to assess the effect of gender on the perceptions of participants in the UDL dataset are summarised in Table 4.7. The outcomes indicate that there was no statistically significant difference in the participants' perceptions of the different constructs by gender except in the case of System Features (p=0.040) and Performance Expectancy (p=0.49). Consequently, hypothesis H10a, *Gender affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of the University Digital Library (UDL) users*, is partially accepted.

Table 4.6 *Outcome of Mann-Whitney U Test by Gender – UDL Dataset*

Gender		N	Mean Rank	Sum of Ranks	Mann-Whitney U	Sig.
Behavioural Intention	Male	128	98.91	12660.50	4404.500	0.593
	Female	72	103.33	7439.50		
Facilitating Conditions	Male	128	102.34	13099.00	4373.000	0.547
	Female	72	97.24	7001.00		
Effort Expectancy	Male	128	104.98	13437.50	4034.500	0.135
	Female	72	92.53	6662.50		

Gender		N	Mean Rank	Sum of Ranks	Mann-Whitney U	Sig.
Performance Expectancy	Male	128	106.46	13627.50	3844.500	0.049
	Female	72	89.90	6472.50		
Social Influence	Male	128	99.05	12678.00	4422.000	0.634
	Female	72	103.08	7422.00		
System Features	Male	128	106.79	13668.50	3803.500	0.040
	Female	72	89.33	6431.50		
Individual Differences	Male	128	101.55	12998.00	4474.000	0.733
	Female	72	98.64	7102.00		

The outcomes of the Mann-Whitney U test to assess the effect of educational status on the perceptions of participants in the UDL dataset are summarised in Table 4.8. The outcomes indicate that there was no statistically significant difference in the participants' perceptions of the different constructs by educational status. Hence, hypothesis H12a*, Educational Status affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of the University Digital Library (UDL) users*, is rejected.

Table 4.7 *Outcome of Mann-Whitney U Test by Educational status – UDL Dataset*

Educational status		N	Mean Rank	Sum of Ranks	Mann-Whitney U	Sig.
Behavioural Intention	Master's student	156	97.78	15253.50	3007.500	0.197
	Doctoral student	44	110.15	4846.50		
Facilitating Conditions	Master's student	156	101.78	15877.00	3233.000	0.555
	Doctoral student	44	95.98	4223.00		
Effort Expectancy	Master's student	156	100.01	15602.00	3356.000	0.818
	Doctoral student	44	102.23	4498.00		
Performance Expectancy	Master's student	156	98.22	15323.00	3077.000	0.288
	Doctoral student	44	108.57	4777.00		
Social Influence	Master's student	156	100.96	15750.50	3359.500	0.830
	Doctoral student	44	98.85	4349.50		
System Features	Master's student	156	99.32	15493.50	3247.500	0.586

Educational status		N	Mean Rank	Sum of Ranks	Mann-Whitney U	Sig.
	Doctoral student	44	104.69	4606.50		
Individual Differences	Master's student	156	101.63	15854.50	3255.500	0.603
	Doctoral student	44	96.49	4245.50		

The outcomes for the Google Scholar dataset are presented in the following sub-section.

4.4.2 Google Scholar Dataset

The outcomes of the Kruskal-Wallis test to assess the effect of age on the perceptions of participants in the Google Scholar dataset are summarised in Table 4.9. The outcomes indicate that there was no statistically significant difference in the participants' perceptions of the different constructs by age. Consequently, hypothesis H11b, *Age affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of Google Scholar users*, is rejected.

Table 4.8 *Outcome of Kruskal-Wallis by Age – Google Scholar Dataset*

Age		N	Mean Rank	Chi-Square	Sig.
Behavioural Intention	Under 23	8	109.94	0.428	0.934
	24-30 years	141	100.63		
	31-40 years	38	96.93		
	41 or older	13	103.65		
Facilitating Conditions	Under 23	8	75.31	5.885	0.117
	24-30 years	141	104.72		
	31-40 years	38	85.05		
	41 or older	13	115.38		
Effort Expectancy	Under 23	8	80.81	2.407	0.492
	24-30 years	141	104.17		
	31-40 years	38	94.08		
	41 or older	13	91.54		
Performance Expectancy	Under 23	8	80.19	1.283	0.733
	24-30 years	141	100.23		
	31-40 years	38	103.64		

Age		N	Mean Rank	Chi-Square	Sig.
	41 or older	13	106.73		
Social Influence	Under 23	8	93.06	3.015	0.389
	24-30 years	141	103.73		
	31-40 years	38	98.58		
	41 or older	13	75.69		
System Features	Under 23	8	83.13	1.945	0.584
	24-30 years	141	100.44		
	31-40 years	38	98.42		
	41 or older	13	117.88		
Individual Differences	Under 23	8	77.69	1.620	0.655
	24-30 years	141	100.08		
	31-40 years	38	106.04		
	41 or older	13	102.88		

The outcomes of the Kruskal-Wallis test to assess the effect of university on the perceptions of participants in the Google Scholar dataset are summarised in Table 4.10. The outcomes indicate that there was no statistically significant difference in the participants' perceptions of the different constructs by university. Thus, hypothesis H13b, *University of study affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of Google Scholar users*, is rejected.

Table 4.9 *Outcome of Kruskal-Wallis by University – Google Scholar Dataset*

University		N	Mean Rank	Chi-Square	Sig.
Behavioural Intention	Manchester Metropolitan University	116	101.72	0.953	0.621
	The University of Manchester	70	101.28		
	Other	14	86.50		
Facilitating Conditions	Manchester Metropolitan University	116	94.60	4.076	0.130
	The University of Manchester	70	111.70		
	Other	14	93.36		
Effort Expectancy	Manchester Metropolitan University	116	98.92	2.063	0.356
	The University of Manchester	70	106.41		
	Other	14	84.04		
	Manchester Metropolitan University	116	95.20	5.570	0.062

University		N	Mean Rank	Chi-Square	Sig.
Performance Expectancy	The University of Manchester	70	112.81		
	Other	14	82.89		
Social Influence	Manchester Metropolitan University	116	101.53	2.412	0.299
	The University of Manchester	70	103.38		
	Other	14	77.61		
System Features	Manchester Metropolitan University	116	98.94	0.282	0.869
	The University of Manchester	70	103.46		
	Other	14	98.68		
Individual Differences	Manchester Metropolitan University	116	95.41	3.195	0.202
	The University of Manchester	70	110.44		
	Other	14	93.00		

The outcomes of the Mann-Whitney U test to assess the effect of Preferred Tool for Information Search on the perceptions of participants in the Google Scholar dataset are summarised in Table 4.11. The outcomes indicate that there was no statistically significant difference in the participants' perceptions of the different constructs by Preferred Tool for Information Search. Hence, hypothesis H14b, *Preferred Tool for Information Search affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of Google Scholar users*, is also rejected.

Table 4.10 *Outcome of Mann-Whitney U Test by Preferred Tool for Information Search – Google Scholar Dataset*

Preferred Tool for Information Search		N	Mean Rank	Sum of Ranks	Mann-Whitney U	Sig.
Behavioural Intention	University Library Website	142	99.78	14169.00	4016.000	0.775
	Google Scholar	58	102.26	5931.00		
Facilitating Conditions	University Library Website	142	100.87	14323.50	4065.500	0.887
	Google Scholar	58	99.59	5776.50		
Effort Expectancy	University Library Website	142	101.31	14386.00	4003.000	0.750
	Google Scholar	58	98.52	5714.00		
Performance Expectancy	University Library Website	142	98.14	13935.50	3782.500	0.360
	Google Scholar	58	106.28	6164.50		

Preferred Tool for Information Search		N	Mean Rank	Sum of Ranks	Mann-Whitney U	Sig.
Social Influence	University Library Website	142	99.35	14107.00	3954.000	0.658
	Google Scholar	58	103.33	5993.00		
System Features	University Library Website	142	99.96	14194.00	4041.000	0.836
	Google Scholar	58	101.83	5906.00		
Individual Differences	University Library Website	142	101.11	14357.50	4031.500	0.816
	Google Scholar	58	99.01	5742.50		

The outcomes of the Mann-Whitney U test to assess the effect of gender on the perceptions of participants in the Google Scholar dataset are summarised in Table 4.12. The outcomes indicate that there was no statistically significant difference in the participants' perceptions of the different constructs by gender. Therefore, hypothesis H10b, *Gender affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of Google Scholar users*, is rejected.

Table 4.11 *Outcome of Mann-Whitney U Test by Gender – Google Scholar Dataset*

Gender		N	Mean Rank	Sum of Ranks	Mann-Whitney U	Sig.
Behavioural Intention	Male	118	102.25	12065.50	4631.500	0.594
	Female	82	97.98	8034.50		
Facilitating Conditions	Male	118	102.50	12094.50	4602.500	0.557
	Female	82	97.63	8005.50		
Effort Expectancy	Male	118	99.96	11795.50	4774.500	0.871
	Female	82	101.27	8304.50		
Performance Expectancy	Male	118	99.66	11759.50	4738.500	0.802
	Female	82	101.71	8340.50		
Social Influence	Male	118	102.76	12125.50	4571.500	0.507
	Female	82	97.25	7974.50		
System Features	Male	118	98.49	11621.50	4600.500	0.555
	Female	82	103.40	8478.50		
Individual Differences	Male	118	105.07	12398.00	4299.000	0.181
	Female	82	93.93	7702.00		

The outcomes of the Mann-Whitney U test to assess the effect of educational status on the perceptions of participants in the Google Scholar dataset are summarised in Table 4.13. The outcomes indicate that there was no statistically significant difference in the participants' perceptions of the different constructs by educational status. Hence, hypothesis H12b, *Educational Status affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences of Google Scholar users*, is also rejected.

Table 4.12 *Outcome of Mann-Whitney U Test by Educational Status – Google Scholar Dataset*

Educational status		**N**	**Mean Rank**	**Sum of Ranks**	**Mann-Whitney U**	**Sig.**
Behavioural Intention	Master's student	173	99.88	17279.00	2228.000	0.690
	Doctoral student	27	104.48	2821.00		
Facilitating Conditions	Master's student	173	102.29	17695.50	2026.500	0.267
	Doctoral student	27	89.06	2404.50		
Effort Expectancy	Master's student	173	100.03	17305.50	2254.500	0.766
	Doctoral student	27	103.50	2794.50		
Performance Expectancy	Master's student	173	103.87	17969.50	1752.500	0.035
	Doctoral student	27	78.91	2130.50		
Social Influence	Master's student	173	102.33	17703.00	2019.000	0.257
	Doctoral student	27	88.78	2397.00		
System Features	Master's student	173	101.21	17509.50	2212.500	0.660
	Doctoral student	27	95.94	2590.50		
Individual Differences	Master's student	173	99.54	17220.00	2169.000	0.552
	Doctoral student	27	106.67	2880.00		

4.4.3 Status of the Hypotheses with the Moderating Variables

As mentioned in Section 3.12.3, a few hypotheses were proposed to test whether the moderating variables had any impact on the perceptions of the students with regard to the different constructs of the study's extended UTAUT model (Figure 3.3). Table 4.14 summarises the status of these hypotheses based on the discussions in the preceding section.

Table 4.13 *Hypotheses with the Moderating Variables - Status*

Hypothesis	Hypothesis Statement	Hypothesis Status		Method of Testing
		UDL Dataset	**GS Dataset**	
H10	Gender affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences.	Partially accepted (impact on Social Influence and Performance Expectancy)	Rejected	Mann-Whitney U Test
H11	Age affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences.	Rejected	Rejected	Kruskal-Wallis
H12	Educational Status affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences.	Rejected	Rejected	Mann-Whitney U test
H13	University of study affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences.	Partially accepted (impact on Social Influence)	Rejected	Kruskal-Wallis
H14	Preferred Tool for Information Search affects students' perceptions related to Behavioural Intention, Facilitating Conditions, Performance Expectancy, Effort Expectancy, Social Influence, System Features, and Individual Differences.	Rejected	Rejected	Mann-Whitney U test

The next section describes the outcomes of the correlation analysis undertaken in the study.

4.5 Correlation Analysis

Spearman's rho correlation test was utilised to explore the correlation between the perceptions of the students across the study's variables. This test is a non-parametric statistic and was selected for use due to the non-normal distribution of data. The robustness and direction of the relationship in existence between two variables is measured by this test. Further, it is a bivariate correlation analysis and is utilised the measure the relationship between the study's twelve constructs. The effect size between two variables is represented by the correlation coefficient. Moreover, it indicates the extent to which they are correlated in a linear fashion. In this study, the following ranges were utilised to describe the strength of the correlation:

- -1 – perfect negative relationship
- 0 – no relationship
- .00-.19 – "very weak"
- .20-.39 – "weak"
- .40-.59 – "moderate"
- .60-.79 – "strong"
- .80-1.0 – "very strong"
- +1 – perfect positive relationship

4.5.1 UDL Dataset

The outcomes of the Spearman's rho correlation test for the UDL dataset (Table 4.15) indicated that there were significant positive associations between most the constructs measured in the study (at 0.01 level or 0.05 level). However, it must be noted that the strength of the significant correlations were mostly weak indicating that there was barely any relationship between the variables. These associations are described in the following sub-sections.

Table 4.14 *Spearman's rho correlation analysis between the study variables - University Library Website*

	DK	CS	RE	AC	VI	SE	EE	MO	FC	SI	PE	BI
DK	1.000											
CS	0.075	1.000										
RE	0.114	0.055	1.000									
AC	0.072	.255**	.404**	1.000								
VI	0.099	0.033	.320**	.353**	1.000							
SE	-0.024	.144*	.185**	.211**	.162*	1.000						
EE	.203**	.154*	.365**	.530**	.354**	.232**	1.000					
MO	-0.036	0.052	.193**	.195**	.275**	.196**	.173*	1.000				
FC	.172*	0.012	.220**	.168*	.261**	0.094	.311**	0.040	1.000			
SI	0.092	-0.032	.331**	.259**	.154*	.237**	.233**	.294**	0.120	1.000		
PE	0.073	-0.128	.241**	.161*	.207**	0.027	.284**	0.096	.429**	.254**	1.000	
BI	0.118	0.045	.210**	.293**	.239**	.271**	.305**	.289**	.342**	.166*	.395**	1.000

***. Correlation is significant at the 0.01 level (2-tailed).*

**. Correlation is significant at the 0.05 level (2-tailed).*

DK=Domain Knowledge; CS=Computer Experience; RE=Relevance; AC=Accessibility; VI=Visibility; SE=Computer Self-efficacy; EE=Effort Expectancy; MO=Motivation; FC=Facilitating Conditions; SI=Social Influence; PE=Performance Expectancy; BI=Behavioural Intention

4.5.1.1 Domain Knowledge

The study found that the students' perceptions of their Domain Knowledge were related to their perceptions regarding Effort Expectancy (spearman's rho = .203, $p < 0.01$). In other words, students' perceptions of their Domain Knowledge were related to whether they thought they would find it easy to use the UDL. Moreover, the students' perceptions of Domain Knowledge were related to Facilitating Conditions (Spearman's rho = .172, $p<0.05$) which indicated that students' knowledge of the area of their search seemed to be associated with their belief that infrastructure was available to support their use of the UDL.

4.5.1.2 Computer Experience

Computer Experience was found to be related to Accessibility (Spearman's rho = .255, $p<0.01$) of the UDL and the students' Computer Self-Efficacy (Spearman's rho = .144, $p<0.01$). These relationships indicate that the students' perceptions of Accessibility of the UDL and their own Computer Self-efficacy were related to their existing Computer Experience. Moreover, Computer Experience was related to Effort Expectancy (Spearman's rho = .154, $p<0.05$) which is not surprising as it could be inferred that an individual's experience was related to his/her expectations with regard to the effort in using the system. For instance, a person with low computer experience would believe that the effort in using the UDL would be significant.

4.5.1.3 Computer Self-Efficacy

Computer Self-Efficacy was found to be related to Effort Expectancy (Spearman's rho = .232, $p<0.01$), Motivation (Spearman's rho = .196, $p<0.01$), Social Influence (Spearman's rho = .237, $p<0.01$), and Behavioural Intention (Spearman's rho = .271, $p<0.01$). That is, it would appear that the students' perceptions of the effort required to utilise the UDL, and their motivation to use it were related to their Computer Self-Efficacy. Further, Social Influence such as from peers, friends, and family was related to the students' Computer Self-Efficacy. Moreover, it appeared that Computer Self-Efficacy was related to the students' overall Behavioural Intention to use the UDL.

4.5.1.4 Motivation

The study found that Motivation was related to Social Influence (Spearman's rho = .294, $p<0.01$) and Behavioural Intention (Spearman's rho = 289, $p<0.01$). In other words, external influences such as peers, friends, and family were found to be related to the students' Motivation to utilise the UDL. Further, the students' Motivation could be understood to be a probable influence on their intention to use the UDL.

4.5.1.5 Relevance

The students' perceptions of the UDL's Relevance were related to their perceptions of its Accessibility (Spearman's rho = .404, $p<0.01$) and Visibility (Spearman's rho = .320, $p<0.01$). Moreover, they were related to their Computer Self-Efficacy (Spearman's rho = .185, $p<0.01$), Motivation (Spearman's rho = .195, $p<0.01$), Effort Expectancy (Spearman's rho = .365, $p<0.01$), and Performance Expectancy (Spearman's rho = .241, $p<0.01$). Other relationships with the students' perceptions of the UDL's Relevance were seen with external aspects such as Facilitating Conditions (Spearman's rho = .220, $p<0.01$) and Social Influence (Spearman's rho = .331, $p<0.01$). Finally, Relevance was also related to Behavioural Intention (Spearman's rho = .210, $p<0.01$). Overall, it would appear that the perceived Relevance of the UDL had a role to play in the perceptions of how accessible or visible it was. Moreover, personal factors such as Computer Self-Efficacy and Motivation to use the system were perhaps unsurprisingly related to the system's relevance as an individual's confidence in his/her ability to use a system could influence the motivation to use the system and hence impact the perception of the system's relevance.

4.5.1.6 Accessibility

The study found that the students' perceptions of the UDL's Accessibility were related to their perceptions of the system's Visibility (Spearman's rho = .353, $p<0.01$). Individual factors related to this perception were Motivation (Spearman's rho = .195, $p<0.01$), Computer Self-Efficacy (Spearman's rho = .211, $p<0.01$), Effort Expectancy (Spearman's rho = .365, $p<0.01$), and Performance Expectancy (Spearman's rho = .161, $p<0.05$). Facilitating Conditions (Spearman's rho = .168, $p<0.05$) and Social Influence (Spearman's rho = .259, $p<0.01$) were external aspects related to this perception. Finally, the students' Behavioural Intention (Spearman's rho = .293, $p<0.01$) to use the UDL was also related to its Accessibility. Overall, it appeared that the Accessibility of the UDL was a significant factor with probable influence on the Behavioural Intention of the students to use it.

4.5.1.7 Visibility

Visibility of the UDL was also found to be an important factor related to the students' Behavioural Intention (Spearman's rho = .239, $p<0.01$) to use the system. Moreover, the students' perceptions of Visibility were related to their perceptions of their Computer Self-Efficacy (Spearman's rho = .162, $p<0.05$), Motivation (Spearman's rho = .275, $p<0.01$), Effort Expectancy (Spearman's rho = .354, $p<0.01$), and Performance Expectancy (Spearman's rho = .207, $p<0.01$). Facilitating Conditions (Spearman's rho = .261, $p<0.01$) and Social Influence (Spearman's rho = .154, $p<0.05$) appeared to be external aspects which were related to the system's Visibility. This is not surprising as the university's infrastructure can be designed to draw attention to the UDL. Moreover, students' peers and friends could make them aware of the UDL.

4.5.1.8 Effort Expectancy

Students' Effort Expectancy in using the UDL was found to be related to Motivation (Spearman's rho = .173, $p<0.05$), Social Influence (Spearman's rho = .233, $p<0.01$), Facilitating Conditions (Spearman's rho = 311, $p<0.01$). Performance Expectancy (Spearman's rho = .284, $p<0.01$) and Behavioural Intention (Spearman's rho = .305, $p<0.01$); that is, the effort in using the system was related to their expectations of its performance and their motivation to use the system. Moreover, external aspects such as Facilitating Conditions and Social Influence could have an impact on their expectations of effort related to using the system. Overall, Effort Expectancy was also found to be an important factor related to the students' Behavioural Intention to use the UDL.

4.5.1.9 Performance Expectancy

The students' perceptions regarding Performance Expectancy and Behavioural Intention (Spearman's rho = .395, $p<0.01$) were found to be related indicating that the students' intention to use the UDL was related to their expectations regarding its performance.

4.5.1.10 Facilitating Conditions

Facilitating Conditions was found to be related to Performance Expectancy (Spearman's rho = .429, $p<0.01$) and Behavioural Intention (Spearman's rho = .342, $p<0.01$). This indicated that the students' perceptions of the expected performance of the UDL and their intention to use the UDL were related to the conditions facilitating its probable use.

4.5.1.11 Social Influence

The study found that Social Influence was related to the students' perceptions of Performance Expectancy (Spearman's rho = .254, $p<0.01$) regarding use of the UDL. Moreover, it was related to their overall intention to use the system (Spearman's rho = .166, $p<0.05$). This is not an unusual finding as Social Influence along with Performance Expectancy has been found to support the intention of students to use technology such as social media (Gruzd et al., 2012).

4.5.2 Google Scholar Dataset

Similarly, the outcomes of the Spearman's rho correlation test for the Google Scholar dataset (Table 4.16) again indicated that there were significant positive associations between most the constructs measured in the study (at 0.01 level or 0.05 level). Nevertheless, it would appear from the poor strength (weak to moderate) of all the positive and significant associations that their effect was limited. These associations are described in the following subsections.

Table 4.15 *Spearman's rho correlation analysis between the study variables – Google Scholar*

	DK	CS	RE	AC	VI	SE	EE	MO	FC	SI	PE	BI
DK	1.000											
CS	0.095	1.000										
RE	-0.038	0.036	1.000									
AC	0.121	.249**	.252**	1.000								
VI	0.073	.159*	.160*	.531**	1.000							
SE	.170*	0.077	.269**	.267**	.139*	1.000						
EE	.178*	.185**	0.068	.560**	.324**	.227**	1.000					
MO	0.087	0.031	.207**	0.029	0.057	.157*	0.109	1.000				
FC	0.081	0.003	.392**	.191**	.221**	.293**	.206**	.266**	1.000			
SI	0.050	-0.030	.226**	0.123	0.078	0.074	0.065	.142*	.350**	1.000		
PE	0.008	0.135	.379**	.190**	.266**	0.114	.165*	.246**	.470**	.471**	1.000	
BI	0.094	.242**	0.096	.283**	.158*	.162*	.323**	.146*	.228**	0.055	.326**	1.000

***. Correlation is significant at the 0.01 level (2-tailed).*

**. Correlation is significant at the 0.05 level (2-tailed).*

DK=Domain Knowledge; CS=Computer Experience; RE=Relevance; AC=Accessibility; VI=Visibility; SE=Computer Self-efficacy; EE=Effort Expectancy; MO=Motivation; FC=Facilitating Conditions; SI=Social Influence; PE=Performance Expectancy; BI=Behavioural Intention

4.5.2.1 Domain Knowledge

In the Google Scholar dataset, the students' perceptions regarding Domain Knowledge and Effort Expectancy (Spearman's rho = .178, $p<0.05$) were found to be related. However, in contrast to the UDL, Domain Knowledge was found to be related to Computer Self-Efficacy (Spearman's rho = .170, $p<0.05$). These indicate firstly that domain knowledge impacts students' expectations of the effort required to utilise Google Scholar. Secondly, the students' confidence in using computers to achieve their tasks was related to their domain knowledge.

4.5.2.2 Computer Experience

Computer Experience was found to be related to Accessibility (Spearman's rho = .249, $p<0.01$) and Visibility (Spearman's rho = .159, $p<0.05$) of Google Scholar. Moreover, Computer Experience was found to be related to Computer Self-Efficacy (Spearman's rho = .185, $p<0.01$) and the overall Behavioural Intention (Spearman's rho = .242, $p<0.01$) concerning Google Scholar. These findings were not unexpected as people with considerable computer experience would not be unfamiliar with Google Scholar due to its accessibility and visibility. On the other hand, a person confident in his/her ability to use computers to accomplish a task would exhibit the intent to use familiar tools such as Google Scholar.

4.5.2.3 Computer Self-Efficacy

Computer Self-Efficacy was found to be related to Effort Expectancy (Spearman's rho =.227, $p<0.01$), Motivation (Spearman's rho = .157, $p<0.05$), Behavioural Intention (Spearman's rho = .162, $p<0.05$), and Facilitating Conditions (Spearman's rho = .293, $p<0.01$). That is, it would appear that the students' perceptions of the effort required to utilise Google Scholar and their motivation to use it were related to their Computer Self-Efficacy. Further, Facilitating Conditions were related to the students' Computer Self-Efficacy. Moreover, it appeared that Computer Self-Efficacy was related to the students' overall Behavioural Intention to use Google Scholar.

4.5.2.4 Motivation

Motivation was found to be related to Social Influence (Spearman's rho = .142, $p<0.05$), Facilitating Conditions (Spearman's rho = .246, $p<0.01$), Behavioural Intention (Spearman's rho = .146, $p<0.05$), and Performance Expectancy (Spearman's rho = .246, $p<0.01$). Thus, external aspects such as social influence and facilitating conditions would appear to be related to the students’ Motivation to use Google Scholar. Additionally, Motivation was related to the students’ expectations of Google Scholar’s performance. Further, the students’ Motivation could be understood to be a probable influence on their intention to use Google Scholar.

4.5.2.5 Relevance

The students’ perceptions of Google Scholar’s Relevance were related to their perceptions of its Accessibility (Spearman’s rho = .252, p<0.01) and Visibility (Spearman’s rho = (.160, p<0.05). Moreover, they were related to their Computer Self-Efficacy (Spearman’s rho = .269, p<0.01), Motivation (Spearman’s rho = .207, p<0.01), and Performance Expectancy (Spearman’s rho = .379, p<0.01). Other relationships with the students’ perceptions of Google Scholar’s Relevance were seen with external aspects such as Facilitating Conditions (Spearman’s rho = .392, p<0.01) and Social Influence (Spearman’s rho = .226, p<0.01). Overall, it would appear that the perceived Relevance of Google Scholar had a role to play in the perceptions of how accessible or visible it was. Moreover, personal factors such as Computer Self-Efficacy and Motivation indicated that an individual’s confidence in his/her ability to use a system could influence the motivation to use the system, and hence impact the perception of the system’s relevance. Also, if an individual believes a system to be relevant, their perceptions of its performance are also influenced.

4.5.2.6 Accessibility

The students’ perception of Google Scholar’s Accessibility was found to be related to its Visibility (Spearman’s rho = .531, p<0.01), their own Computer Self-Efficacy (Spearman’s rho = .267, p<0.01), expectations related to effort required to use the system (Spearman’s rho =.560, p<0.01), and expectations related to Google Scholar’s performance (Spearman’s rho = .190, p<0.01). Moreover, external Facilitating Conditions (Spearman’s rho = .191, p<0.01) had a role to play in their perceptions of Google Scholar’s accessibility. Finally, their Behavioural Intention (Spearman’s rho = .283, p<0.01) to use Google Scholar seemed to be influenced by its accessibility.

4.5.2.7 Visibility

Visibility of Google Scholar was also found to be an important factor related to the students’ Behavioural Intention (Spearman’s rho = .158, p<0.05) to use the system. The students’ perceptions of Visibility were further related to their perceptions of Computer Self-Efficacy (Spearman’s rho = .139, p<0.05), Effort Expectancy (Spearman’s rho = .324, p<0.01), Performance Expectancy (Spearman's rho = .266, p<0.01), and Facilitating Conditions (Spearman's rho = .221, p<0.01). The students' self-efficacy with regard to computers does indicate a greater likelihood of exposure to Google Scholar. Moreover, it was perhaps not unexpected that the students' expectations regarding the effort to use Google Scholar and its performance were related to Google Scholar's Visibility.

4.5.2.8 Effort Expectancy

Effort Expectancy in using Google Scholar was found to be related to Facilitating Conditions (Spearman's rho = .206, p<0.01), Performance Expectancy (Spearman's rho = .165, p<0.05), and Behavioural Intention (Spearman's rho = .323, p<0.05).

4.5.2.9 Performance Expectancy

Performance Expectancy was found be related to the students' perceptions of their Behavioural Intention (Spearman's rho = .326, p<0.01) to use Google Scholar, indicating that the students' intention to use Google Scholar was related to their expectations regarding its performance.

4.5.2.10 Facilitating Conditions

Facilitating Conditions were found to be related to Performance Expectancy (Spearman's rho = .470, p<0.01), Social Influence (Spearman's rho = .350, p<0.01), and Behavioural Intention (Spearman's rho = .228, p<0.01). This indicated that the students' perceptions of the expected performance of Google Scholar and their intention to use the UDL were related to the conditions facilitating its probable use. Moreover, Social Influence could be a probable influence on the students' perceptions of the conditions facilitating use of Google Scholar.

4.5.2.11 Social Influence

The study found that Social Influence was related to the students' perceptions of Performance Expectancy (Spearman's rho = .471, p<0.01) regarding use of Google Scholar. The relationship between Social Influence and Performance Expectancy has been reported by earlier studies (e.g., Gruzd et al., 2012).

4.6 Multiple Regression Analysis

Multiple Regression models were utilised to facilitate scrutiny of the nature and extent of the relationship between the different constructs in the study. In other words, they were employed to ascertain and assess the cause-effect association between the study's dependent variable (that is, Behavioural Intention) and the seven independent variables and constructs.

4.6.1 Effect of Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions on students' Behavioural Intention

4.6.1.1 UDL Dataset

The effect of Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions on students' Behavioural Intention was analysed for the UDL dataset. The descriptive statistics, model summary and coefficients for this multiple regression analysis are depicted in Appendix V. It can be seen that 15.8% of the variation in the Behavioural Intention could be explained by Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions. Moreover, the effect was found to be positive and significant in the case of Performance Expectancy and Facilitating Conditions. Consequently, hypothesis H1a, *Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions directly influences students' Behavioural Intention,* could be partially accepted for the UDL dataset.

4.6.1.2 Google Scholar Dataset

Multiple regression analyses were performed on the data obtained via the questionnaires. First, the effect of Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions on students' Behavioural Intention was analysed for the Google Scholar dataset. The descriptive statistics, model summary and coefficients for this multiple regression analysis are depicted in Appendix V. It can be seen that 11.8% of the variation in the Behavioural Intention could be explained by Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions. Moreover, the effect was found to be positive and significant in the case of Performance Expectancy and Effort Expectancy. Consequently, hypothesis H1b, *Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions directly influences students' Behaviour*al *Intention,* could be partially accepted for the Google Scholar dataset.

4.6.2 Effect of Accessibility, Visibility and Relevance of the System on Students' Performance Expectancy

4.6.2.1 UDL Dataset

The effect of Accessibility, Visibility and Relevance of the System on Students' Performance Expectancy was analysed for the UDL dataset. The descriptive statistics, model summary and coefficients for this multiple regression analysis are depicted in Appendix V. It can be seen that 8.6% of the variation in the Performance Expectancy could be explained by Accessibility, Visibility and Relevance. Moreover, the effect was found to be positive and significant in the case of Relevance and Visibility. Consequently, hypothesis H2a, *Accessibility, Visibility and Relevance of the System directly influence students' Performance Expectancy*, could be partially accepted for the UDL dataset.

4.6.2.2 Google Scholar Dataset

The effect of Accessibility, Visibility and Relevance of the System on Students' Performance Expectancy was analysed for the Google Scholar dataset. The descriptive statistics, model summary and coefficients for this multiple regression analysis are depicted in Appendix V. It can be seen that 18.6% of the variation in the Performance Expectancy could be explained by Accessibility, Visibility and Relevance. Moreover, the effect was found to be positive and significant in the case of Relevance and Visibility. Consequently, hypothesis H2b, *Accessibility, Visibility and Relevance of the System directly influence students' Performance Expectancy*, could be partially accepted for the Google Scholar dataset.

4.6.3 Effect of Computer Self-Efficacy, Computer Experience, Domain Knowledge and Motivation on Students' Effort Expectancy

4.6.3.1 UDL Dataset

The effect of Computer Self-Efficacy, Computer Experience, Domain Knowledge and Motivation on Effort Expectancy was analysed using multiple regression analysis for the UDL dataset. The descriptive statistics, model summary and coefficients for this multiple regression analysis are depicted in Appendix V.

It can be seen that merely 7.1% of the variation in the Effort Expectancy could be explained by Computer Self-Efficacy, Computer Experience, Domain Knowledge and Motivation. Moreover, the effect was found to be positive and significant only in the case of Computer Self-Efficacy. Consequently, hypothesis H3a, *Computer Self-Efficacy, Computer experience, Domain Knowledge and Motivation directly influences students' Effort Expectancy*, can also be partially accepted for the UDL dataset.

4.6.3.2 Google Scholar Dataset

The effect of Computer Self-Efficacy, Computer Experience, Domain Knowledge and Motivation on Effort Expectancy was analysed using multiple regression analysis for the Google Scholar dataset. The descriptive statistics, model summary and coefficients for this multiple regression analysis are depicted in Appendix V.

It can be seen that merely 4.9% of the variation in the Effort Expectancy could be explained by Computer Self-Efficacy, Computer Experience, Domain Knowledge and Motivation. Moreover, the effect was found to be positive and significant only for Computer Self-Efficacy. Consequently, hypothesis H3b, *Computer Self-Efficacy, Computer Experience, Domain Knowledge and Motivation directly influences students' Effort Expectancy*, can also be partially accepted for the Google Scholar dataset.

4.7 Measurement Scale Analyses

Factor analysis, according to Child (2006), involves the use of mathematical procedures in order to simplify interrelated measures for the identification of patterns within a set of variables. The technique is also described by Pallant (2010, p. 81) as "a data reduction technique. It takes a large set of variables and looks for a way data may be reduced or summarised using a smaller set of factors or components." The reason for its use is to obtain a summary of complex data to enable the interpretation and deeper understanding of relationships and patterns in the data. Factor analysis is generally used to separate variables into a small set of clusters according to shared variance, therefore helping to isolate concepts and constructs. If a researcher has a particularly large dataset made up of a number of variables, factor analysis makes it possible to reduce this through the observation of groups of variables – or factors – and arranging them to create descriptive categories of common variables. This method is helpful in research projects that have a few or many variables, a battery of tests, or items from questionnaires that can be narrowed down into smaller sets and to make interpretation easier (Rummel, 1970). It can be much simpler to narrow the variables down into key factors for analysis rather than having many disparate and sometimes unnecessary variables to deal with. Factor analysis also has a number of other uses, such as hypothesis testing, data transformation, scaling and mapping (Rummel, 1970). The two main methods involved in factor analysis are confirmatory factor analysis (CFA) and exploratory factor analysis (EFA). EFA is used to reveal complex patterns in the dataset and to test predictions, whereas CFA looks to confirm hypotheses and can represent variables using path analysis diagrams.

It must be noted that since the principal objective of this study was to compare the perceptions of two groups of international postgraduate students regarding the factors influencing their decision to use either Google Scholar or their UDL, this study differs from other studies where an extended UTAUT model has been developed and tested in that only a single iteration of the EFA and CFA will be performed. Moreover, only the two constructs which pertain to Effort Expectancy and Performance Expectancy namely, Individual Differences and System Features, are scrutinised as these were believed, by the researcher, to be most relevant in the context of the present study. As described in Section 3.12.2, Individual Differences pertains to Domain Knowledge, Computer Experience, Computer Self-Efficacy, and Motivation of an individual. On the other hand, System Features are related to a system's Relevance, Accessibility, and Visibility.

The next section describes the EFA performed in the study in further detail.

4.7.1 Reliability Analysis

The reliability of the questionnaires utilised in the study were analysed using Cronbach's alpha (Ritchie & Lewis, 2003). The internal consistency of a questionnaire has been reported to increase when covariance is exhibited by a considerable number of items contained in the questionnaire. Robust internal consistency of a scale is indicated when the Cronbach's value is close to 1. Moreover, the extent of correlation between the items in the questionnaire increases with increasing values of Cronbach's alpha. All the items that exhibited Cronbach's value of >0.5 were classified as acceptable in the present study (Hinton, McMurray, & Brownlow, 2014).

The Cronbach's alpha coefficients for the Google Scholar dataset ranged from 0.64 to 0.91. On the other hand, the Cronbach's alpha coefficients for the UDL dataset ranged from 0.68 to 0.87. Overall, the items in the questionnaires utilised in the study were found to be acceptable for use (Table 4.17).

Table 4.16 *Cronbach's Alpha for Students' Perceived Use of Google Scholar and UDL*

Constructs	**No. of items**	**Google Scholar Dataset**	**UDL Dataset**
Domain Knowledge	4	..77	..77
Computer Experience	4	..65	..78
Relevance	.5	.64	.82
Accessibility	5	..91	..87
Visibility	3	..88	..82
Computer Self-Efficacy	5	..78	..80
Effort Expectancy	4	..84	..85
Motivation	6	..80	..76
Facilitating Conditions	6	.90.	..80.
Social Influence	6.	.82	.68
Performance Expectancy	5	.87	.83
Behavioural Intention	4	.78	.84

4.7.2 Exploratory Factor Analysis (EFA)

The next subsections describe the EFA performed in the study. EFA was utilised to assess the construct validity of the following constructs: *System Features and Internal Differences measured as per the study's conceptual model* (Table 4.18). As mentioned earlier, only these two constructs are scrutinised as it was believed that they are the most relevant in the context of the present study.

Table 4.17 *Constructs Included in the Conceptual Framework*

Construct	Sub-Construct
Individual Differences	Computer Self-efficacy (SE)
	Computer Experience (CS)
	Domain Knowledge (DK)
	Motivation (M0)
System Features	Accessibility (AC)
	Visibility (VI)
	Relevance (RE)

4.7.2.1 EFA for System Features (Accessibility, Visibility, Relevance)

The Kaiser-Meyer-Olkin (KMO) test and the Bartlett's test of sphericity are typically utilised to ascertain the factorability of the output matrix of a scale (Coakes, 2005; Pallant, 2005). In general, the feasibility of the factor analysis is indicated by high values of the KMO test (>0.50; de Vaus, 2002; Field, 2005; Netemeyer, Bearden, & Sharma, 2003) and high significance value of the Bartlett's test. The KMO Measure of Sampling Adequacy, with a value of 0.866, indicates that the sample size was sufficiently large to perform factor analysis for the System Features construct. Moreover, the Bartlett's test of sphericity was significant with p=0.000, indicating adequate correlations between the variables (Table 4.19).

Table 4.18 *KMO and Bartlett's Test for System Features*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.866
Bartlett's Test of Sphericity	Approx. Chi-Square	4031.604
	df	78
	Sig.	0.000

The outcomes of the factor analysis for the System Features construct are provided in Table 4.20. Factors with eigenvalues of >1 and a factor loading of at least 0.5 were considered acceptable. It can be seen that the facets related to the Accessibility of a system was the most important factor that could explain 49.697% of the variance in system features, followed by Visibility and Relevance. Moreover, it could be seen that all the items in each construct had factor values greater than the cut-off level.

Table 4.19 *Factors of System Features*

Variable Code	Factors	Factor loadings	% of Variance	Cumulative %
Accessibility			**49.697**	**49.697**
AC1	I find it easy to navigate	0.846		
AC2	I am able to use it whenever I need it	0.828		
AC3	I find it easy to get access to	0.859		
AC4	It is easily accessible	0.773		
AC5	I can locate the resources I need	0.848		
Visibility			**16.385**	**66.082**
VI1	People at my university know that it exists	0.869		
VI2	People know where to look to find it	0.855		
VI3	I find that it is always available	0.740		
Relevance			**8.371**	**74.453**
RE1	It has resources that relate to my area of interest	0.739		
RE2	It has enough resources for my study	0.845		
RE3	It provides current information in my area of interest	0.540		
RE4	It is a very efficient study tool	0.510		
RE5	It is limited in its coverage of my area of interest	0.886		

The EFA for the UDL dataset is described next.

UDL Dataset

The KMO Measure of Sampling Adequacy, with a value of 0.753, indicates that the sample size was sufficiently large to perform factor analysis for the System Features construct in the UDL dataset. Moreover, the Bartlett's test of sphericity was significant with p=0.000, indicating adequate correlations between the variables (Table 4.21).

Table 4.20 *KMO and Bartlett's test for System Features – UDL Dataset*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.753
Bartlett's Test of Sphericity	Approx. Chi-Square	1411.543
	df	78
	Sig.	0.000

The outcomes of the factor analysis for the System Features construct are provided in Table 4.22. Factors with eigenvalues of >1 and a factor loading of at least 0.5 were considered acceptable. In contrast to the combined dataset, it can be seen that the facets related to the Relevance of a system was the most important factor that could explain 38.003% of the variance in system features, followed by Accessibility and Visibility. Further, it can be seen that all the items in each construct had factor values greater than the cut-off level.

Table 4.21 *Factors of System Features – UDL Dataset*

Variable Code	**Factors**	**Factor Loadings**	**% of Variance**	**Cumulative %**
Relevance			**38.003**	**38.003**
RE1	It has resources that relate to my area of interest	0.778		
RE2	It has enough resources for my study	0.827		
RE3	It provides current information in my area of interest	0.675		
RE4	It is a very efficient study tool	0.511		
RE5	It is limited in its coverage of my area of interest	0.875		
Accessibility			**15.526**	**53.530**
AC1	I find it easy to navigate	0.817		

Variable Code	Factors	Factor Loadings	% of Variance	Cumulative %
AC2	I am able to use it whenever I need it	0.732		
AC3	I find it easy to get access to	0.864		
AC4	It is easily accessible	0.711		
AC5	I can locate the resources I need	0.814		
Visibility			**13.414**	**66.944**
VI1	People at my university know that it exists	0.871		
VI2	People know where to look to find it	0.900		
VI3	I find that it is always available	0.709		

Google Scholar Dataset

The KMO Measure of Sampling Adequacy, with a value of 0.800, indicates that the sample size was sufficiently large to perform factor analysis for the System Features construct in the Google Scholar dataset. Moreover, the Bartlett's test of sphericity was significant with p=0.000, indicating adequate correlations between the variables (Table 4.23).

Table 4.22 *KMO and Bartlett's Test for System Features - Google Scholar Dataset*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.800
Bartlett's Test of Sphericity	Approx. Chi-Square	1383.825
	df	55
	Sig.	0.000

The outcomes of the factor analysis for the System Features construct are provided in Table 4.24. Factors with eigenvalues of >1 and a factor loading of at least 0.5 were considered acceptable. Similar to the UDL dataset, it can be seen that the facets related to the Relevance of a system was the most important factor that could explain 45.619% of the variance in system features, followed by Accessibility and Relevance. Moreover, it can be seen that all the items in each construct had factor values greater than the cut-off level.

Table 4.23 *Factors of System Features - Google Scholar Dataset*

Variable Code	**Factors**	**Factor Loadings**	**% of Variance**	**Cumulative %**
Relevance			**45.619**	**45.619**
RE1	It has resources that relate to my area of interest	0.741		
RE2	It has enough resources for my study	0.817		
RE5	It is limited in its coverage of my area of interest	0.858		
Accessibility			**17.741**	**63.360**
AC1	I find it easy to navigate	0.891		
AC2	I am able to use it whenever I need it	0.795		
AC3	I find it easy to get access to	0.866		
AC4	It is easily accessible	0.727		
AC5	I can locate the resources I need	0.833		
Visibility			**10.881**	**74.241**
VI1	People at my university know that it exists	0.877		
VI2	People know where to look to find it	0.823		
VI3	I find that it is always available	0.829		

4.7.2.2 EFA for Internal Differences (Domain Knowledge, Computer Experience, Computer Self-efficacy, Motivation)

The KMO Measure of Sampling Adequacy, with a value of 0.791, indicates that the sample size was sufficiently large to perform factor analysis for the Internal Differences construct. Moreover, the Bartlett's test of sphericity was significant with p=0.000, indicating adequate correlations between the variables (Table 4.25).

Table 4.24 *KMO and Bartlett's Test for Internal Differences*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.791
Bartlett's Test of Sphericity	Approx. Chi-Square	4433.648
	df	171
	Sig.	0.000

The outcomes of the factor analysis for the Internal Differences construct are provided in Table 4.26. Factors with eigenvalues of >1 and a factor loading of at least 0.5 were considered acceptable. It can be seen that the facets related to the Domain Knowledge of an individual was the most important factor that could explain 31.259% of the variance in internal differences, this was followed by Motivation, Computer Self-efficacy, and Computer Experience. Moreover, it could be seen that all the items in each construct had factor values greater than the cut-off level.

Table 4.25 *Factors of Internal Differences*

Variable Code	**Factors**	**Factor loadings**	**% of Variance**	**Cumulative %**
Domain Knowledge			**31.259**	**31.259**
DK1	I am familiar with the subject domain that I search for	0.880		
DK2	I am knowledgeable in the topic to search for	0.894		
DK3	I have previous experience searching in this subject domain	0.848		
DK4	I have the domain knowledge that it necessary to search for what I want to find	0.840		
Motivation			**14.069**	**45.328**
MO1	Helps me achieve in my studies	0.861		
MO2	I use it because people around me do	0.726		
MO3	I have been trained to use it	0.762		
MO4	I am confident in using it	0.457		
MO5	I don’t always feel in control of the outcome	0.798		
MO6	Makes me feel really involved in my studies	0.456		
Computer Self-Efficacy			**11.198**	**56.526**
SE1	I feel confident in my ability to use it	0.794		
SE2	I can use it even if there is no one around me to show me	0.693		
SE3	I don’t need a lot of time to complete my task using it	0.767		
SE4	I often find it difficult to use it for my studies	0.659		

Variable Code	Factors	Factor loadings	% of Variance	Cumulative %
SE5	Helps even when the task is challenging	0.767		
Computer Experience			**8.334**	**64.860**
CS1	I am confident in using computers	0.800		
CS2	I think I am efficient in the use of a computer to complete my task	0.900		
CS3	I can use a computer even if there is no one around to show me	0.872		
CS4	I am happier if there is someone around to ask for help	0.431		

UDL Dataset

The KMO Measure of Sampling Adequacy, with a value of 0.675, indicates that the sample size was sufficiently large to perform factor analysis for the Internal Differences construct in the UDL dataset. Moreover, the Bartlett's test of sphericity was significant with p=0.000, indicating adequate correlations between the variables (Table 4.27).

Table 4.26 *KMO and Bartlett's test for Individual Differences – UDL Dataset*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.675
Bartlett's Test of Sphericity	1639.049	1364.857
	136	153
	0.000	0.000

The outcomes of the factor analysis for the Internal Differences construct are provided in Table 4.28. Factors with eigenvalues of >1 and a factor loading of at least 0.5 were considered acceptable. It could be seen that the facets related to the Domain Knowledge of an individual was the most important factor that could explain 22.222% of the variance in internal differences, this was followed by Computer Experience, Motivation, and Computer Self-efficacy. In contrast to the combined dataset, the factor loadings of items CS4 and MO6 did not meet the cut-off and could be excluded from further analysis.

Table 4.27 *Factors of Individual Differences – UDL Dataset*

Variable Code	**Factors**	**Factor Loadings**	**% of Variance**	**Cumulative %**
Domain Knowledge			**22.222**	**22.222**
DK1	I am familiar with the subject domain that I search for	0.800		
DK2	I am knowledgeable in the topic to search for	0.801		
DK3	I have previous experience searching in this subject domain	0.760		
DK4	I have the domain knowledge that it necessary to search for what I want to find	0.720		
Computer Experience			**16.897**	**39.120**
CS1	I am confident in using computers	0.826		
CS2	I think I am efficient in the use of a computer to complete my task	0.956		
CS3	I can use a computer even if there is no one around to show me	0.926		
Motivation			**13.501**	**52.621**
MO1	Helps me achieve in my studies	0.871		
MO2	I use it because people around me do	0.649		
MO3	I have been trained to use it	0.699		
MO4	I am confident in using it	0.541		
MO5	I don't always feel in control of the outcome	0.813		
Computer Self-Efficacy			**10.178**	**62.799**
SE1	I feel confident in my ability to use it	0.812		
SE2	I can use it even if there is no one around me to show me	0.711		
SE3	I don't need a lot of time to complete my task using it	0.754		
SE4	I often find it difficult to use it for my studies	0.657		
SE5	Helps even when the task is challenging	0.719		

Google Scholar Dataset

The KMO Measure of Sampling Adequacy, with a value of 0.669, indicates that the sample size was sufficiently large to perform factor analysis for the Internal Differences construct in the Google Scholar dataset. Moreover, the Bartlett's test of sphericity was significant with p=0.000, indicating adequate correlations between the variables (Table 4.29).

__Table 4.28__ KMO and Bartlett's test for Individual Differences – Google Scholar Dataset

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.669
Bartlett's Test of Sphericity	Approx. Chi-Square	1364.857
	df	153
	Sig.	0.000

The outcomes of the factor analysis for the Internal Differences construct are provided in Table 4.30. Factors with eigenvalues of >1 and a factor loading of at least 0.5 were considered acceptable. It could be seen that the facets related to the Domain Knowledge of an individual was the most important factor that could explain 21.297% of the variance in internal differences, this was followed by Computer Experience, Computer Self-efficacy, and Motivation. In contrast to the combined dataset, the factor loadings of item MO4 did not meet the cut-off and could be excluded from further analysis.

__Table 4.29__ Factors of Individual Differences – Google Scholar Dataset

Variable Code	**Factors**	**Factor Loadings**	**% of Variance**	**Cumulative %**
Domain Knowledge			**21.297**	**21.297**
DK1	I am familiar with the subject domain that I search for	0.798		
DK2	I am knowledgeable in the topic to search for	0.794		
DK3	I have previous experience searching in this subject domain	0.774		
DK4	I have the domain knowledge that it necessary to search for what I want to find	0.715		
Computer Experience			**14.627**	**35.925**
CS1	I am confident in using computers	0.689		
CS2	I think I am efficient in the use of a computer to complete my task	0.839		
CS3	I can use a computer even if there is no one around to show me	0.797		

Variable Code	Factors	Factor Loadings	% of Variance	Cumul ative %
CS4	I am happier if there is someone around to ask for help	0.612		
Computer Self-Efficacy			**12.349**	**48.274**
SE1	I feel confident in my ability to use it	0.787		
SE2	I can use it even if there is no one around me to show me	0.681		
SE3	I don't need a lot of time to complete my task using it	0.782		
SE4	I often find it difficult to use it for my studies	0.618		
SE5	Helps even when the task is challenging	0.741		
Motivation			**10.344**	**58.617**
MO1	Helps me achieve in my studies	0.844		
MO2	I use it because people around me do	0.752		
MO3	I have been trained to use it	0.776		
MO5	I don't always feel in control of the outcome	0.800		
MO6	Makes me feel really involved in my studies	0.526		

The next section describes the CFA performed in the study in further detail.

4.7.3 Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis is a "process to test (confirm) specific hypotheses or theories concerning the structure underlying a set of variables" (Pallant, 2010, p.181). CFA is used to check whether a dataset fits a measurement model (Janssens, 2008). Carrying out CFA on the variables associated with each factor ensures that the items are sufficiently loaded, as well as checking that all variables satisfactorily fit with the confirmatory model.

4.7.3.1 CFA for System Features (Accessibility, Visibility, Relevance)

Table 4.31 presents the fit indices of the scales obtained in CFA for System Features. The CMIN/DF of 2.859 suggests that model is a good fit, as the value is within the expected value of <5. The NFI (.850), RFI (.812), IFI (.863), TLI (.828), and CFI (.863) were close to 0.9 suggesting that the model is a good fit. The CFA model of System Features is illustrated in Figure 4.1.

Table 4.30 *Model Fit Indices for System Features*

Model Fit Indices	**Recommended Guideline Values**	**Value**	**Reference**
Chi-square (CMIN/DF)	< 5	2.859	Bollen & Long, 1993 Kelloway, 1995
Normed Fit Index (NFI)	> 0.90	.850	Byrne, 1994
Relative Fit Index (RFI)	> 0.90	.812	Bollen, 1990
Incremental Fit Index (IFI)	> 0.90	.863	Bollen, 1990
Tucker Lewis Index (TLI)	> 0.90	.828	Hu & Bentler, 1998
Comparative Fit Index (CFI)	> 0.90	.863	Byrne, 1994
Root Mean Square Error of Approximation (RMSEA)	< 0.08	.049	MacCallum, Browne, & Sugawara, 1996

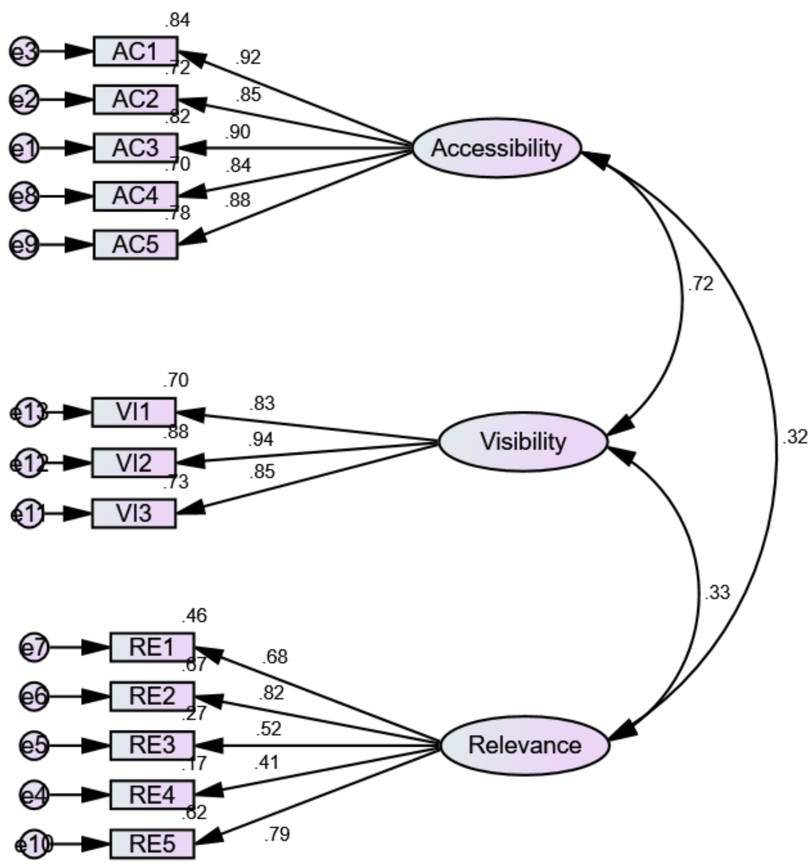


Figure 4.1 *Structure Equation Model representing CFA of System Features*

The association between the observed and latent constructs was further tested using standardised estimates. In this study, all the items had standardised estimates which were between 0.034 and 0.293 suggesting low loadings for System Features, and all of them were highly significant at $p<0.01$ (Table 4.32).

Table 4.31 *Standardised Regression Weights of System Features*

			Estimate	S.E.	C.R.	P	Label
AC3	<---	Accessibility	.904				
AC2	<---	Accessibility	.848	.038	24.523	***	
AC1	<---	Accessibility	.915	.034	29.435	***	
RE4	<---	Relevance	.410				
RE3	<---	Relevance	.523	.196	6.579	***	
RE2	<---	Relevance	.821	.293	7.674	***	
RE1	<---	Relevance	.679	.245	7.308	***	
AC4	<---	Accessibility	.837	.038	23.855	***	
AC5	<---	Accessibility	.884	.037	26.965	***	
RE5	<---	Relevance	.785	.289	7.614	***	
VI3	<---	Visibility	.852				
VI2	<---	Visibility	.941	.044	24.703	***	
VI1	<---	Visibility	.834	.046	20.962	***	

Robust and significant correlations were found between all the latent constructs Accessibility and Visibility ($r=0.719$), Accessibility and Relevance ($r=.318$), and Relevance and Visibility ($r=.334$). Similarly, r^2 values as estimated by squared multiple correlations was found to lie between 0.168 and 0.885, suggesting that the variables had high explanation power. Table 4.33 provides the Squared Multiple Correlations of System Features.

Table 4.32 *Squared Multiple Correlations of System Features*

	Estimate
VI1	.696
VI2	.885
VI3	.726
RE5	.617
AC5	.781
AC4	.701

	Estimate
RE1	.462
RE2	.674
RE3	.274
RE4	.168
AC1	.838
AC2	.719
AC3	.817

UDL Dataset

The item loadings obtained through CFA for the system features construct are listed in Table 4.34. It can be seen that the item loadings ranged from 0.555 to 0.954, with eight out of the 10 items having loadings greater than 0.7. Items where the factor loading values were not significant or very low were removed from the model. The AVE (average variance extracted) exceeded 0.5 for all of sub-constructs. The CR (composite reliability) exceeded 0.7 for the Accessibility and Relevance sub-constructs, but not for the Visibility sub-construct where the CR was 0.652. This indicates that the scale has reasonably good validity (Fornell & Larcker, 1981) as the majority of the constructs have values of AVE and CR, which are greater than those recommended. In addition, the Cronbach's alpha values for all of the sub-constructs are greater than 0.7, which indicates good reliability (Hinton et al., 2014).

Table 4.33 *Standardised item loadings, AVE, CR, and Alpha Values for System Features – UDL Dataset*

Factor	Item	Standardised loadings	AVE	CR	Alpha
Accessibility	AC1	0.816	0.581	0.873	0.872
	AC2	0.716			
	AC3	0.821			
	AC4	0.660			
	AC5	0.784			
Relevance	RE1	0.703	0.698	0.872	0.827
	RE2	0.831			

Factor	Item	Standardised loadings	AVE	CR	Alpha
	RE5	0.954			
Visibility	VI1	0.555	0.494	0.652	0.828
	VI3	0.824			

Table 4.35 presents the fit indices of the scales obtained in CFA for System Features in the UDL dataset. The CMIN/DF of 4.173 suggests that model is a good fit, as the value is within the expected value of <5. The NFI (.868), RFI (.814), IFI (.896), TLI (.852), and CFI (.895) were close to 0.9 suggesting that the model is a good fit. The CFA model of System Features for the UDL dataset is illustrated in Figure 5.2.

Table 4.34 *Model Fit Indices for System Features – UDL Dataset*

Model Fit Indices	Recommended Guideline Values	Value	Reference
Chi-square (CMIN/DF)	< 5	4.173	Bollen & Long, 1993 Kelloway, 1995
Normed Fit Index (NFI)	> 0.90	.868	Byrne, 1994
Relative Fit Index (RFI)	> 0.90	.814	Bollen, 1990
Incremental Fit Index (IFI)	> 0.90	.896	Bollen, 1990
Tucker Lewis Index (TLI)	> 0.90	.852	Hu & Bentler, 1998
Comparative Fit Index (CFI)	> 0.90	.895	Byrne, 1994
Root Mean Square Error of Approximation (RMSEA)	< 0.08	.126	MacCallum, Browne, & Sugawara, 1996

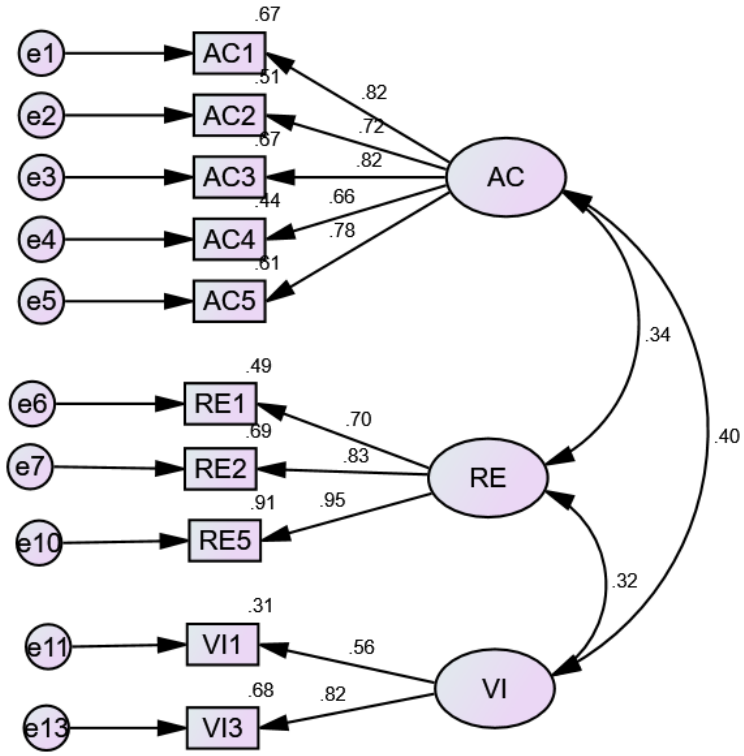


Figure 4.2 *Structure Equation Model representing CFA of System Features – UDL dataset*

The association between the observed and latent constructs was further tested using standardised estimates. In this study, all the items had standardised estimates which were between 0.078 and 0.346 suggesting low loadings for System Features, and all of them were highly significant at p<0.01 (Table 4.36).

Table 4.35 ***Standardised Regression Weights of System Features – UDL dataset***

			Estimate	S.E.	C.R.	P	Label
AC1	<---	Accessibility	1.000				
AC2	<---	Accessibility	.894	.084	10.649	***	
AC3	<---	Accessibility	1.066	.085	12.597	***	
AC4	<---	Accessibility	.756	.078	9.656	***	
AC5	<---	Accessibility	1.022	.086	11.916	***	
RE1	<---	Relevance	1.000				
RE2	<---	Relevance	1.328	.119	11.120	***	
RE5	<---	Relevance	1.626	.144	11.325	***	
VI1	<---	Visibility	1.000				
VI3	<---	Visibility	1.260	.346	3.644	***	

Robust and significant correlations were found between all the latent constructs Accessibility and Relevance (r=0.336), Accessibility and Visibility (r=.400), and Relevance and Visibility (r=.316). Similarly, r^2 values as estimated by squared multiple correlations was found to lie between 0.308 and 0.911, suggesting that the variables had high explanation power. Table 4.37 provides the Squared Multiple Correlations of System Features.

Table 4.36 *Squared Multiple Correlations of System Features – UDL dataset*

	Estimate
VI3	.680
VI1	.308
RE5	.911
RE2	.691
RE1	.495
AC5	.614
AC4	.436
AC3	.674
AC2	.512
AC1	.666

Google Scholar Dataset

The item loadings obtained through CFA for the system features construct are listed in Table 4.38. It can be seen that the item loadings ranged from 0.5 to 0.964, with eight out of the 10 items having loadings greater than 0.7. Items where the factor loading values were not significant or very low were removed from the model. The AVE exceeded 0.5 for the Visibility sub-construct but not for the Accessibility and Relevance sub-constructs, though the AVE value for these was >0.5. The CR exceeded 0.7 for all the sub-constructs. This indicates that the scale has reasonably good validity (Fornell & Larcker, 1981) as the majority of the constructs have values of AVE and CR which are greater than those recommended. In addition, the Cronbach's alpha values for all of the sub-constructs are greater than 0.7 which indicates good reliability (Hinton et al., 2014).

Table 4.37 *Standardised item loadings, AVE, CR, and Alpha Values for System Features – Google Scholar Dataset*

Factor	**Item**	**Standardised loadings**	**AVE**	**CR**	**Alpha**
Accessibility	AC1	0.899	0.681	0.914	0.913
	AC2	0.762			
	AC3	0.870			
	AC4	0.705			
	AC5	0.874	0.711	0.881	0.880
Visibility	VI1	0.846			
	VI2	0.833			
	VI3	0.851			
Relevance	RE1	0.500	0.519	0.750	0.680
	RE2	0.615			
	RE5	0.964			

Table 4.39 presents the fit indices of the scales obtained in CFA for System Features in the Google Scholar dataset. The CMIN/DF of 3.257 suggests that model is a good fit, as the value is within the expected value of <5. The NFI (.778), RFI (.723), IFI (.835), TLI (.790), and CFI (.832) were close to 0.9 suggesting that the model is a reasonably good fit. The CFA model of System Features is illustrated in Figure 4.3.

Table 4.38 *Model Fit Indices for System Features – Google Scholar Dataset*

Model Fit Indices	**Recommended Guideline Values**	**Value**	**Reference**
Chi-square (CMIN/DF)	< 5	3.257	Bollen & Long, 1993 Kelloway, 1995
Normed Fit Index (NFI)	> 0.90	.778	Byrne, 1994
Relative Fit Index (RFI)	> 0.90	.723	Bollen, 1990
Incremental Fit Index (IFI)	> 0.90	.835	Bollen, 1990
Tucker Lewis Index (TLI)	> 0.90	.790	Hu & Bentler, 1998
Comparative Fit Index (CFI)	> 0.90	.832	Byrne, 1994
Root Mean Square Error of Approximation (RMSEA)	< 0.08	.107	MacCallum, Browne, & Sugawara, 1996

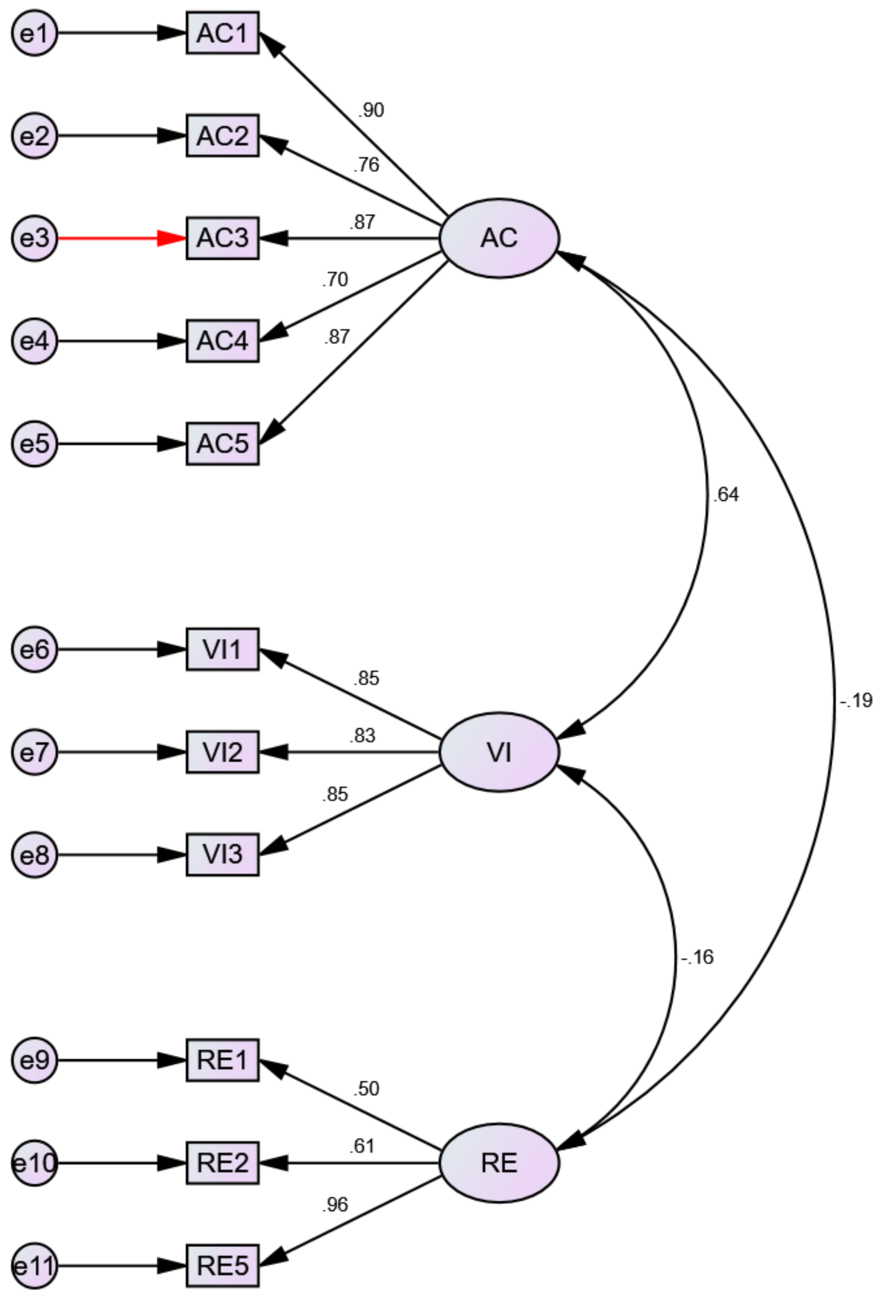


Figure 4.3 *Structure Equation Model representing CFA of System Features – Google Scholar Dataset*

The association between the observed and latent constructs was further tested using standardised estimates. In this study, all the items had standardised estimates which were between 0.055 and 0.376 suggesting low loadings for System Features, and all of them were highly significant at $p<0.01$ (Table 4.40).

__Table 4.39__ Standardised Regression Weights of System Features – Google Scholar Dataset

			Estimate	S.E.	C.R.	P	Label
AC1	<---	Accessibility	1.000				
AC2	<---	Accessibility	.809	.059	13.639	***	
AC3	<---	Accessibility	.970	.055	17.501	***	
AC4	<---	Accessibility	.724	.060	11.999	***	
AC5	<---	Accessibility	1.025	.058	17.675	***	
VI1	<---	Visibility	1.000				
VI2	<---	Visibility	.949	.070	13.478	***	
VI3	<---	Visibility	.926	.067	13.801	***	
RE1	<---	Relevance	1.000				
RE2	<---	Relevance	1.255	.199	6.313	***	
RE5	<---	Relevance	1.946	.376	5.180	***	

Robust and significant correlations were found between the latent constructs Accessibility and Visibility (r=0.639) but not between Accessibility and Relevance (r=-.190), and Visibility and Relevance (r=-.160). Similarly, r^2 values as estimated by squared multiple correlations were found to lie between 0.5 and 0.964, suggesting that the variables had high explanation power. Table 4.41provides the Squared Multiple Correlations of System Features.

__Table 4.40__ Squared Multiple Correlations of System Features – Google Scholar Dataset

	Estimate
AC1	.899
AC2	.762
AC3	.870
AC4	.705
AC5	.874
VI1	.846
VI2	.833
VI3	.851
RE1	.500
RE2	.615
RE5	.964

4.7.3.2 *CFA for Individual Differences (Domain Knowledge, Computer Self-Efficacy, Computer Experience, Motivation)*

Table 4.72 presents the fit indices of the scales obtained in CFA for the Individual Differences construct. The CMIN/DF of 3.003 suggests that model is a good fit, as the value is within the expected value of <5. The NFI (.819), RFI (.782), IFI (.845), TLI (.812), and CFI (.844) were close to 0.9 suggesting that the model is a good fit. The CFA model of Individual Differences is illustrated in Figure 4.4.

Table 4.41 *Model Fit Indices for Individual Differences*

Model Fit Indices	**Recommended Guideline Values**	**Value**	**Reference**
Chi-square (CMIN/DF)	< 5	3.003	Bollen & Long, 1993 Kelloway, 1995
Normed Fit Index (NFI)	> 0.90	.819	Byrne, 1994
Relative Fit Index (RFI)	> 0.90	.782	Bollen, 1990
Incremental Fit Index (IFI)	> 0.90	.845	Bollen, 1990
Tucker Lewis Index (TLI)	> 0.90	.812	Hu & Bentler, 1998
Comparative Fit Index (CFI)	> 0.90	.844	Byrne, 1994
Root Mean Square Error of Approximation (RMSEA)	< 0.08	.049	MacCallum, Browne, & Sugawara, 1996

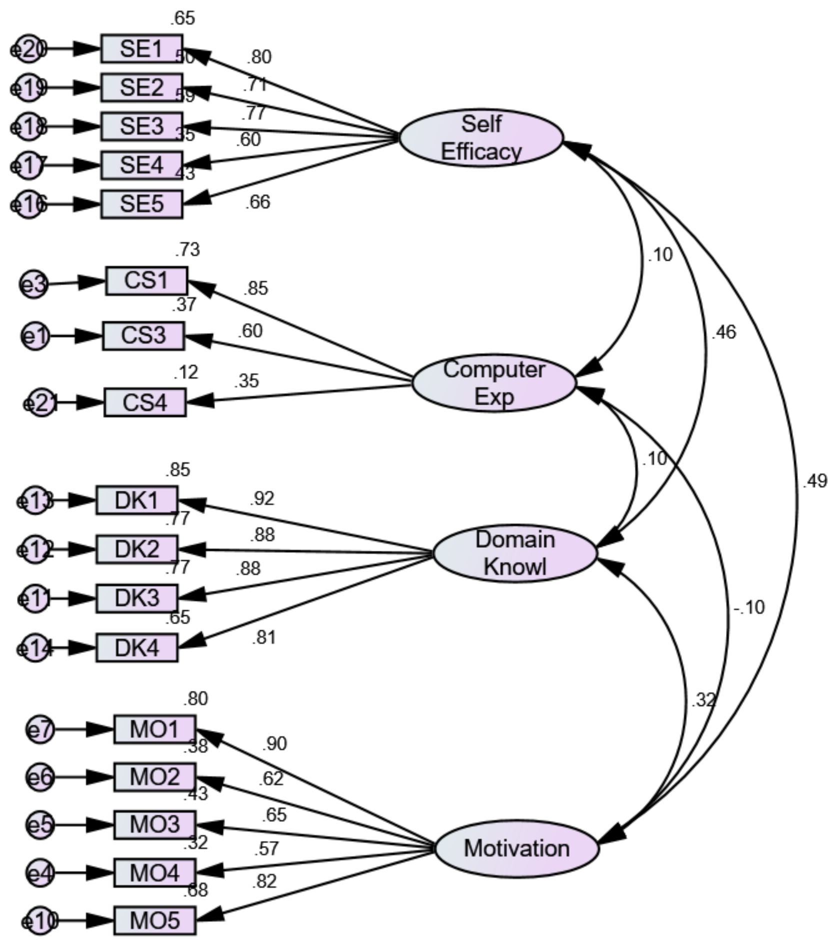


Figure 4.4 *Structural Equation Model representing CFA of Individual Differences*

The association between the observed and latent constructs was further tested using standardised estimates. In this study, all the items had standardised estimates which were between 0.345 and 0.919 suggesting moderate to high loadings for Individual Differences, and all of them were highly significant at p<0.01 (Table 4.43).

Table 4.42 *Standardised Regression Weights of Individual Differences*

			Estimate	S.E.	C.R.	P
CS3	<---	Computer Experience	.605			
CS1	<---	Computer Experience	.855	.285	5.382	***
MO4	<---	Motivation	.568			
MO3	<---	Motivation	.655	.127	10.101	***
MO2	<---	Motivation	.620	.125	9.736	***

			Estimate	S.E.	C.R.	P
MO1	<---	Motivation	.897	.139	11.964	***
MO5	<---	Motivation	.823	.139	11.584	***
DK3	<---	Domain Knowledge	.877			
DK2	<---	Domain Knowledge	.875	.040	24.139	***
DK1	<---	Domain Knowledge	.919	.038	26.447	***
DK4	<---	Domain Knowledge	.805	.044	20.677	***
SE5	<---	Computer Self-efficacy	.657			
SE4	<---	Computer Self-efficacy	.595	.095	10.260	***
SE3	<---	Computer Self-efficacy	.767	.094	12.589	***
SE2	<---	Computer Self-efficacy	.706	.085	11.820	***
SE1	<---	Computer Self-efficacy	.804	.097	12.992	***
CS4	<---	Computer Experience	.345	.137	5.678	***

Robust and significant correlations were found between the constructs Computer Experience and Domain Knowledge (r=0.096), Motivation and Domain Knowledge (r=0.323), Computer Experience and Computer Self-Efficacy (r=0.099), Domain Knowledge and Computer Self-Efficacy (r=0.457), and Motivation and Computer Self-Efficacy (r=0.495). However, the correlation between Computer Experience and Motivation was found to be negative (r=-0.104). The r^2 values estimated using squared multiple correlations was found to lie between 0.119 and 0.845, suggesting that the variables had high explanation power. Table 4.44 provides the Squared Multiple Correlations of Individual Differences.

Table 4.43 *Squared Multiple Correlations of Individual Differences*

	Estimate
CS4	.119
SE1	.647
SE2	.499
SE3	.589
SE4	.355
SE5	.432
DK4	.648
DK1	.845
DK2	.766
DK3	.770
MO5	.677

	Estimate
MO1	.804
MO2	.384
MO3	.429
MO4	.323
CS1	.731
CS3	.366

UDL Dataset

The item loadings obtained through CFA for the individual construct are listed in Table 4.45. It can be seen that the item loadings are greater than 0.5 for all the items, with seven out of the 10 items having loadings greater than 0.7. Items where the factor loading values were not significant or very low were removed from the model. The AVE exceeded 0.5 for the all the sub-constructs. The CR exceeded 0.7 for all the sub-constructs. This indicates that the scale has good validity (Fornell & Larcker, 1981) as all the constructs have values of AVE and CR which are greater than those recommended. In addition, the Cronbach's alpha values for all of the sub-constructs are greater than 0.7 which indicates good reliability (Hinton et al., 2014).

Table 4.44 *Standardised item loadings, AVE, CR, and Alpha Values for Individual Differences – UDL Dataset*

Factor	Item	Standardised loadings	AVE	CR	Alpha
Computer Experience	CS1	0.785	0.488	0.789	0.786
	CS2	0.580			
	CS3	0.787			
	CS4	0.618			
Motivation	MO1	0.765	0.787	0.879	0.760
	MO5	0.994			
Computer Self Efficacy	SE1	0.673	0.659	0.790	0.800
	SE2	0.930			
Domain Knowledge	DK1	0.776	0.711	0.830	0.771
	DK3	0.905			

Table 4.46 presents the fit indices of the scales obtained in CFA for the Individual Differences construct in the UDL dataset. The CMIN/DF of 3.238 suggests that model is a good fit, as the value is within the expected value of <5. The NFI (.875), RFI (.807), IFI (.910), TLI (.858), and CFI (.908) were close to 0.9 suggesting that the model is a good fit. The CFA model of Individual Differences is illustrated in Figure 4.5.

Table 4.45 *Model Fit Indices for Individual Differences – UDL dataset*

Model Fit Indices	**Recommended Guideline Values**	**Value**	**Reference**
Chi-square (CMIN/DF)	< 5	3.238	Bollen & Long, 1993 Kelloway, 1995
Normed Fit Index (NFI)	> 0.90	.875	Byrne, 1994
Relative Fit Index (RFI)	> 0.90	.807	Bollen, 1990
Incremental Fit Index (IFI)	> 0.90	.910	Bollen, 1990
Tucker Lewis Index (TLI)	> 0.90	.858	Hu & Bentler, 1998
Comparative Fit Index (CFI)	> 0.90	.908	Byrne, 1994
Root Mean Square Error of Approximation (RMSEA)	< 0.08	.106	MacCallum, Browne, & Sugawara, 1996

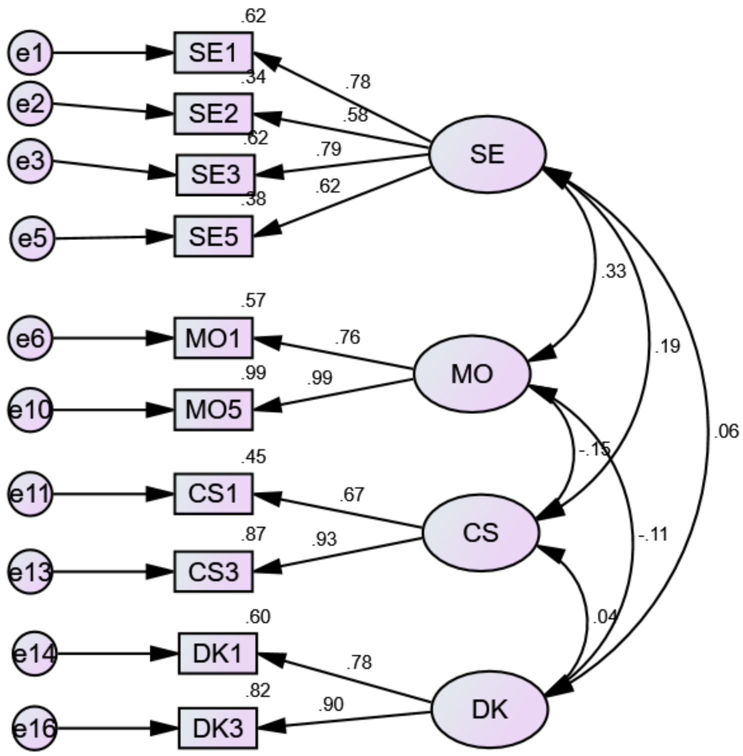


Figure 4.5 *Structure Equation Model representing CFA of Individual Differences – UDL dataset*

The association between the observed and latent constructs was further tested using standardised estimates. In this study, all the items had standardised estimates which were between 0.094 and 0.6 suggesting moderate to high loadings for Individual Differences. The loadings were highly significant at p<0.01 for all the items except the third item in the Domain Knowledge construct (Table 4.47).

Table 4.46 *Standardised Regression Weights of Individual Differences – UDL dataset*

			Estimate	S.E.	C.R.	P
SE1	<---	Computer Self-efficacy	1.000			
SE2	<---	Computer Self-efficacy	.703	.094	7.476	***
SE3	<---	Computer Self-efficacy	.930	.097	9.559	***
SE5	<---	Computer Self-efficacy	.884	.111	7.950	***
MO1	<---	Motivation	1.000			
MO5	<---	Motivation	1.411	.237	5.961	***

			Estimate	S.E.	C.R.	P
CS1	<---	Computer Experience	1.000			
CS3	<---	Computer Experience	1.389	.424	3.279	.001
DK1	<---	Domain Knowledge	1.000			
DK3	<---	Domain Knowledge	1.261	.600	2.103	.036

Robust and significant correlations were found between the constructs Computer Self-Efficacy and Motivation (r=0.327), Computer Self-Efficacy and Computer Experience (r=0.187), Computer Self-Efficacy and Domain Knowledge (r=0.061), and Computer Experience and Domain Knowledge (r=0.036). However, negative correlations were found between Motivation and Computer Experience (r=-0.155) and Motivation and Domain Knowledge (r=-0.108). The r^2 values estimated using squared multiple correlations was found to lie between 0.337 and 0.989, suggesting that the variables had high explanation power. Table 4.48 provides the Squared Multiple Correlations of Individual Differences.

Table 4.47 *Squared Multiple Correlations of Individual Differences – UDL Dataset*

	Estimate
DK3	.819
DK1	.602
CS3	.865
CS1	.454
MO5	.989
MO1	.570
SE5	.381
SE3	.619
SE2	.337
SE1	.616

Google Scholar Dataset

The item loadings obtained through CFA for the individual construct are listed in Table 4.49. It can be seen that the item loadings range from 0.345 to 0.919, with 16 out of the 17 items having loadings greater than 0.5. Items where the factor loading values were not significant or very low were removed from the model. The AVE exceeded 0.5 for the all the sub-constructs apart from Computer Experience where it was 0.405. The CR exceeded 0.7 for all the sub-constructs apart again from Computer Experience where it was 0.646. This indicates that the scale has reasonably good validity (Fornell & Larcker, 1981) as most of the constructs have values of AVE and CR which are greater than those recommended. In addition, the Cronbach's alpha values for all of the sub-constructs are greater than 0.65 which indicates good reliability (Hinton et al., 2014).

Table 4.48 *Standardised item loadings, AVE, CR, and Alpha Values for Individual Differences – Google Scholar Dataset*

Factor	**Item**	**Standardised loadings**	**AVE**	**CR**	**Alpha**
Computer Experience	CS3	0.605	0.405	0.646	0.654
	CS1	0.855			
	CS4	0.345			
Motivation	MO4	0.568	0.524	0.842	0.803
	MO3	0.655			
	MO2	0.620			
	MO1	0.897			
	MO5	0.823			
Domain Knowledge	DK3	0.877	0.757	0.925	0.778
	DK2	0.875			
	DK1	0.919			
	DK4	0.805			
Computer Self Efficacy	SE5	0.657	0.504	0.834	0.786
	SE4	0.595			
	SE3	0.767			
	SE2	0.706			
	SE1	0.804			

Table 4.50 presents the fit indices of the scales obtained in CFA for the Individual Differences construct in the Google Scholar dataset. The CMIN/DF of 4.587 suggests that model is a good fit, as the value is within the expected value of <5. The NFI (.867), RFI (.822), IFI (.893), TLI (.855),

and CFI (.892) were close to 0.9 suggesting that the model is a good fit. The CFA model of Individual Differences is illustrated in Figure 4.6.

Table 4.49 *Model Fit Indices for Individual Differences – Google Scholar Dataset*

Model Fit Indices	**Recommended Guideline Values**	**Value**	**Reference**
Chi-square (CMIN/DF)	< 5	4.587	Bollen & Long, 1993 Kelloway, 1995
Normed Fit Index (NFI)	> 0.90	.867	Byrne, 1994
Relative Fit Index (RFI)	> 0.90	.822	Bollen, 1990
Incremental Fit Index (IFI)	> 0.90	.893	Bollen, 1990
Tucker Lewis Index (TLI)	> 0.90	.855	Hu & Bentler, 1998
Comparative Fit Index (CFI)	> 0.90	.892	Byrne, 1994
Root Mean Square Error of Approximation (RMSEA)	< 0.08	.134	MacCallum, Browne, & Sugawara, 1996

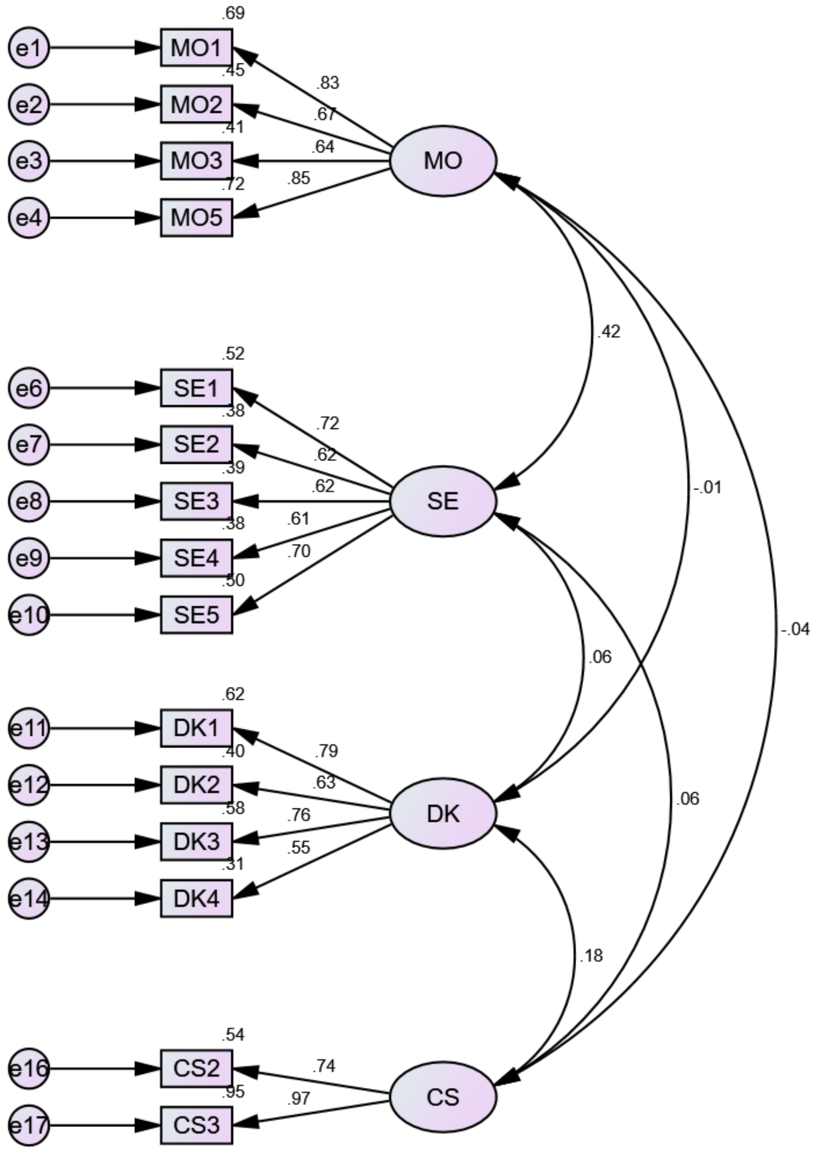


Figure 4.6 *Structure Equation Model representing CFA of Individual Differences – Google Scholar Dataset*

The association between the observed and latent constructs was further tested using standardised estimates. In this study, all the items had standardised estimates which were between 0.089 and 0.531 suggesting moderate to high loadings for Individual Differences, and all of them were highly significant at p<0.01 (Table 4.51).

Table 4.50 *Standardised Regression Weights of Individual Differences – Google Scholar Dataset*

			Estimate	S.E.	C.R.	P
MO1	<---	Motivation	1.000			
MO2	<---	Motivation	.863	.089	9.676	***
MO3	<---	Motivation	.839	.091	9.250	***
MO5	<---	Motivation	1.107	.090	12.286	***
SE1	<---	Computer Self-efficacy	1.000			
SE2	<---	Computer Self-efficacy	.718	.097	7.439	***
SE3	<---	Computer Self-efficacy	.838	.112	7.491	***
SE4	<---	Computer Self-efficacy	.943	.127	7.402	***
SE5	<---	Computer Self-efficacy	.928	.112	8.276	***
DK1	<---	Domain Knowledge	1.000			
DK2	<---	Domain Knowledge	.780	.098	7.925	***
DK3	<---	Domain Knowledge	1.180	.132	8.931	***
DK4	<---	Domain Knowledge	.831	.119	6.967	***
CS2	<---	Computer Experience	1.000			
CS3	<---	Computer Experience	1.393	.531	2.625	.009

Robust and significant correlations were found between the constructs Motivation and Computer Self-Efficacy (r=0.415), Computer Self-Efficacy and Domain Knowledge (r=0.064), Computer Self-Efficacy and Computer Experience (r=0.061), and Domain Knowledge and Computer Experience (r=0.179). Negative correlations were found between Motivation and Domain Knowledge (r=-0.012) and Motivation and Computer Experience (r=-0.040) (Table 5.87). The r^2 values estimated using squared multiple correlations was found to lie between 0.305 and 0.949, suggesting that the variables had high explanation power. Table4.52 provides the Squared Multiple Correlations of Individual Differences.

Table 4.51 *Squared Multiple Correlations of Individual Differences – Google Scholar Dataset*

	Estimate
CS3	.949
CS2	.544
DK4	.305
DK3	.577

	Estimate
DK2	.401
DK1	.625
SE5	.496
SE4	.376
SE3	.387
SE2	.381
SE1	.518
MO5	.721
MO3	.415
MO2	.448
MO1	.694

The next section describes the SEM models created for the study.

4.7.4 Structural Equation Modelling (SEM)

4.7.4.1 Constructs and Variables

A goal of the study was to explore the factors that affect the acceptance and usage of UDLs and Google Scholar among international postgraduate students. Hence, SEM models were created using Behavioural Intention (BI) as the endogenous variable and Individual Differences (ID), System Features (SF), Effort Expectancy (EE), Performance Expectancy (PE), Facilitating Conditions (FC), and Social Influence (SI) as the exogenous variables. Sub-constructs were identified using the factor loadings obtained through the EFA and these were used in the construction of the model. These assessments were expected to confirm or reject the relationship among the constructs. Table 4.53 depicts the constructs and factors utilised in the models.

Table 4.52 *Constructs and Factors in the model*

Construct	Factors
System Features	Accessibility
	Visibility
	Relevance
Individual Differences	Domain Knowledge
	Computer Self-Efficacy
	Computer Experience
	Motivation

Construct	Factors
Social Influence	-
Facilitating Conditions	-
Effort Expectancy	-
Performance Expectancy	-
Behavioural Intention	-

However, it must be noted that the moderating effects of the moderator variables (that is, Gender, Age, Educational Status, University of Study, and Preferred Tool for Information Search) were not tested on the model as this study places emphasis on comparing the perceptions of international postgraduate students with regard to the use of UDLs or GS.

4.7.4.2 Model Specification

Behavioural Intention (BI) is the chief construct that denotes the intention of students to utilise their UDL or Google Scholar. Hence, this construct is considered to be the model's main endogenous factor. Effort Expectancy (EE), Performance Expectancy (PE), Facilitating Conditions (FC), and Social Influence (SI) are the exogenous variables whose influence on BI is examined through the model. Individual Differences (ID) and System Features (SF) are included to scrutinise their impact on EE and PE respectively. The statistical package AMOS (v21.0) was utilised for the model development.

The next section discusses the model created using the UDL dataset.

4.7.4.3 UDL Dataset

A SEM was constructed to determine the association between System Features, Individual Differences, Performance Expectancy, Effort Expectancy, Facilitating Conditions, Social Influence, and Behavioural Intention in the UDL dataset (Figure 4.7). The sub-constructs of these variables were used to build the model. Table 4.54 summarises the model fit indices of the scales obtained for the model in SEM. The CMIN/DF of 4.379 indicates that the model is a good fit since the value is within the guideline value (<5). The values of CFI (.861), NFI (.912), RFI (.881), IFI (.976), and TLI (.943) were close to 0.9 indicating the goodness of fit of the model.

Figure 4.7 depicts the structural equation model created using the UDL dataset.

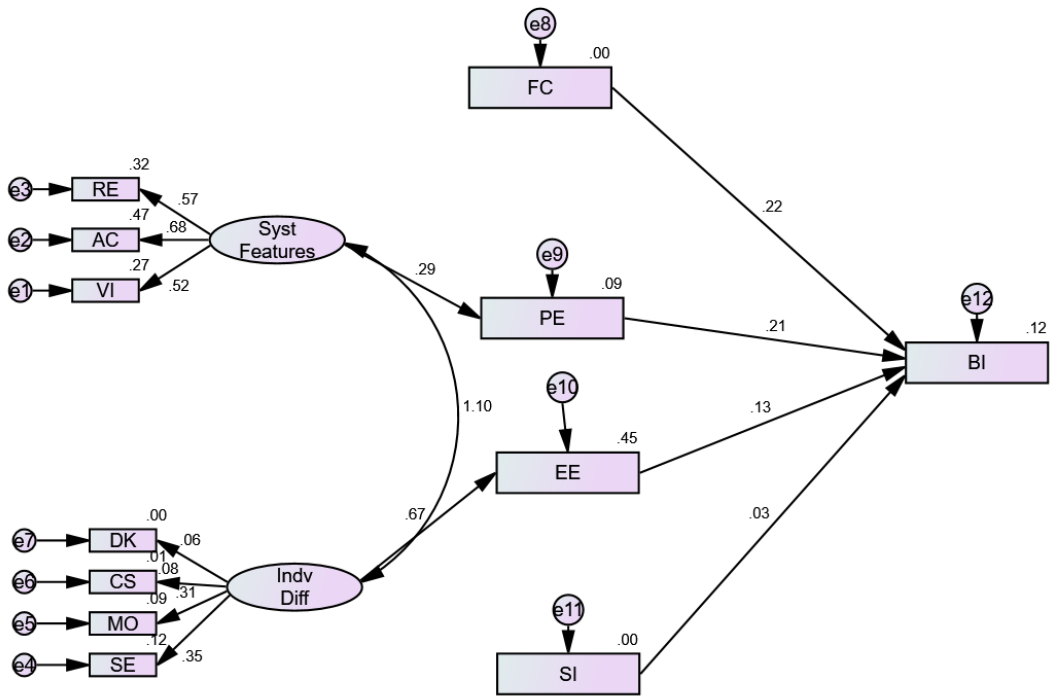


Figure 4.7 *Structural Equation Model using UDL dataset*

Table 4.53 *Model Fit Indices using UDL dataset*

Model Fit Indices	Recommended Guideline Values	Value	Reference
Chi-square (CMIN/DF)	< 5	4.379	Bollen & Long, 1993 Kelloway, 1995
Comparative Fit Index (CFI)	> 0.90	.861	Byrne, 1994
Normed Fit Index (NFI)	> 0.90	.912	Byrne, 1994
Relative Fit Index (RFI)	> 0.90	.881	Bollen, 1990
Incremental Fit Index (IFI)	> 0.90	.976	Bollen, 1990
Tucker Lewis Index (TLI)	> 0.90	.943	Hu & Bentler, 1998
Root Mean Square Error of Approximation (RMSEA)	< 0.08	.063	MacCallum, Browne, & Sugawara, 1996

An examination of the standardised regression weights (Table 4.55) revealed that Performance Expectancy was significantly influenced by System Features. Moreover, Effort Expectancy was significantly influenced by Individual Differences. System Features was significantly influenced by Accessibility and Relevance. The significance was at p<0.01 for these associations. On the other hand, Behavioural Intention was found to be significantly influenced by Facilitating Conditions and Performance Expectancy. Also, Individual Differences was found to be influenced by Motivation. The significance was at p<0.05 for these associations.

Table 4.54 *Standardised Regression Weights using UDL dataset*

			Estimate	S.E.	C.R.	P
PE	<---	System Features	.294	.151	3.374	***
EE	<---	Individual Differences	.668	.508	4.318	***
VI	<---	System Features	.523			
AC	<---	System Features	.683	.188	6.046	***
RE	<---	System Features	.566	.123	5.491	***
SE	<---	Individual Differences	.349			
MO	<---	Individual Differences	.307	.250	3.103	.002
CS	<---	Individual Differences	.081	.201	1.014	.310
DK	<---	Individual Differences	.062	.204	.779	.436
BI	<---	Facilitating Conditions	.221	.049	3.332	***
BI	<---	Performance Expectancy	.209	.047	3.067	.002
BI	<---	Effort Expectancy	.131	.051	1.920	.055
BI	<---	Social Influence	.034	.045	.512	.609

The exogenous variables System Features and Individual Differences were found to co-vary with each other. Moreover, the covariance was highly significant (β=0.209) in the case of System Features. They were also highly correlated with each other with r = 1.099 The squared multiple correlation values (R^2) ranged from 0.000 to 0.466.

Hypotheses Framed for the UDL dataset

Table 4.56 lists the hypotheses framed for the study using the different constructs and the proposed model as basis.

__Table 4.55__ Hypotheses framed to evaluate the SEM for the UDL dataset

Hypothesis	Hypothesis Statement
H4a	Performance Expectancy directly influences students’ Behavioural Intention
H5a	Effort Expectancy directly influences students’ Behavioural Intention
H6a	Social Influence directly influences students’ Behavioural Intention
H7a	Facilitating Conditions directly influence students’ Behavioural Intention
H8a	System Features directly influence students’ Performance Expectancy
H9a	Individual Differences directly influence students’ Effort Expectancy

Relationship between Performance Expectancy and students’ Behavioural Intention

The examination of the SEM (Figure 4.7) and the Standard Regression Weights (Table 5.91) revealed that Performance Expectancy was found to significantly influence students’ Behavioural Intention with 0.209 as the standardised estimate (β coefficient) ($p<0.05$). Thus, hypothesis H4a, *Performance Expectancy directly influences students’ Behavioural Intention*, is accepted.

Relationship between Effort Expectancy and students’ Behavioural Intention

The examination of the SEM (Figure 5.7) and the Standard Regression Weights (Table 5.91) revealed that Effort Expectancy did not significantly influence students’ Behavioural Intention with 0.131 as the standardised estimate (β coefficient) ($p>0.05$). Thus, hypothesis H5a, *Effort Expectancy directly influences students’ Behavioural Intention*, is rejected.

Relationship between Social Influence and students’ Behavioural Intention

The examination of the SEM (Figure 5.7) and the Standard Regression Weights (Table 5.91) revealed that Social Influence did not significantly influence students’ Behavioural Intention with 0.034 as the standardised estimate (β coefficient) ($p>0.05$). Thus, hypothesis H6a, *Social Influence directly influences students’ Behavioural Intention*, is rejected.

Relationship between Facilitating Conditions and students’ Behavioural Intention

The examination of the SEM (Figure 4.7) and the Standard Regression Weights revealed that Facilitating Conditions significantly influence students' Behavioural Intention with 0.221 as the standardised estimate (β coefficient) ($p<0.05$). Thus, hypothesis H7a, *Facilitating Conditions directly influences students' Behavioural Intention*, is accepted.

Relationship between System Features and students' Performance Expectancy

The examination of the SEM (Figure 4.7) and the Standard Regression Weights revealed that System Features significantly influence students' Performance Expectancy with 0.294 as the standardised estimate (β coefficient) ($p<0.05$). Thus, hypothesis H8a, *System Features directly influence students' Performance Expectancy*, is accepted.

Relationship between Individual Differences and students' Effort Expectancy

The examination of the SEM (Figure 4.7) and the Standard Regression Weights revealed that Individual Differences significantly influence students' Effort Expectancy with 0.668 as the standardised estimate (β coefficient) ($p<0.05$). Thus, hypothesis H9a, *Individual Differences directly influences students' Effort Expectancy*, is accepted.

The next section discusses the model created using the Google Scholar dataset.

4.7.4.4 Google Scholar Dataset

A second SEM was constructed to determine the association between System Features, Individual Differences, Performance Expectancy, Effort Expectancy, Facilitating Conditions, Social Influence, and Behavioural Intention in the Google Scholar dataset (Figure 4.8). Again, the sub-constructs of these variables were used to build the model. Table 4.57 summarises the model fit indices of the scales obtained for the model in SEM. The CMIN/DF of 4.476 indicates that the model is a good fit since the value is within the guideline value (<5). The values of CFI (.854), NFI (.906), RFI (.873), IFI (.869), and TLI (.924) were close to 0.9 indicating the goodness of fit of the model.

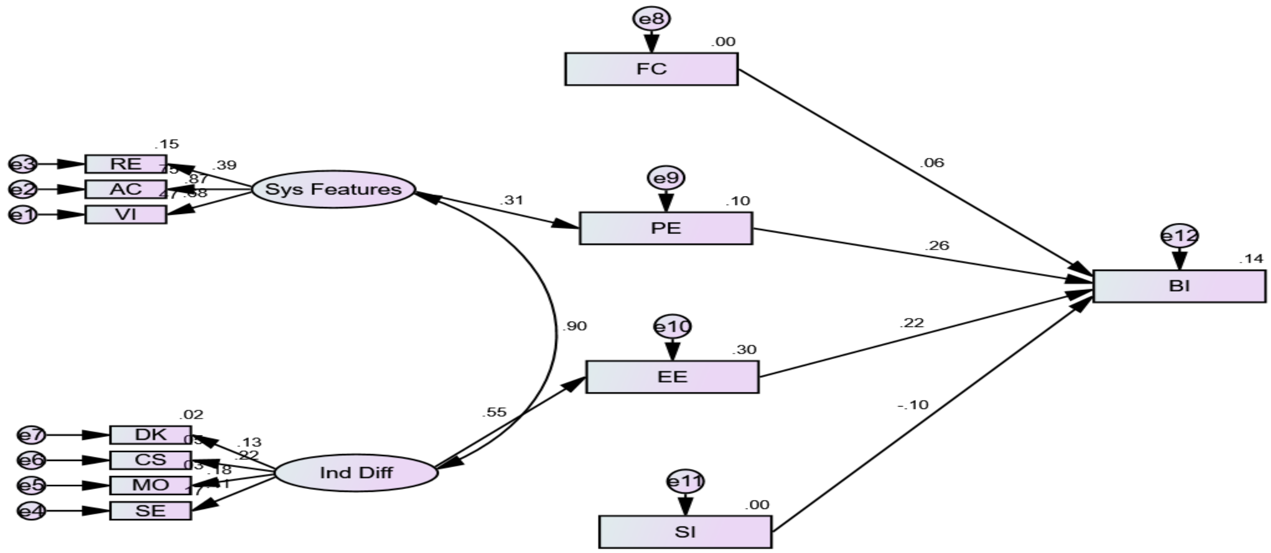


__Figure 4.8__ Structural Equation Model using Google Scholar dataset

__Table 4.56__ Model Fit Indices using Google Scholar dataset

Model Fit Indices	**Recommended Guideline Values**	**Value**	**Reference**
Chi-square (CMIN/DF)	< 5	4.476	Bollen & Long, 1993 Kelloway, 1995
Normed Fit Index (NFI)	> 0.90	.906	Byrne, 1994
Relative Fit Index (RFI)	> 0.90	.873	Bollen, 1990
Incremental Fit Index (IFI)	> 0.90	.869	Bollen, 1990
Tucker Lewis Index (TLI)	> 0.90	.924	Hu & Bentler, 1998
Comparative Fit Index (CFI)	> 0.90	.854	Byrne, 1994
Root Mean Square Error of Approximation (RMSEA)	< 0.08	.032	MacCallum, Browne, & Sugawara, 1996

An examination of the standardised regression weights (Table 4.58) revealed that Performance Expectancy was significantly influenced by System Features ($p<0.05$). Moreover, Effort Expectancy was significantly influenced by Individual Differences. System Features was significantly influenced by Accessibility and Relevance. On the other hand, Behavioural Intention was found to be significantly influenced by Performance Expectancy.

Table 4.57 *Standardised Regression Weights using Google Scholar dataset*

			Estimate	S.E.	C.R.	P
PE	<---	System Features	.311	.113	3.921	***
EE	<---	Individual Differences	.551	.270	4.285	***
VI	<---	System Features	.684			
AC	<---	System Features	.867	.166	7.898	***
RE	<---	System Features	.386	.076	4.818	***
SE	<---	Individual Differences	.412			
MO	<---	Individual Differences	.176	.202	1.974	.048
CS	<---	Individual Differences	.216	.162	2.358	.018
DK	<---	Individual Differences	.134	.185	1.545	.122
BI	<---	Facilitating Conditions	.063	.044	.963	.336
BI	<---	Performance Expectancy	.257	.049	3.878	***
BI	<---	Effort Expectancy	.216	.062	3.249	.001
BI	<---	Social Influence	-.098	.042	-1.493	.135

The exogenous variables System Features and Individual Differences were found to be strongly correlated with each other with r = 0.895. The squared multiple correlation values (R^2) ranged from 0.000 to 0.751.

Hypotheses Framed for the Google Scholar dataset

Table 4.59 lists the hypotheses framed for the study using the different constructs and the proposed model as basis.

Table 4.58 *Hypotheses framed to evaluate the SEM for the Google Scholar dataset*

Hypothesis	Hypothesis Statement
H4b	Performance Expectancy directly influences students' Behavioural Intention
H5b	Effort Expectancy directly influences students' Behavioural Intention
H6b	Social Influence directly influences students' Behavioural Intention
H7b	Facilitating Conditions directly influence students' Behavioural Intention
H8b	System Features directly influence students' Performance Expectancy
H9b	Individual Differences directly influence students' Effort Expectancy

Relationship between Performance Expectancy and students' Behavioural Intention

The examination of the SEM (Figure 4.8) and the Standard Regression Weights revealed that Performance Expectancy was found to significantly influence students' Behavioural Intention with 0.257 as the standardised estimate (β coefficient) ($p<0.05$). Thus, hypothesis H4b, *Performance Expectancy directly influences students' Behavioural Intention*, is accepted.

Relationship between Effort Expectancy and students' Behavioural Intention

The examination of the SEM (Figure 4.8) and the Standard Regression Weights revealed that Effort Expectancy significantly influenced students' Behavioural Intention with 0.216 as the standardised estimate (β coefficient) ($p<0.05$). Thus, hypothesis H5b, *Effort Expectancy directly influences students' Behavioural Intention*, is accepted.

Relationship between Social Influence and students' Behavioural Intention

The examination of the SEM (Figure 4.8) and the Standard Regression Weights revealed that Social Influence did not significantly influence students' Behavioural Intention with -0.098 as the standardised estimate (β coefficient) ($p>0.05$). Thus, hypothesis H6b, *Social Influence directly influences students' Behavioural Intention*, is rejected.

Relationship between Facilitating Conditions and students' Behavioural Intention

The examination of the SEM (Figure 4.8) and the Standard Regression Weights revealed that Facilitating Conditions did not significantly influence students' Behavioural Intention with 0.063 as the standardised estimate (β coefficient) ($p>0.05$). Thus, hypothesis H7b, *Facilitating Conditions directly influences students' Behavioural Intention*, is rejected.

Relationship between System Features and students' Performance Expectancy

The examination of the SEM (Figure 5.8) and the Standard Regression Weights revealed that System Features significantly influence students' Performance Expectancy with 0.311 as the standardised estimate (β coefficient) ($p<0.05$). Thus, hypothesis H8b, *System Features directly influence students' Performance Expectancy*, is accepted.

Relationship between Individual Differences and students' Effort Expectancy

The examination of the SEM (Figure 5.8) and the Standard Regression Weights revealed that Individual Differences significantly influence students' Effort Expectancy with 0.551 as the standardised estimate (β coefficient) ($p<0.05$). Thus, hypothesis H9b, *Individual Differences directly influences students' Effort Expectancy*, is accepted.

4.8 Overall Status of the Hypotheses related to the key constructs

Table 4.60 summarises the status of the different hypotheses tested using multiple regression analysis (Section 4.6) and SEM modelling (Section 4.7.4).

Table 4.59 *Hypotheses Status*

Hypothesis	**Hypothesis Statement**	**Hypothesis Status**		**Method of Testing**
		UDL dataset	**Google Scholar dataset**	
H1	Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions directly influences students' Behavioural Intention	Partially Accepted	Partially Accepted	Multiple Regression Analysis
H2	Accessibility, Visibility and Relevance of the System directly influence students' Performance Expectancy	Partially Accepted	Partially Accepted	Multiple Regression Analysis
H3	Computer Self-Efficacy, Computer experience, Domain Knowledge and Motivation directly influences students' Effort Expectancy	Partially Accepted	Partially Accepted	Multiple Regression Analysis
H4	Performance Expectancy directly influences students' Behavioural Intention	Accepted	Accepted	SEM
H5	Effort Expectancy directly influences students' Behavioural Intention	Rejected	Accepted	SEM
H6	Social Influence directly influences students' Behavioural Intention	Rejected	Rejected	SEM
H7	Facilitating Conditions directly influence students' Behavioural Intention	Accepted	Rejected	SEM

H8	System Features directly influence students' Performance Expectancy	Accepted	Accepted	SEM
H9	Individual Differences directly influence students' Effort Expectancy	Accepted	Accepted	SEM

The next section discusses the qualitative analysis of the information obtained from the open-ended question contained in the questionnaires.

4.9 Qualitative Analysis of the Open-Ended Question

A few (40) of the 400 survey participants were asked to provide details to substantiate their choice of either Google Scholar or the UDL in response to the questionnaire item "*When searching for information on your research, which of the following would you prefer to use?*" An equal number of participants (20 each) were purposefully selected from the groups to which the questionnaire had been circulated. Further, an equal number of the students were from Master's and Doctoral student groups. One of the aims of the open-ended question was to capture any new factors influencing the adoption of UDL or GS other than those mentioned in the questionnaire. From Table 4.61, it can be seen that the majority of these participants had indicated that Google Scholar was their tool of choice for information searching.

Table 4.60 *Preferred Tool for Information Searching – Open-Ended Question*

Preferred Tool	Frequency	Percentage
Google Scholar	33	82.5
University Library Website	7	17.5

The analysis of the responses to the open-ended question was performed in stages, using a combination of deductive and inductive coding (also called 'hybrid' coding; Fereday & Muir-Cochrane, 2006). The system of coding and the categories and themes subsequently derived from the coding were developed gradually and collaboratively. The codes developed corresponded to the reasons provided by the students for their choice of tool; i.e. *what could precisely and definitely identify their reasons for using a specific site?* The principal categories in the final code system are summarised in Table 4.62.

Table 4.61 *Principal Categories in the Code System*

Category	Description	Example
Accessibility (A)	Used to code statements that referred to access as a reason	All articles are available without any obscurity [Google Scholar]
References (R)	Used to code statements that referred to citations or references	I used Google Scholar in finding the references. [Google Scholar]
Accuracy (C)	Used to code statements that referred to accuracy of the information obtained using the tool	Although Google scholar has variety of info and sources, I prefer the MMU library because its academic approach, reliability and it is lined with academic staff including my supervision team. [UDL]
Search and Functionality (S)	Used to code statements that referred to the ease with which the students could find information or to the operations that could be performed with the information obtained. For example, copying and exporting	My university library website will shut down every 10 minutes. [Google Scholar]
Availability (V)	Used to code statements that referred to availability of the tool or availability of information	I will use Google scholar because it is free. [Google Scholar]
Spectrum (P)	Used to code statements that referred to coverage and scope of the tool	If the search related to the field terms I feel it is much better to use the Uni website in order to get less and focused results. [UDL]

Figure 4.9 depicts a visual representation of the participants' thought process when undertaking an information search.

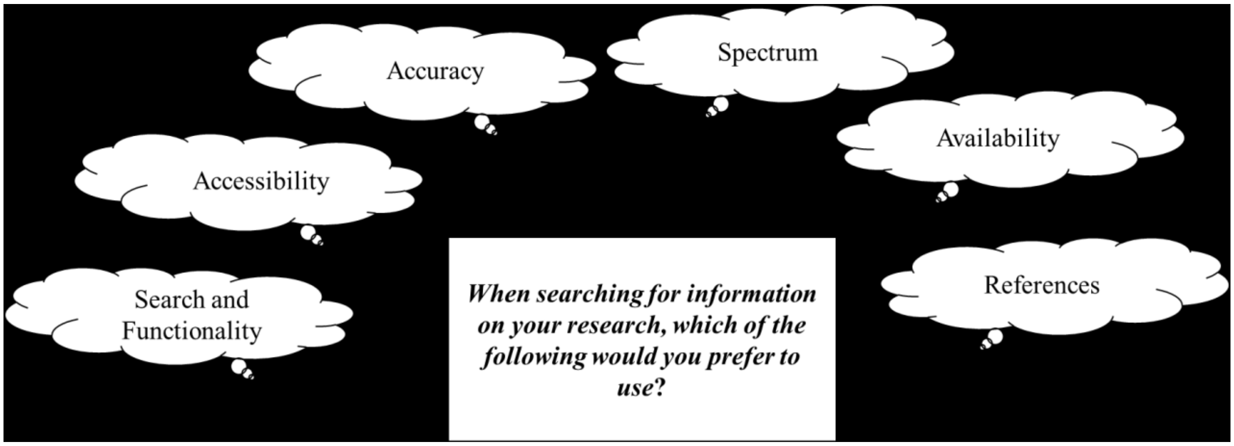


Figure 4.9 *Visual representation of the participants' thought process when undertaking an information search*

Figure 4.10 depicts the distribution of participants' responses across the different categories.

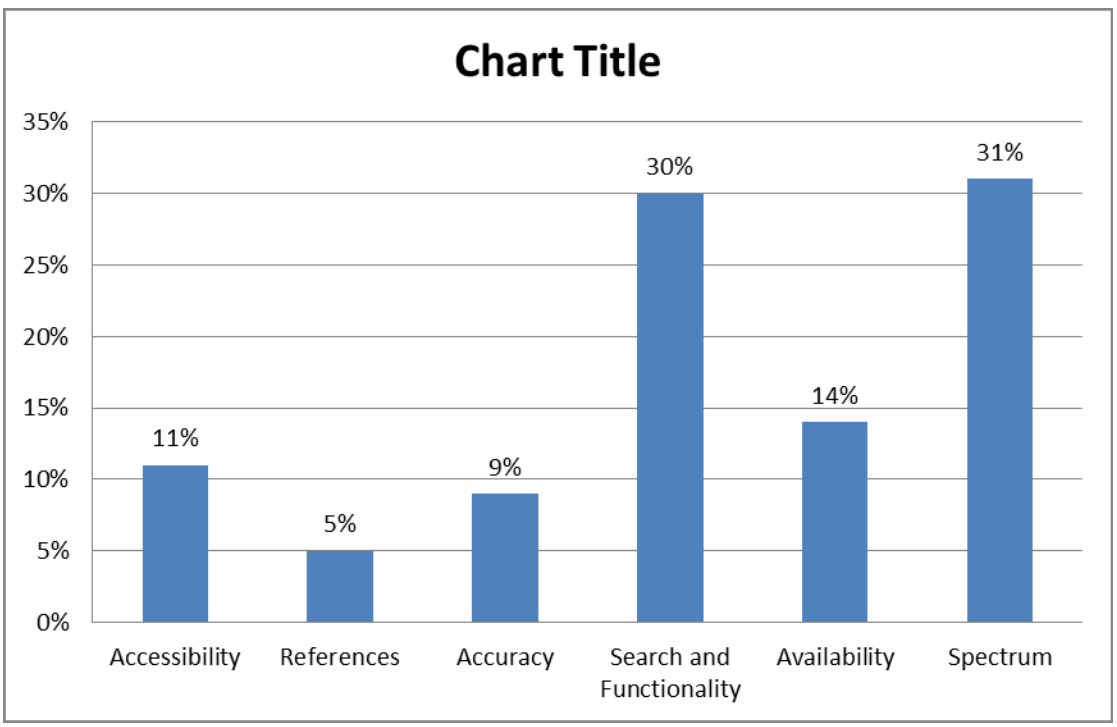


Figure 4.10 *Distribution of Participants' Responses*

The participants' stated reasons for selection of either Google Scholar or their UDL under the different categories are presented in the following sub-sections. Representative quotes are provided where appropriate.

4.9.1 Spectrum

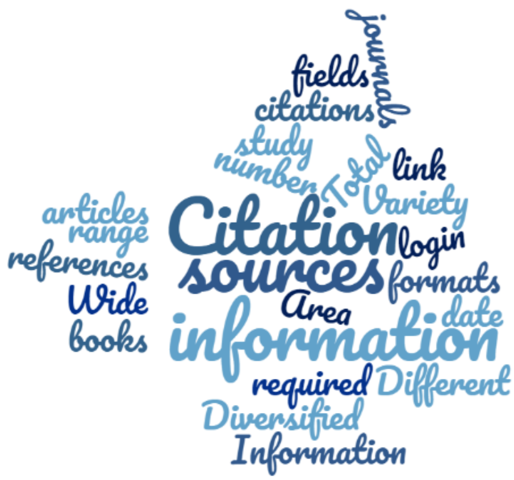
The students' responses in this category indicated the different attributes that led to their selection of a specific tool for use, such as the coverage and scope of the preferred tool. In general, students who indicated that they preferred to use Google Scholar to their UDLs explained their preference in terms of looking for more, updated, unlimited, wide range of resources, citation link, and freedom of use. For instance, Student 1 stated "*I would use Google Scholar since it has a wide range of sources in all fields*." The response of Student 40 seemed to agree with this: "*I will use Google Scholar because it enables me to get all information which I am looking for.*" Student 18 added more detail, explaining that Google Scholar has "*More references & journals articles in my areas of study*." Further support for Google Scholar came from Students 2 and 8, who stated that it provided citation for articles and books in different formats, so that it became easy to use and copy the citation to a Word document. Moreover, Student 10 pointed out that in addition to the citation link, Google Scholar provided the total number of citations for each article in the search results which helped the researcher to choose those papers/ books that could be believed to be the hub of knowledge on a particular topic. In addition, Students 20 and 21 pointed out that Google Scholar is more up to date and has more diversified information in comparison to a UDL.

Nevertheless, the students also reported drawbacks of using Google Scholar. For example, Students 13, 21, and 35 highlighted that a UDL is easier to use and more focused on a topic than Google Scholar. Specifically, Student 35 mentioned "*If the search related to the field terms I feel it is much better to use the Uni website in order to get less and focused results*." Additionally, some of the students indicated that the search outcomes in Google Scholar are sometimes random, diversified, and often less focused. However, the search outcomes include the citation link, citation count (that reflect the importance of that research paper/book) and ease of use, as no login is required.

Student 26 commented, "*I used my university library website because it contains everything I need.*" Student 23 pointed out that a UDL has access to reliable published papers and largely meets his requirements. As Student 13 commented, "*Although Google Scholar has a variety of info and sources, I prefer the MMU library because of its academic approach, reliability and it is lined with academic staff including my supervision team*."

Table 4.63 depicts the word clouds for Google Scholar and UDLs associated with this category. It was interesting to note that there were no negative responses related to Google Scholar.

Table 4.62 *Word clouds for Spectrum*

<table>
<tr><th>Dimension</th><th>Google Scholar</th><th>University Library Website</th></tr>
<tr><td>Positive</td><td>
</td><td>
</td></tr>
<tr><td>Negative</td><td>
</td><td>Nil</td></tr>
</table>

4.9.2 Search and Functionality

The students' reasons related to the search and functionality of their preferred search tool indicated that they utilised Google Scholar because of its simplicity, ease of use, speed of searching, and no requirement for a sign-in, for example. As mentioned by Student 2, "… *there is a citation link at the bottom which provides you to export your citation to different styles for the source that you are interested in easily*." Students 3 and 6 mentioned that it is "*easier and faster to search without the need to login*." Student 12 indicated that "*I prefer GS because it is simple and easy to use. When I search on GS while at MMU, it shows me whether if the articles are available at MMU or not,* *then I can go directly to it. On the other hand, I don't check MMU library website directly because it has many options to select from and I think it is not easy to use*." Student 27 mentioned that "*Google Scholar is easy to use and has a variety of data*." Student 34 also supported Google Scholar, observing that it "*is easy to use, providing or making availability of more journal articles, and easy to deal with and see how many number of citations on them. Also it is user friendly*." Further, its convenience and clarity for use was highlighted by Student 39.

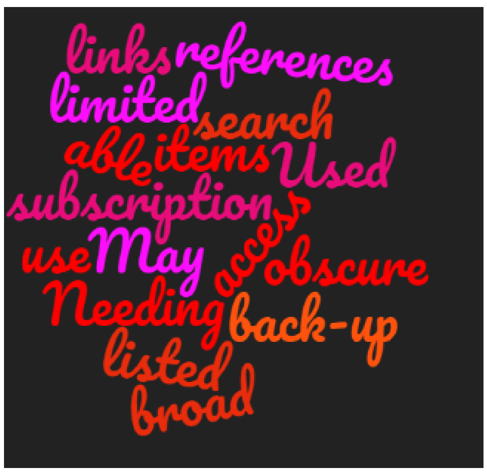
Student 14 indicated that the UDL was somehow more complicated to use and did not always provide access to the required material: "*MMU library is not always making what I am searching for available and it is somehow complicated to use, plus, I have to log in to access it. On the other hand, Google Scholar is easier to use and I am more likely to find what I am searching for*."

Another student, Student 15, indicated that the UDL is the back-up option if Google Scholar is not helpful: "*If it is not working in Google Scholar I use my University library website*." This opinion was seemingly confirmed by Student 16: "*If I don't find what I am searching for, I might consider my University library website then*." Another perception which was in agreement with these two students was provided by Student 23, who observed that "*The university library website is good for literature searches and allows me to access the majority of journal articles I require. It does need specific research returns of authors, Google Scholar used as a broad back-up search for more obscure references and links*." Student 33 also indicated that Google Scholar was utilised as a back-up for the UDL, as "*On its own its use is limited as there may not be access to some items listed (needing subscription). However, it does provide access to some sites that will not appear on library site-such as those run by some organisations*."

Student 25 seemed to recognise the utility of the UDL, stating "*I used my university library website because there are many resources and it is easy to use*." However, a significant concern regarding availability of the UDL was expressed by Student 29: "*My university library website will shut down every 10 minutes*."

Table 4.64 depicts the word clouds for Google Scholar and UDLs associated with this category.

Table 4.63 *Word clouds for Search and Functionality*

<table>
<tr><th>Dimension</th><th>Google Scholar</th><th>University Library Website</th></tr>
<tr><td>Positive</td><td>
</td><td>
</td></tr>
<tr><td>Negative</td><td>
</td><td>
</td></tr>
</table>

4.9.3 Availability

The students' responses in this category indicated that reasons for using their UDL or Google Scholar could be based on availability of the tool or availability of information. Regarding Google Scholar, Student 5 mentioned that "*All articles are available without any obscurity*." On the other hand, Student 6 indicated the choice of Google Scholar "*Because it is widespread and known, general, does not require a username and password, can carry the file and save it and copy it*." Student 8 chose Google Scholar due to its "*features, and it is updated*." Student 9 defended the use of Google Scholar stating "*it becomes more than a web search engine*."

On the whole it seemed that most of the students found Google Scholar more available, as confirmed by Student 34: "*Google Scholar is easy to use, providing or making availability of more journal articles, and easy to deal with and or see how many number of citations on them. Also it is user friendly*." Also, Student 36 indicated that "*Google Scholar has a variety of knowledge and free*," as did Student 37, who stated "*I will use Google Scholar because it is free*."

Student 12 also preferred to use Google Scholar due to its simplicity and ease of use, but indicated that the combination was useful because "*When I search on GS while at MMU, it shows me whether the articles are available at MMU or not, then I can go directly to it. On the other hand, I don't check MMU library website directly because it has many options to select from and I think it is not easy to use*."

On the other hand, Student 14 indicated that the UDL library at MMU was "*not always making what I am searching for available and it is somehow complicated to use, plus, I have to log in to access it. On the other hand, Google Scholar is easier to use and I am more likely to find what I am searching for*." Student 17 also mentioned that "*some library resources, you need to pay to download*." This last comment could perhaps be explained by a lack of familiarity with the UDL, since it appeared that the UDLs provided access to restricted information as evidenced by Student 31's observation: "*Although I prefer to use Google Scholar, some of the articles are restricted. I need university access*."

Table 4.65 depicts the word clouds for Google Scholar and UDLs associated with this category.

Table 4.64 *Word clouds for Availability*

Dimension	Google Scholar	University Library Website
Positive		
Negative		

4.9.4 Accessibility

Accessibility was also a reason given by students to defend their choice of UDL or Google Scholar. Student 3 mentioned that Google Scholar was "*Easier and faster to search without the need to login*" while Student 5 found "*All articles are available without any obscurity*." However, Student 31 found Google Scholar to be limited by its restricted access to some required articles.

Student 6 reported the absence of user credentials as the reason for preferring Google Scholar. This rationale was supported by Student 7, who mentioned that Google Scholar was "*Easier and faster to search without the need to log in*" and by Student 14 who drew attention to the need to log in to access the UDL.

Student 23 found the UDL to be good for literature searches, and moreover it "*allows me to access the majority of journal articles I require. It does need specify research returns of authors, Google Scholar used as a broad back-up search for more obscure references and links*." Student 33 observed "*I use Google Scholar as back-up to the university library website. On its own its use is limited as there may not be access to some items listed (needing subscription etc.). However, it does provide access to some sites that will not appear on library sites – such as those run by some organisations*."

Table 4.66 depicts the word clouds for Google Scholar and UDLs associated with this category.

Table 4.65 Word clouds for Accessibility

<table>
<tr><th>Dimension</th><th>Google Scholar</th><th>University Library Website</th></tr>
<tr><td>Positive</td><td>
</td><td>Nil</td></tr>
<tr><td>Negative</td><td>
</td><td>Nil</td></tr>
</table>

4.9.5 Accuracy

The students' perceptions drew attention to Accuracy as a factor in choosing between UDL and Google Scholar. Supporters of Google Scholar, such as Students 4, 11, 32, 38, and 39, indicated its accuracy and credibility, reliability, efficiency, precision, ease of use, availability of in depth information, convenience, and clarity of use. However, Student 32 also highlighted that "*access to some articles through it is difficult*."

Student 13 preferred to use the UDL library because of "*its academic approach, reliability and it is lined with academic staff including my supervision team*." This was despite acknowledging the variety of information and sources available through Google Scholar.

Table 4.67 depicts the word clouds for Google Scholar and UDLs associated with this category.

Table 4.66 *Word clouds for Accuracy*

Dimension	Google Scholar	University Library Website
Positive		
Negative		Nil

4.9.6 References

Some of the students' responses indicated the providing of citations or references as a reason to choose a tool. In this case, all the responses were related to Google Scholar. For instance, Student

2 mentioned the “*citation link at the bottom which provides you to export your citation to different styles for the source that you are interested in easily*.” Students 10, 11, 24, and 34 highlighted the usefulness of Google Scholar in finding references and also the citation metrics of different papers which can help researchers identify key papers in a particular topic.

Table 4.68 depicts the word clouds for Google Scholar and UDLs associated with this category.

Table 4.67 *Word clouds for References*

Dimension	Google Scholar	University Library Website
Positive		Nil
Negative	Nil	Nil

4.9.7 Summary of Open-Ended Question

Overall, the majority of the respondents to the open-ended question were found to prefer Google Scholar to their UDL, particularly highlighting the difficulty in the latter with regard to accessing and retrieving up-to-date research articles, as well as in exporting them into citations for referencing them in their research works. Consequently, it would appear that most of these respondents reported that the user-friendly aspects and powerful indexing capabilities of Google Scholar with regard to retrieval, access, and exporting of relevant research materials online were the most common factors for choosing to use Google Scholar over UDL.

Overall, it can be seen that the reasons for utilising the UDL were largely subjective as pertaining to “need” (or requirements) or “goodness” (for literature search). In contrast, the reasons for using Google Scholar were more objective, such as being “user-friendly,” “easier and faster to search,” “without the need to log in,” and so on. However, accessibility was a key aspect and the UDLs did not bear up well when compared with Google Scholar in this regard. Indeed, Google Scholar seemed to be ahead in all aspects such as Accessibility, References, Accuracy, and Availability as well as Spectrum and Search and Functionality. The word clouds drawn up for each category revealed an overwhelming use of positive words with regard to Google Scholar and often no remarks at all regarding UDLs. Nevertheless, these findings are not conclusive due to the small group of students who responded to the open-ended question and must be examined in greater detail in the light of the quantitative findings. However, they certainly indicate a strong preference for Google Scholar among international postgraduate students, and perhaps a lack of awareness of the features and usability of the UDLs.

Figure 4.11 provides a high-level visual depiction of these findings from the qualitative information obtained from the open-ended questions in the light of the extended UTAUT model. It can be seen that there appears to be a great emphasis on system features.

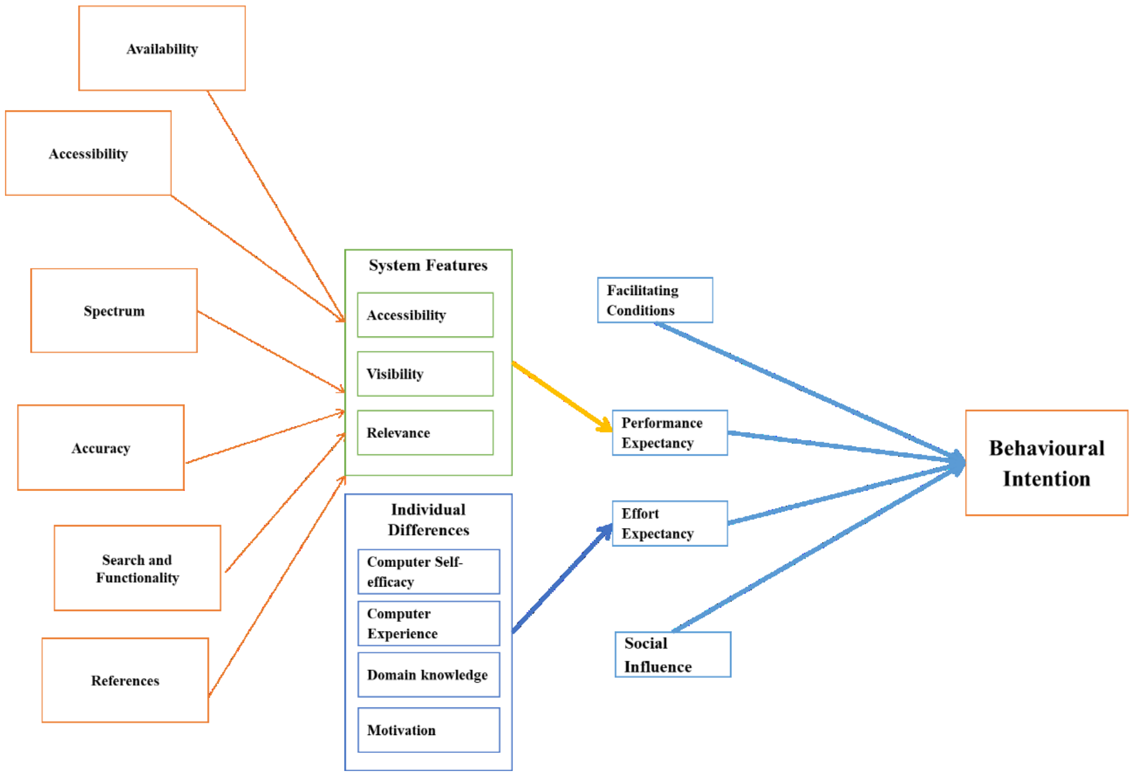


Figure 4.11 *High-level visual depiction of the impact of the open-ended questions on the extended UTAUT model*

4.10 Chapter Summary

This chapter described the findings from the data obtained using the questionnaires designed for the study. The first section described the normality testing of the data. The second section provided the findings from the analysis of the students' demographic data and also summarised the findings from the descriptive analysis of the students' perceptions regarding the studied constructs. The third section presented the findings related to the effect of the moderating variables (i.e., demographic variables) on the students' perceptions and the status of the hypotheses tested on these. The fourth section presented the correlation analysis of the data. The fifth section described the multiple regression analyses performed on the data. The seventh section described the measurement scale analyses which included the reliability and factor analyses (exploratory and confirmatory) of the questionnaire, and the use of structural equation modelling (SEM) to assess the robustness of the conceptual extended UTAUT model developed for this study. The eighth section summarised the outcomes of the testing of the study's hypotheses related to the key constructs of the extended UTAUT model. The final section described the findings from the open-ended question.

The normality testing of the two datasets revealed that the study population was not normally distributed. Accordingly, the selection of tests for the testing of the study's hypotheses was impacted. Consequently, nonparametric tests which do not assume normality were chosen for use.

For the UDL dataset, it was found that the participant's age, preferred tool for information search, gender, and educational status did not influence their perceptions of Behavioural Intention, Facilitating Conditions, Effort Expectancy, Performance Expectancy, Social Influence, System Features, and Individual Differences. However, their university was found to significantly influence Social Influence but not the other constructs. For the Google Scholar dataset, participants' age, university, preferred tool for information search, gender, and educational status did not influence their perceptions of Behavioural Intention, Facilitating Conditions, Effort Expectancy, Performance Expectancy, Social Influence, System Features, and Individual Differences.

The Spearman's rho correlation test indicated the associations between Domain Knowledge and Computer Experience, Relevance, Accessibility, Visibility, Computer Self-Efficacy, Motivation, Social Influence, Performance Expectancy, and Behavioural Intention; Computer Experience and Relevance, Visibility, Motivation, Facilitating Conditions, and Behavioural Intention; Facilitating Conditions and Computer Self-Efficacy; Motivation and Facilitating Conditions and Performance Expectancy; and Facilitating Conditions and Social Influence were not significant for the UDL dataset. Similarly, no significant associations were found among Domain Knowledge and Computer Experience, Relevance, Accessibility, Visibility, Motivation, Facilitating Conditions, Social Influence, Performance Expectancy, and Behavioural Intention; Computer Experience and Relevance, Computer Self-Efficacy, Motivation, Facilitating Conditions, and Performance Expectancy; Relevance and Effort Expectancy and Behavioural Intention; Accessibility and Motivation and Social Influence; Visibility and Motivation and Social Influence; Computer Self-Efficacy and Social Influence and Performance Expectancy; Effort Expectancy and Motivation and Social Influence; and Social Influence and Behavioural Intention, in the Google Scholar dataset. However, the strength of the significant correlations ranged from weak to moderate in both datasets.

The various hypotheses tested indicate that Performance Expectancy and Facilitating Conditions directly influenced students' Behavioural Intention in the UDL dataset, whereas Performance

Expectancy and Effort Expectancy directly influenced students' Behavioural Intention in the Google Scholar dataset. Moreover, Visibility and Relevance of the System directly influenced students' Performance Expectancy in the UDL and Google Scholar datasets. Furthermore, Computer Self-Efficacy was found to directly influence students' Effort Expectancy in the UDL and Google Scholar datasets.

Additionally, while Performance Expectancy was found to directly influence students' Behavioural Intention in both datasets, Effort Expectancy was found to directly influence students' Behavioural Intention in the UDL dataset only. Nevertheless, Social Influence was not found to directly influence students' Behavioural Intention in both datasets. Again, Facilitating Conditions was found to directly influence students' Behavioural Intention only in the UDL dataset. In both datasets, System Features and Individual Differences were respectively found to directly influence students' Performance Expectancy and Effort Expectancy.

The scrutiny of the responses to the open-ended question revealed that six aspects, namely spectrum, search and functionality, availability, accessibility, accuracy, and references, influenced the students' decision to use their UDLs or Google Scholar. The next chapter presents the discussion of these findings.

Chapter 5: Discussion

5.1 Introduction

For the research to attain the aim of (i) "identifying factors that affect international postgraduate students' choose Google Scholar over their University Digital Libraries (UDLs)", there is a need to undertake an integrated examination of responses from the literature review in Chapter 2 and relate it to the respondents' views from Chapter 4. On one hand, the literature review examined how information seekers behave and what motivates them to undertake particular actions to maximise the goal of accessing the information needed at any point in time (Chapter 2). Conceptually, models have been developed with the view of facilitating a detailed comprehension of information seeking and the drivers, which could be useful to understand the behaviour and outcomes of the information search process typical of a university learner. If we consider the platforms available to international students around the world (Appendix IV), UDLs form a pivotal platform for information seeking. However, the advancement in information technology has resulted in other platforms that learners could avail themselves at any point in time (Chapter 2). Therefore, identifying factors that drive the choices made by international students on the information platform they prefer would need a detailed review of both literature and primary data from the research (in Chapter 4).

Additionally, the research also aims at (ii) "developing an information driven framework to determine information search strategy responsive to dynamic end-user (student) preferences at library" (see section 1.4). This would also require undertaking a critical discussion of both secondary data (Chapter 2) and primary data (Chapter 4), in order to establish the originality in the arguments that could form the said framework.

This chapter, therefore, undertakes a holistic approach at integrating the research results with secondary sources as a means to undertake a comparative analysis between the use of UDLs and Google Scholar. The realisable information has been used to develop a framework that contributes to the information-searching protocol for institutions of learning to consider as they review their provisions. The research discussion has been predominantly structured in two sections: the first section discusses the findings from the quantitative data obtained from the questionnaire about the intention to use Google Scholar and the UDLs – it discusses the relationships of the different constructs of the research. The second section examines key findings and contribution to the development of the framework necessary to information seekers in institutions of higher learning. Table 5.1 summarises the associations between the study's theoretical foundations, objectives, the research questions, and the instruments of data collection; with results that have been used in the discussion of results herein.

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Table 5.1 *Summary of associations between the theoretical foundations, objectives, research questions, and instruments*

Theoretical Foundation	Objective	Research Question	Data Collection Instrument
Wilson's Model of Information-seeking behaviour (Information needs/ Information seeking behaviour)	To review the literature on student online search behaviour, with specific reference to their use of Google Scholar and university libraries.	**RQ4**: What is the current state of knowledge on student online search behaviour, with specific reference to their use of Google Scholar and university libraries?	Existing literature
Wilson's Model of Information-seeking behaviour (Information needs/ Information seeking behaviour)	To examine international students' perspectives on the factors that affect their use of Google Scholar / University Digital Libraries (UDL)	**RQ2**: What are the international postgraduate students' perceptions of and attitudes towards the University Digital Libraries (UDL) and Google Scholar?	Questionnaire
UTAUT	To propose and test a conceptual model of the factors that affect international students' use of Google Scholar/ University Digital Libraries (UDL)	**RQ3**: What are the key factors that influence international postgraduate students' acceptance and usage of University Digital Libraries (UDL) and Google Scholar in universities at Manchester? **RQ1**: What are the factors that affect the acceptance and use of University Digital Libraries (UDL) and Google Scholar in universities at Manchester?	Questionnaire

Theoretical Foundation	Objective	Research Question	Data Collection Instrument
UTAUT	To compare the factors that influence the use of Google Scholar and the use of University Digital Libraries (UDL).	**RQ3**: What are the key factors that influence international postgraduate students' acceptance and usage of University Digital Libraries (UDL) and Google Scholar in universities at Manchester? **RQ1**: What are the factors that affect the acceptance and use of University Digital Libraries (UDL) and Google Scholar in universities at Manchester?	Questionnaire
NA	To formulate recommendations for further research and practice	NA	NA

5.2 Interpreting Primary Data in General

For this research to address the issue of identifying the factors that affect international postgraduate students' decision to use Google Scholar over their UDLs, it was designed to collect primary information using a questionnaire survey (see section 3.7 for the design of the questionnaire). In that questionnaire, the main constructs were derived from the UTAUT conceptual model as well as Wilson's 2018 information seeking model, updated by Mowbray (2018). Using the approved questions for the survey it was possible to develop twelve (12) constructs (or variables) under all research questions and hypotheses could be evaluated, as demonstrated in section 4.3. The constructs include: Performance Expectancy (PE); Effort Expectancy (EE); Social Influence (SI); Facilitating Conditions (FC); Accessibility (AC); Visibility (VI); Relevance (RE); Computer Self-Efficacy (SE); Behavioural Intention (BI); Motivation (MO); Domain Knowledge (DK); and Computer Experience (CS) – see section 4.3.

From the onset, all constructs were given equal importance and weighting in the survey in Chapter 4; however, it was critical to discuss the influence of literature on information seeking behaviour and the potential impact from other constructs (herein called research variables). The conceptual framework, presented under the UTAUT model in section 4.7, contains variables whose links were established in the literature review (Chapter 2). Figure 5.1 shows the connectivity of variables within the UTAUT model – for instance, system features were linked to the performance expectancy of the information seeker, and eventually to the behaviour that the information seeker takes up as they search for information. Similarly, the Wilson's 2018 model conveys the message that factors could have contextualised at an individual level as the information seeker sets goals for the type of information they need. Placing the UTAUT model next to the Wilson's 2018 model, as shown in Figure 5.1, demonstrates the need for a detailed discussion that could be based on establishing patterns between the variables in order to draw meaningful conclusions as well as establish areas for knowledge contribution from this research.

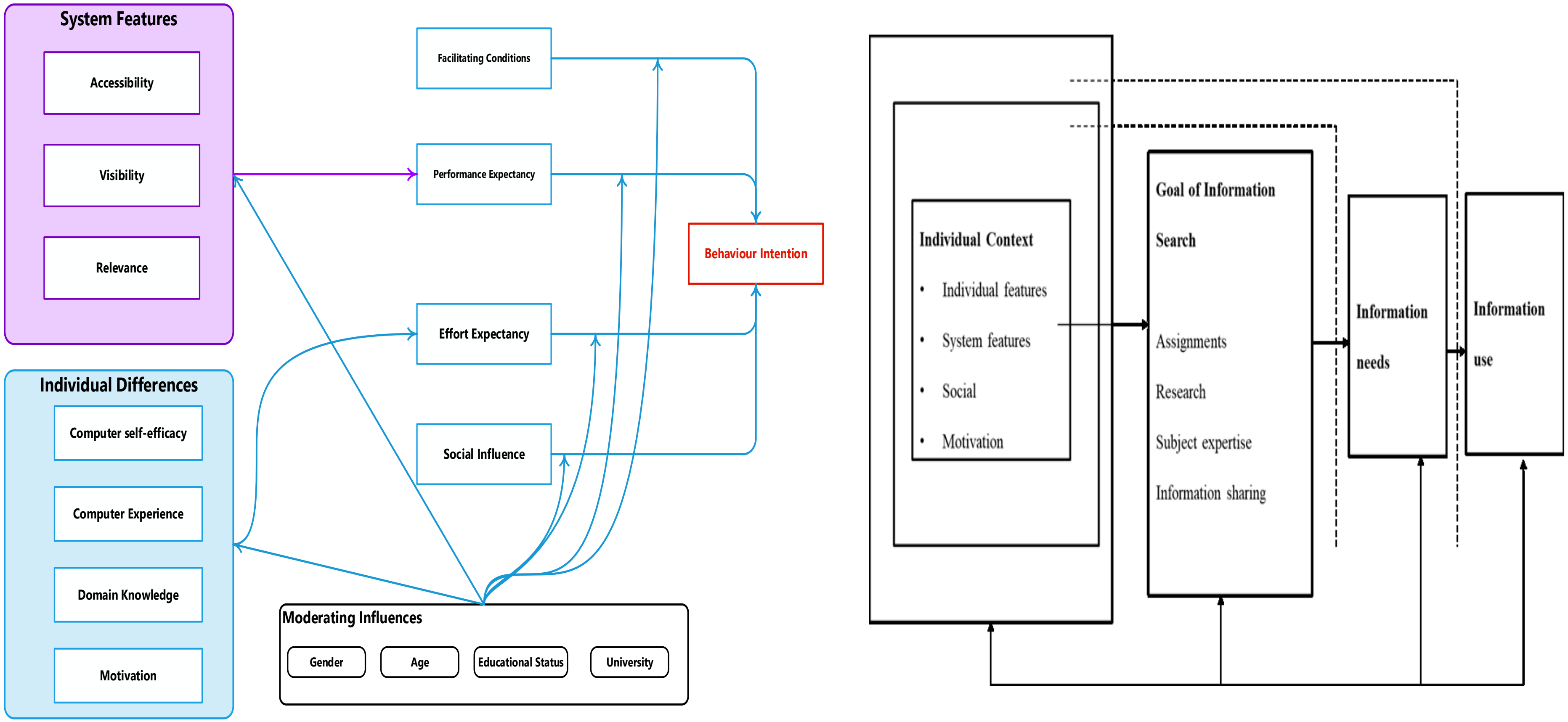

Figure 5.1 *Integration of questionnaire survey constructs (variables) for non-parametric analysis (Adapted: Wilsons Model 2018, UTAUT, 2019).*

For the discussion to establish clear patterns of the constructs (variables) contained in the conceptual framework and the Wilson's 2018 model (Figure 5.1) it is vital that all results in Chapter 4 are integrated. Therefore, the discussion starts with the interpretation of quantitative data on the influence of the direct determinants of the intention to use Google Scholar or UDLs and then examines participants' perceptions held according to core factors and the further influencing individual and system features. The chapter uses the findings to compare them to that of others in the literature review. Secondly, this chapter integrates the findings of the correlations amongst the constructs with the interpretation of the qualitative data in the form of answers to the open questions regarding perceptions influencing use of a platform for information searching. The rationale was to build a conceptual model of UDL and Google Scholar acceptance and intention to use in the context of postgraduate international students.

5.3 Modelling the factors influencing intention to use for both UDLs and Google Scholar

The intention to use UDLs or Google Scholar formed a critical element of the measurement yardstick for this research. As such, the literature under appendix IV explored the implementation of the unified theory of acceptance and use of technology (UTAUT) as a conceptual framework. It was observed that the UTAUT has been applied in various situations that needed to examine the factors influencing the acceptance of a particular technology either in teaching and learning or information search (Alfaresi & Hone, 2015; Tosuntas et al., 2015). From the UTAUT conceptual model, the direct determinants influencing the intention to use UDLs or Google Scholar were reduced to four: (i) Facilitating Conditions; (ii) Performance Expectancy; (iii) Effort Expectancy and (iv) Social Influence – see Figure 5.2.

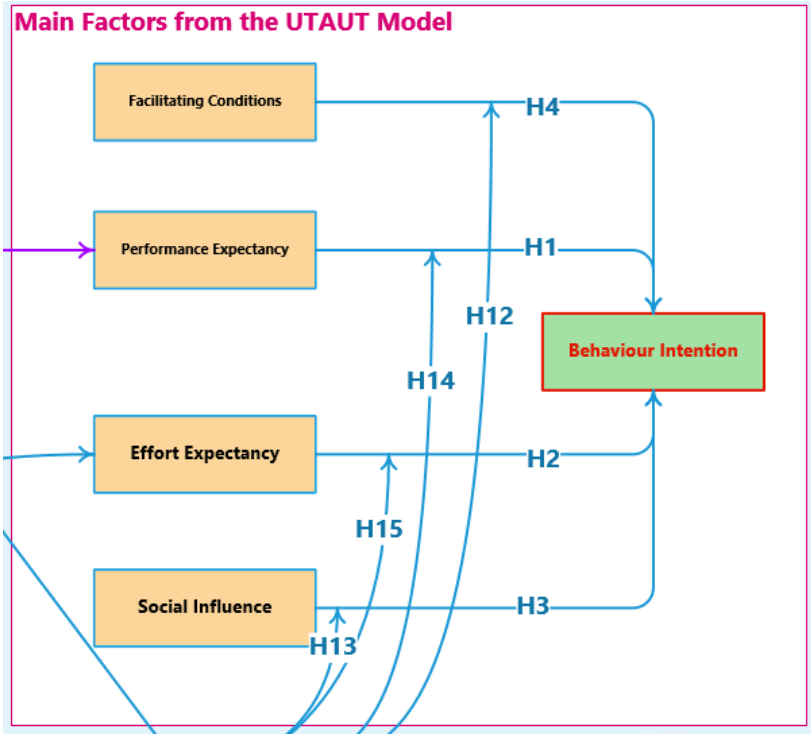

Figure 5.2 *Direct determinants influencing the intention to use UDLs or Google Scholar*

The mentioned direct determinants were critical to responding to the research questions herein. The principal orientation for the research questions was to examine the acceptance and usage of UDLs and Google Scholar by the international postgraduate students. Accordingly, a conceptual technology adoption model based on the UTAUT was developed and empirically tested through a series of statistical tests. This section, therefore, discusses the findings with respect to the extended UTAUT research model in light of the research questions, using the key determinants shown in Figure 5.2.

Answering RQ1

What are the factors that affect the acceptance and use of University Digital Libraries (UDL) and Google scholar in universities at Manchester? a. How effectively does a modified UTAUT model evaluate the use of UDLs by international postgraduate students in universities at Manchester? b. How effectively does a modified UTAUT model evaluate the use of Google Scholar by international postgraduate students in universities at Manchester?

In this section, the perception held is obtained of Perceived Effort, Perceived Performance, Facilitating Conditions and Social Influence in regards to the UDL and Google Scholar, and the influence of each considered concerning influencing intention to use as determined in the extended UTAUT.

5.3.1 Structural Equation Modelling and the Constructs for Intention

Because the goal was to examine the factors that affect the acceptance and usage of UDLs and Google Scholar among international postgraduate students, it was critical to use a method that could focus on the main constructs, hence, it was justified to use structural equation modelling (SEM). The results from SEM models on Behavioural Intention (BI), as the endogenous variable and Individual Differences (ID), System Features (SF), Effort Expectancy (EE), Performance Expectancy (PE), Facilitating Conditions (FC), and Social Influence (SI), as the exogenous variables are discussed below.

5.3.2 Behavioural Intention under the UDL Dataset

The SEM results shows that Performance Expectancy (PE) was significantly influenced by System Features (SF); and Effort Expectancy (EE) was significantly influenced by Individual Differences (ID). System Features was significantly influenced by Accessibility and Relevance. This shows that the main constructs had significant connectivity and influence on each other; however, when it comes to Behavioural Intention (BI), it was clear that it was significantly influenced by Facilitating Conditions (FC) and Performance Expectancy (PE), as detailed below.

5.3.2.1 Performance Expectancy

SEM results show students' Behavioural Intention to use UDLs was directly influenced by Performance Expectancy, hence H4a was accepted. This result is similar to the study set in Ankara University by Turan and Bayram (2013), which scrutinised the perceptions and habits of 280 students from three different faculties (Letters, Pharmacy, and Veterinary Medicine) to identify the purpose of usage, frequency of usage, and tools utilised with regard to the digital library. The results of the study indicated that the digital library was not considered their first preference, but they expected to perform well in their assignments if they used the digital library (UDLs). Alshehri (2012) investigated the factors influencing the acceptance of e-government services in Saudi Arabia, and used Performance Expectancy (PE) as one of the constructs for assessing behavioural intention for e-services. The research found that PE had significantly influenced BI of users to accept and utilise e-government services.

5.3.2.2 Facilitating Conditions (FC)

Under the FC construct, the SEM results show Behavioural Intention by students to use UDLs was significantly influenced by Facilitating Conditions; hence, hypothesis H7a is accepted. Facilitating conditions was a critical construction in Huang (2018), who used UTAUT2 as a means to assess the UDLs, considering that China had restrictions on access to search engines and social media. Huang (2018) investigated a sample of 197 undergraduate students and 54 faculty from two public universities in Guangzhou, China, and found that the intention to use a particular search mechanism (UDLs enabled or supported media) was significantly influenced by FC, among other factors. Another way of looking at FC was undertaken by Sohail and Ahmad (2017), who conducted a comparative assessment of e-resource and services used by Fiji National University students and faculty members. In the study, the majority of the participants reported awareness of advancements in electronic resources and their appropriate usage in the fields of academia and research; however, end-users had problems in the use of e-resources and services, mainly because of insufficient IT infrastructure and website blockage. Similarly, Sohail et al. (2019) compared the use of electronic journals by postgraduate students and research scholars from the Faculties of Science of the Delhi and Jamia Millia Islamia Universities, India. They found that FC such as access to e-journals, insufficient IT infrastructure and speed of download was a significant factor in the usage of e-resources.

5.3.2.3 Effort Expectancy (EE)

On the contrary, the SEM results show that Behavioural Intention of students to use UDLs was not directly influenced by Effort Expectancy; hence, hypothesis H5a was rejected. This result contradicts research by Alrawashdeh (2011), who used an extended UTAUT model in the context of computer-based distance training system (CBDTS) among public sector employees in Jordan. The study's primary objective was to identify the factors that result in the acceptance of a CBDTS among public sector employees (*ibid*.). The data obtained from 386 public sector employees was analysed using structure equation model (SEM); it found that Behavioural Intention of employees to utilise the CBDTS was significantly influenced by EE. Alrawashdeh (2011) opined that EE was significantly determined by interactivity of the system, enjoyment of the system, computer anxiety, FC, and computer self-efficacy. It could be argued that EE is influenced by other factors; hence, for the UDLs it had no significant influence.

5.3.2.4 Social Influence (SI)

Similarly, the SEM results show that Behavioural Intention of students to use UDLs was not significantly affected by Social Influence; thus, hypothesis H6a is rejected. An early study by Al-Qeisi (2009) proposed an extension of the UTAUT model that explains online usage behaviour with regard to the discretionary usage of internet banking by individuals. He found that social influence did not influence usage behaviour in the model for either country (Al-Qeisi, 2009). However, the result from SEM contradicts Chang et al. (2015), who integrated the UTAUT and website service quality to compile a usage behavioural model for university library electronic resources. Using data obtained from 1089 fourth-year university students and second-year master's students from six public and private universities in Taiwan, it was found that BI was influenced by SI. For international students, Orji et al. (2010) found that SI was a significant factor influencing BI, amongst the other constructs of the UTAUT they used. This shows that Orji et al.'s (2010) results contradict the SEM result herein. Similarly, the results from the multiple regression result under section 4.6.1 conflicts with the SEM, because the multiple regression result partially supports the argument that SI influenced BI. This factor is deemed too weak to change the SEM result.

5.3.2.5 System Features and Performance Expectancy

Using the SEM examination for UDLs dataset, the hypothesis H8a, *System Features directly influenced students' Performance Expectancy*, was accepted. This result demonstrated the influence of other factors such as SF on PE. Natarajan (2017), whose research focussed on e-resources, found this point important. A study of 182 students from Jimma University, Ethiopia, by Natarajan (2017) showed that the use of e-journals had increased due to the students' awareness of e-resources and services but that this was accompanied by a decrease in visits to the library. Moreover, there was a need for students to be instructed about different search strategies (*ibid*.). Therefore, systems features that were made aware by the UDLs made it easier for the students to perform better.

5.3.2.6 Individual Differences and Effort Expectancy

Similarly, the examination of the SEM found that Individual Differences significantly influenced students' Effort Expectancy. Thus, hypothesis H9a, *Individual Differences directly influences students' Effort Expectancy*, was accepted. When applied directly to BI, Nirban (2014) utilised the UTAUT model to gain awareness of a Learning Management System's (LMS) acceptance by students of an institute of higher education. Using regression analysis, the study found that EE did not significantly influence the students' BI. Yet EE cascade to a level of individual differences in terms of effort that one it expected to apply.

5.3.3 Behavioural Intention under Google Scholar Dataset

A second SEM was constructed to determine the influence of System Features, Individual Differences, Performance Expectancy, Effort Expectancy, Facilitating Conditions, Social Influence, on Behavioural Intention using the Google Scholar dataset, as detailed below.

5.3.3.1 Performance Expectancy

The SEM results show that Behavioural Intention by students to use Google Scholar was significantly influenced by Performance Expectancy; thus, hypothesis H4b, *Performance Expectancy directly influences students' Behavioural Intention*, was accepted. A study by Arif et al. (2018) utilised the UTAUT model to investigate the factors influencing master's students' usage of the web-based services in the Allama Iqbal Open University (AIOU) distance education programme. The study found that effort PE had significantly predicted the behavioural intention of students to utilise AIOU web-based services. For international students, the main attraction to web-services such as Google Scholar was difficulties such as the environment, linguistic-cultural, and affective (Kubanyiova & Crookes, 2016). In the environmental context with regard to the university's academic library, international students may be unaware of the academic library environment and its related processes and technologies (Hughes, 2010; Hughes et al., 2018).

5.3.3.2 Effort Expectancy

Similarly, the SEM results show that the Behavioural Intention of students to use Google Scholar was significantly influenced by Effort Expectancy, hence hypothesis H5b, *Effort Expectancy directly influences students' Behavioural Intention*, was accepted. Arif et al. (2018) used the EE construct in the UTAUT model to show how it influenced master's students' usage of the web-based services. They found that EE significantly predicted the Behavioural Intention of students to utilise AIOU web-based services. The result herein, therefore, makes a direct link between EE and the Google Scholar dataset.

5.3.3.3 Social Influence

On the contrary, the SEM results show that Behavioural Intention of students to use Google Scholar was not significantly induced by Social Influence, Thus, hypothesis H6b, *Social Influence directly influences students' Behavioural Intention*, was rejected. This result tallies with Salehi, et al. (2018), who identified the use of web search engines and personalisation in order to search information for educational objectives. Their research collected data from 120 university students regarding their information-seeking behaviour for educational objectives. The study found that the participating students used the Google search engine as their primary information-seeking tool. Moreover, they highlighted that personalised search results were not as relevant or satisfactory as non-personalised search outcomes (*ibid*.). This confirms that Social Influence was not a factor in the behavioural intention to use Google Scholar. Similarly, Kumah (2015) compared the use of library and internet among students from the University of Ghana. He found that graduate students used the internet more than the library. Nevertheless, the results indicate that the library was not bypassed by students in order to satisfy their information requirements. Rather, the students use both the internet and the library for information searching, even though they preferred to use the internet (Kumah, 2015).

5.3.3.4 Facilitating Conditions

Similarly, the SEM results show that Behavioural Intention by students to use Google Scholar was not significantly induced by Facilitating Conditions, meaning that hypothesis H7b, *Facilitating Conditions directly influences students' Behavioural Intention*, was rejected. This result tallies with Mehra and Bilal (2007) who argued, among others, that these international students possess general familiarity with computerised tools as well as searching on the internet. Contrary to this, studies (e.g., Liao et al., 2005; Mittermeyer, 2005; Weber, Hillmert, & Rott, 2018) highlight that these international students, indeed most students, may possess a low level of familiarity with online resources for academic information such as journal databases, and may adopt approaches which are basic or uncritical.

5.3.3.5 System Features and Performance Expectancy

The relationship between System Features and students' Performance Expectancy, as tested by the SEM model, found that the latter had significantly influenced students' Performance Expectancy within the Google Scholar dataset; hence, hypothesis H8b, *System Features directly influence students' Performance Expectancy*, was accepted. A combination of factors using SEM or multiple regression was critical to establish solid themes; hence, SF had an influence on PE even on the Google Scholar dataset. This result tallies with Alshehri (2012) who found a clear link between SF and PE, and many more constructs.

5.3.3.6 Individual Differences and Effort Expectancy

The examination of the SEM also found that Individual Differences significantly influenced students' Effort Expectancy in the Google Scholar dataset. Thus, hypothesis H9b, *Individual Differences directly influenced students' Effort Expectancy*, was accepted. Similarly, Aba et al. (2015) integrated the constructs when they assessed the use of internet services for research by postgraduate students in Francis Idachaba Library, University of Agriculture, Makurdi. The study found a combination of individual differences that results in the use of various elements of information search processes. The study found that the problems encountered in the usage of the digital library included the considerable time taken to display or download web pages and an insufficient quantity of computers. Moreover, the study found that internet usage had caused a reduction in the usage of conventional library facilities and that 94% of the students were fully satisfied with the internet facilities. However, the majority of the students (92.96%) indicated that suitable guidance was required in the matter of e-resources usage. Similarly, Ozonuwe, Nwaogu, Ifijeh, and Fagbohun (2018) evaluated the use of internet search engines among the staff and students of a Nigerian university. The results of the study show that there is extensive awareness of internet search engines as well as online resources among staff and students of the university.

5.3.4 UTAUT Model and Behavioural Intention

This section discusses results on BI based on the UTAUT model as a means for explaining the main constructs.

5.3.4.1 Performance Expectancy

In this research, Performance Expectancy was a direct determinant of behaviour/acceptance in both the UDL and the GS dataset. This finding was consistent with the findings of prior studies by Awwad and Al-Majali (2014), who applied the unified theory of acceptance and use of technology (UTAUT) model in the context of electronic library services in public Jordanian universities. From the technology perspective, Awwad and Al-Majali (2014) found a statistically significant link between PE and the intention to use the electronic library service. In addition, a study by Moorthy et al. (2018) attempted to scrutinise the factors that influence the behavioural intention of undergraduates to utilise digital libraries. The framework utilised by the study combined the UTAUT 2 and Information Systems Success model (ISSM). Using a sample of 391 undergraduates from Malaysian private universities, the study found that behavioural intention was significantly influenced by Performance Expectancy, Hedonic

Motivation, Facilitating Conditions, Social Influence, Habit, and Information Quality, but not by Effort Expectancy.

5.3.4.2 Perceived Effort

For Perceived Effort, quantitative data shows that there was no direct influence of perceived effort on intention to use UDLs. However, there was a direct influence of perceived effort on the intention to use Google Scholar. This finding in the UDL dataset was not consistent with the study by Venkatesh et al. (2012) and Awwad and Al-Majali (2014), who found that perceived effort significantly affected behavioural intention. On the contrary, this finding of no direct influence of perceived effort in use of the UDL was consistent with that of Moorthy et al. (2018). They examined the factors that affect undergraduates' behavioural intention to use digital library among the private universities in Malaysia, using the UTAUT 2 by synthesis of Information Systems Success model (ISSM) (Moorthy et al., 2018, p.128). The finding from Moorthy et al. (2018) shows that intention was not positively influenced by perceived effort (expected effort). Even if their research targeted undergraduates from Malaysian private universities, the outcome was of interest to this research because it indicates that universities need to review their digital library provisions so that they can keep elements of the digital library that works, and improve or implement new elements from an informed position (Moorthy et al., 2018). It implies that even though students felt Perceived Effort did not influence their intention to use UDLs, the outcome can be of use in the decisions made about library services.

The discussion on Perceived Effort had an emphasis on the usability of a technology tool. This was consistent with prior findings, such as Wu and Chen (2014), who found that graduate students' intention to use Google Scholar was significantly influenced by its usability. It would appear that the usability of the UDL was not perceived to be at a similar level. This merits attention since prior research has indicated that the usability of a UDL depends on, among other factors, whether or not users are satisfied with their content and services; users can quickly and easily accomplish tasks with the least possible errors; and users feel contented after they use the website.

5.3.4.3 Facilitating Conditions

Facilitating Conditions directly influenced students' Behavioural Intention under the UDL dataset. However, there was no direct influence of Facilitating Conditions on the intention to use Google Scholar. This finding confirmed the findings of prior studies by Ayele and

Sreenivasarao (2013), Awwad and Al-Majali (2014), and Tibenderana and Ogao (2008) which also found that FC positively influence the behavioural intention of users with regard to library based digital technologies. Chang et al. (2015) integrated the UTAUT and website service quality to compile a usage behavioural model for university library electronic resources. They found that website service quality was significantly associated with students' behavioural intention and use behaviour of electronic resources. The study found that BI and use behaviour can be effectively predicted by PE, SI, website service quality, and FC.

5.3.4.4 Social Influence

The results show that Social Influence did not directly influence students' Behavioural Intention in both UDL and Google Scholar datasets. This finding was in contrast to the studies by Ayele and Sreenivasarao (2013), Awwad and Al-Majali (2014), and Yang and Lee (2007), which found that SI is a strong contributing factor with regard to users' acceptance and usage of digital library technologies across cultures. For instance, a study by Yang and Lee (2007) utilised the UTAUT framework and found that in Korea, adoption of information technologies is impacted significantly by SI and PE in contrast to another country (for example, the USA), where different factors may influence their acceptance due to their differing culture and values.

5.4 International postgraduate students' perceptions of UDLs and Google Scholar

For this research to determine international postgraduate students' perceptions of UDLs and Google Scholar, it was critical to use the second research question (RQ2) as a theme for discussion.

Answering RQ2

What are the international postgraduate students' perceptions of and attitudes towards the University Digital Libraries (UDL) and Google Scholar?

Based on the modelling of the direct determinants of the intention to use, the participants' perceptions held of Google Scholar and UDLs can be examined drawing on the participants' responses to each of the factors determined to influence use. According to section 6.3, there are four main constructs: FC, PE, EE and SI that were examined concerning the behavioural intention. Using SEM, it was found that FC and PE had a positive influence on BI for UDLs while EE and SI had no impact on the BI for UDLs.

Similarly, section 5.3 shows that the SEM results indicated that PE, EE, and FC had a positive influence on the BI for the Google Scholar dataset, while SI had no influence on the BI for the same dataset. This section discusses the results directly linked to international students on both UDLs and Google Scholar datasets. The data emanates from quantitative data analysis as well as the open questions in order to build the user perception for international students.

5.4.1 Facilitating Conditions

Based on the SEM (discussed in section 5.3), Facilitating Conditions influences intention to use in the UDL dataset. On the contrary, SEM results found that FC had no direct influence on intention to use Google Scholar. It shows that international students rely on FC to ensure that they can use the UDLs. This result is in line with the research by Hughes et al. (2018), who found that international students faced challenges when accessing UDLs because of the lack of familiarity with the university's academic and library practices (Hughes et al., 2018). Additionally, Kubanyiova and Crookes (2016) opined that international students had difficulties with the usage of the library and interaction with librarians and related staff, and that they were not aware of the academic library environment and its related processes and technologies (Hughes, 2010). This shows why FC becomes critical to BI for using UDLs. This finding is consistent with those of a study by Chen and Chengalur-Smith (2015) that used the TAM model to examine the direct influences of UDL usage by students. Chen and Chengalur-Smith (2015) examined the factors influencing students' use of a library web portal. They observed that there was general underutilisation of the university library web portal after the universities had invested heavily in the technology to support the web portals (*ibid.*) – failing within the realm of FC.

On the contrary, international students need not have FC to use Google Scholar. From the open questions in section 4.9, the majority of participants had indicated that Google Scholar was their tool of choice for information searching. This was in line with the SEM result that FC had no direct influence on intention to use Google Scholar. Mehra and Bilal (2007), among others, indicated that these international students possess general familiarity with computerised tools as well as searching on the internet.

5.4.2 Performance Expectancy

The SEM results show that international students' Behavioural Intention to use both UDLs and Google Scholar was directly influenced by Performance Expectancy. In both datasets, performance expectancy was fundamental to the justification of the approach to information search. The open questions about information searching under section 4.9.3 to 4.9.6 indicate that international students were of the view that Performance Expectancy was mainly driven by the efficiencies associated with accessibility, availability and accuracy on both UDLs and Google Scholar datasets. Participants in the open questions argued that even if accessibility can be easier for Google Scholar, the accuracy of articles has the potential to wreak better performance. Some participants stated that they started by searching for available articles using Google Scholar before migrating to the UDL to verify the availability of the source; hence, both systems are used to complement each other. This outcome falls in line with Ayele and Sreenivasarao (2013), who described a service-oriented UTAUT (SO-UTAUT) in a library context. Their study found PE to be the most significant determinant of the students' behavioural intention to utilise e-library services. Further, BI was found to be the critical factor determining their actual usage behaviour (*ibid*.). Taking the existence of varied groups of users with varying usage behaviour into account, Orji and colleagues (2010) developed and validated a model based on the UTAUT to explain the acceptance of each user group of Electronic Library Systems (ELS). Data for the study were obtained from a sample of 116 student participants (including international students) from the Middle East Technical University in Turkey and offered support for NUTAUT by indicating that different degrees of influence were exerted by the different UTAUT constructs. Overall, the study found that PE was a crucial element impacting the acceptance and usage of ELSs by students.

5.4.3 Effort Expectancy

In the UDL dataset, students' Effort Expectancy was not considered a critical factor that influenced the choice of UDLs – based on the SEM results of 5.3. On the contrary, the SEM results show that Behavioural Intention of students to use Google Scholar was significantly influenced by Effort Expectancy. This shows that EE by international students was critical in how they selected Google Scholar as a means of searching for information over UDLs. However, further examination of the SEM found that Individual Differences significantly influenced students' Effort Expectancy. Factors such as Motivation and Social Influence influenced EE, and led to Behavioural Intention of not using UDLs. A modified version of the UTAUT model was utilised by Rahman et al. (2011) to investigate the factors anticipated to influence postgraduate students' intention to use digital libraries. The modified UTAUT included various latent variables such as EE. They found that EE is positively associated with the intention to utilise the digital library. This result contradicts the finding from the SEM herein (section 5.3).

Effort Expectancy and the anticipated performance (expectancy) were a critical part of the process, as highlighted in the open question discussions between the UDL and Google Scholar datasets (section 4.9.2). Participants argued that the UDL was somehow more complicated to use and did not always provide access to the required material; they did not always find what they were searching for because of the perceived complicated nature of the platform. On the other hand, Google Scholar was said to be easier to use because they were more likely to easily find the material. Participants felt that there was a realisation of effort in the search for information and the potential performance of the work; this favoured the Google Scholar dataset.

5.4.4 Social Influence

For the construct of Social Influence, the SEM results show that there was no influence on BI in either the UDL or Google Scholar datasets. International students did not feel socially influenced to either choose UDLs or Google Scholar as a platform for information searching. This finding is in line with Alzahrani et al. (2017), where the use of digital library systems by information seekers is strongly influenced by the information quality therefrom, because the higher the quality, the more likely the information will satisfy the user; in turn, the behavioural intention to adopt digital library systems is linked to information quality. Alzahrani et al. (2017) used Delone and McLean’s success model in their research and found the link between quality of information and the usage of UDLs.

International students’ perceptions indicated that Social Influence did not have an impact with respect to the use of Google Scholar, either. The findings of SI on information seekers contradicts the findings from Gruzd et al. (2012). Their research used the UTAUT model to examine the influence of social media in the scholarly activities of researchers. They used UTAUT constructs to examine the research problem. Amongst their findings, it was stated that Social Influence has a significant role in the intentions of researchers to adopt social media in their research practice (Gruzd et al., 2012). Decisions such as the choice of research methodology or the tools for collecting data were shared between researchers using social media (Gruzd et al., 2012). In the open question discussions, factors such as availability, accessibility and ease of use were considered more important than SI – see section 4.9.

5.4.5 Intention to use based on the correlation of the four constructs

Apart from the SEM results of the four main constructs FC, PE, EE and SI that was examined concerning the behavioural intention (see Figure 6-3), there was a need to examine the correlation of other factors from the UTAUT model. According to the Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975), behavioural intention predicts behaviour itself and hence is a principal determinant of behaviour. Consequently, it could be inferred that the low perceptions of behavioural intention impacted the students' use behaviour of UDLs, as shown in Figure 5-3. Intention, under the UDLs was mainly driven by PE, PP, FC and SI according to the SEM results; however, the open question discussions with respondents, herein shown on world clouds on Figure 5-3, pointed to inherent ease of use to access citations as the main driver for BI – herein shown using green lines.

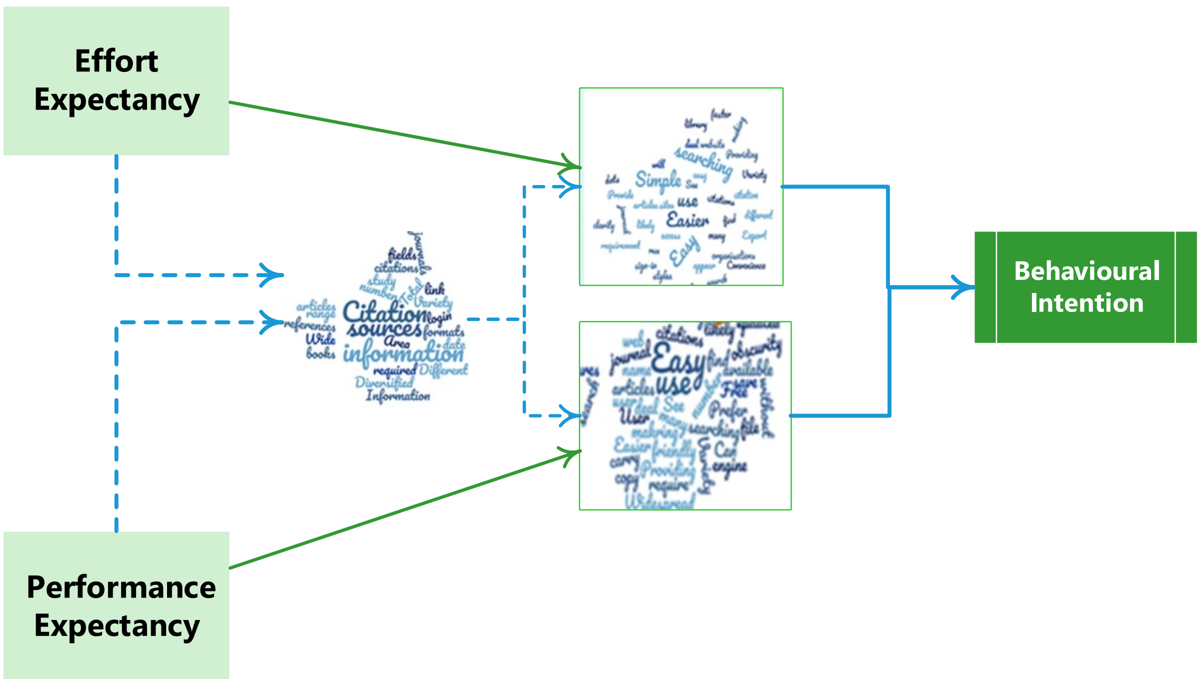

Figure 5.3 *Correlation of constructs EE and PE on Behavioural Intention (UDLs)*

The correlation results indicated that FC were mainly technological; meaning that if the facilitating conditions were ideal at any particular point, information seekers' performance expectancy and behavioural intention would be positively influenced. It was found that Facilitating Conditions were only strongly correlated to Performance Expectancy and Behavioural Intention. It means students' perceptions of the expected performance of the UDLs and their intention to use the UDL had a correlation to the conditions facilitating its probable use. This factor impinges on the behavioural intention of users to seek the UDLs; compounded the problem of accessibility.

For Google scholar, Facilitating Conditions was correlated to Effort Expectancy, Social Influence and Behavioural Intention – as shown in Figure 5-4. This meant that the use of Google Scholar as a platform was being linked to the performance expectations, social influence and behavioural intentions. It could be argued that expected performance of Google Scholar and their intention to use the UDLs were related to the conditions facilitating its probable use. However, Social Influence was strongly correlated to the students' perceptions of Performance Expectancy regarding use of Google Scholar. This implies that intention of use by international students can be influenced by EE, PE, SI, and FC at varied levels – see 5-4. The word clouds shown on Figure 5-4 were generated from the responses of the open questions; meaning, that international students recognised university facilities, but they were driven by results and ease with which they had access to the information they sought.

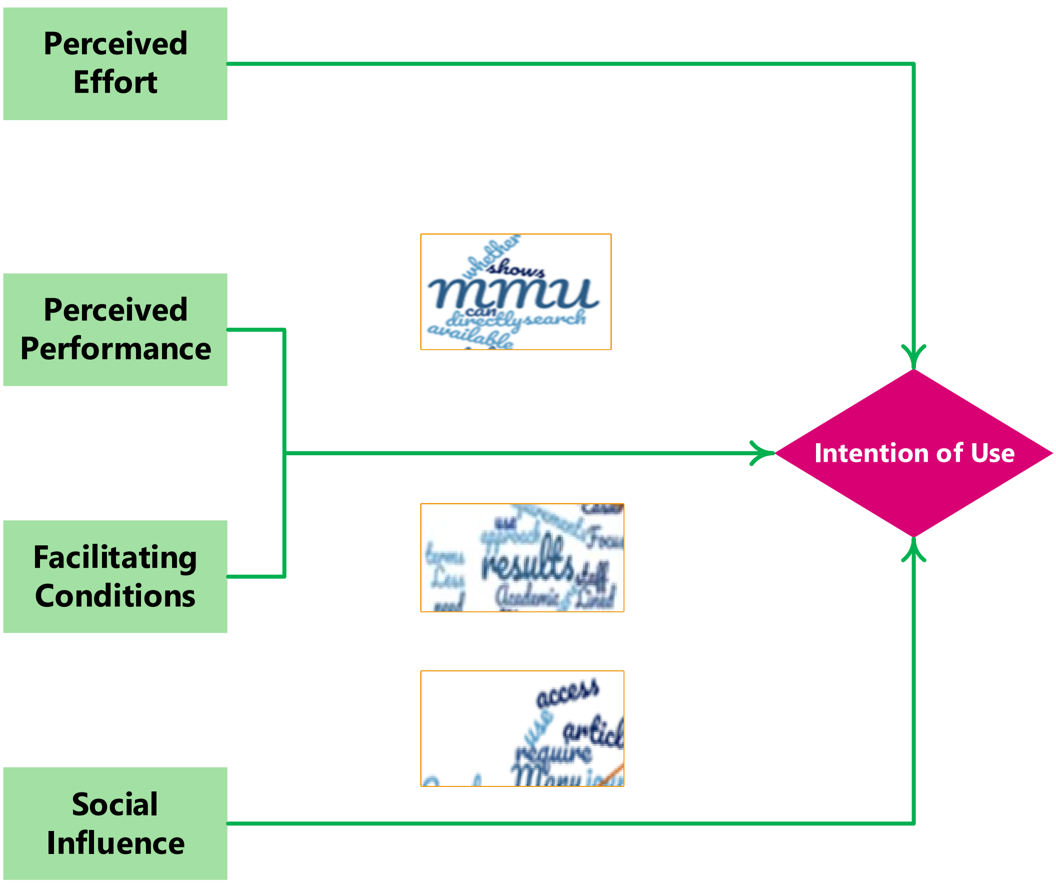

Figure 5.4 *Correlation of the constructs in terms of perceptions of international students towards intention of use (Google Scholar)*

Effort Expectancy was also found to be an important factor, which correlated to the students' Behavioural Intention to use the UDL. On the other hand, Effort Expectancy in using Google Scholar was found to be correlated to Facilitating Conditions and Behavioural Intention. It implies that EE is not influenced by other factors concerning the use of Google Scholar as a means for information searching. Therefore, the examination of the correlation of constructs helps to build a visual representation of influencing factors and perceptions held for both UDL and GS from both the perceptions held according to the core factors and the interpretation of the qualitative data in the form of answers to the open questions regarding perceptions influencing use.

5.5 Discussion from the perspective of the adapted version of Wilson's information needs and seeking model

The key determinants for the factors affecting the acceptance and use of UDLs and Google Scholar were four, however there were other underlying factors, too. Using non-parametric statistical analysis it was possible to examine the influence of other factors on the selected four.

As described in the conceptual framework for information seeking behaviour (see Chapter 4 for more details), it was suggested that the individual's context – that is, as an international postgraduate student – along with intervening variables such as emotional, demographic, interpersonal, role-associated, environmental, and source features, could influence their searching behaviour. Accordingly, an adapted version of Wilson's model was proposed.

Wilson's model (1981) recognises that the context in which the information need originates is critical to the course of information seeking behaviour. Moreover, the intervening variables (such as obstacles and facilitators) are frequently associated with the context. Wilson (1981) also indicates that the information needs – an individual's subjective experience – while problematic for researchers, are outranked by the fundamental needs of human beings (such as the need for food or water).

The findings of the present study indicate to some extent the usefulness of exploring the information needs' context with regard to international postgraduate students. Certainly, contextual factors are originators of information seeking behaviour for students. Moreover, intervening variables are closely associated with the context. In the present study, the context was that of international postgraduate students who are displaced from their country and are perhaps experiencing a considerable change in educational environment and services in comparison to their prior educational experiences. Nevertheless, by itself, Wilson's model has supported a deeper scrutiny of international postgraduate students' decision to use Google Scholar or UDL as an information behaviour.

In this context, the scrutiny of the responses based on the UTAUT constructs indicate that the most significant intervening variable affecting their information seeking seemed to be the perceived usability of the systems (Wu & Chen, 2014; Pant, 2015). Another variable appeared to be a lack of awareness with regard to the features of the UDLs (for instance, Ayele and Sreenivasarao, 2013; Majyambere, 2015; Tibenderana et al., 2010). Thus, the preliminary adaptation of Wilson's model presented in Chapter 3 (Figure 3.2) can be redrawn to include these intervening variables (Figure 5.5).

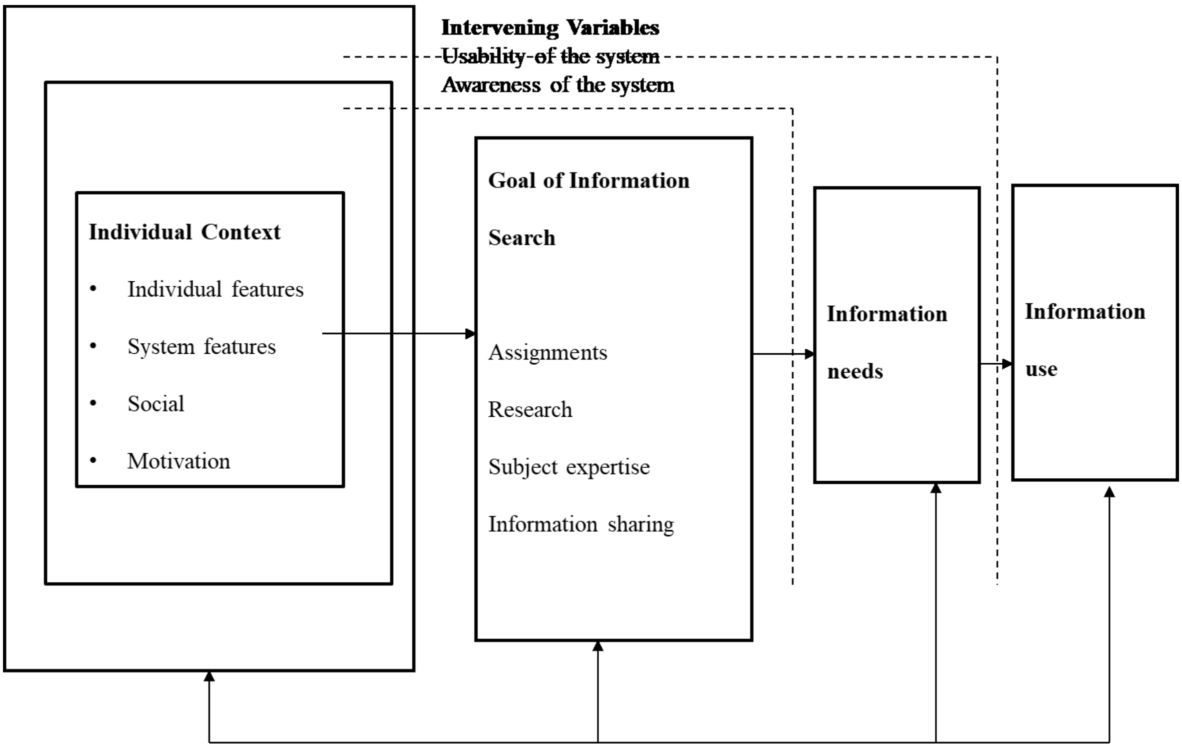

Figure 5.5 *Perceived Usability of the Wilson model based on Mowbray (2018) for the present study*

As can be seen from Figure 5.5, the international students differ in their individual features (for example, Domain Knowledge, Computer Experience, Computer Self-Efficacy), motivation, and social influences. In addition, they have their own perceptions of the features of the systems (such as Relevance, Accessibility, and Visibility) available for information searching. Moreover, their goals of information search are typically related to their academic research and assignments together with sharing of information. The study's findings indicate that the students' perceptions of a system's usability and their awareness of the systems are intervening variables that contribute to their use of a system to fulfil their information needs and, potentially, information use.

5.5.1 *Answering RQ3*

What are the international postgraduate students' perceptions of and attitudes towards the University Digital Libraries (UDL) and Google Scholar?

a. To what extent can individual differences and system features increase use of UDLs?

b. To what extent can individual differences and system features increase use of Google Scholar?

The constructs discussed in this section pertain to Wilson's information needs and seeking model. For instance, the individual features of international students possibly differ (for example, Domain Knowledge, Computer Experience, Computer Self-Efficacy), motivation, and social influences. In addition, they have their own perceptions of the features of the systems available for information searching, such as Visibility, Relevance, and Accessibility.

From the onset, the position depicted from literature indicates that the behaviour of the learner as they search for information could be seen in various ways. The first approach could be the Wilson (1989-1996) model, which emphasises behaviour. It is said that if student information searching is only seen from the element of 'behaviour', then we could argue that the search behaviour of learners could help to identify the drivers for which they are using to search for information, in an objective manner (Wilson, 1981, 1996).

In addition, the Wilson model links well with the UTAUT, which forms part of the conceptual framework for this research. For instance, Domain Knowledge, Computer Experience, and Computer Self-Efficacy from the UTAUT link with Wilson's model of information seekers behaviour. From the view of information seekers behaviour, it can be argued that Social Influence (as is independent on their exposure and driver) cannot easily be ignored because it links with the Wilson (1989-1996) model in its own right, with the perceptions of information search options given to students. SI links to motivation, which is self-driven and critical to the behaviour of the information seeker. The other factors of the model can be classed as the means with which behaviour and choices could be facilitated. Therefore, Computer Self-Efficacy and

Computer Experience act as enablers to the end user, to see how best they can navigate the platform. The Wilson model links these factors in a coherent manner for the research to explain the online search behaviour, with specific reference to their use of Google Scholar and university libraries (as stated in objective (i), section 1.4).

5.5.2 System Features

While the Wilson 2018 model lists system features as key factor in the determination of how information seekers approach the search, it was found that the factor left gaps in what the features could mean from one student to another. Therefore, it was vital to expand the issue of system features to cover areas of Relevance, Accessibility and Visibility (as shown in the UTAUT model).

Relevance

At the time of the development of the Wilson model of 2018, it could be difficult to ascertain how Mowbray (2018) intended to describe or prescribe the ideal system features. However, even if Mowbray (2018) tried to be prescriptive, the model would have been out of date by now because of the rapid changes that take place on platforms for information searching. In the UTAUT model, it was vital to use Relevance as a critical measurement yardstick for system features. It implies that regardless of the level of sophistication of the system in its current form, students were asked to rate the relevance that it gave to them when they were to embark on searching for information. The descriptive statistics (in section 4.3.6) show that each time they were thinking of using UDLs they found it to have low relevance, with a score between 2.81±1.086 and 3.03±1.538 on the Likert scale.

It shows that UDLs were considered inappropriate or irrelevant to the system features when learners were seeking information. On the contrary, the mean scores of the students in the Google Scholar dataset indicated that respondents felt that the relevance of the system features was considered important because they gave an average score greater than three on the Likert scale (3.30±1.219 – 3.92±1.048). Even though the response shows that the relevance of the system favours the use of Google Scholar, there are mitigating factors that offer an explanation behind the scores, as indicated in the Wilson 2018 model. It could be argued that the goal of the information seeker plays a critical role. In the event the information sought is for a simple exercise to fulfil a learning situation, relevance would lead the search to much simpler platforms, with simplicity being a key factor determining the relevance. On the contrary, a more complex problem would need the use of technically sound sources of information such as those provided by the UDL. Therefore, the relevance factor for systems features needs to be examined as an integral part of the models (Wilson's 2018 and the UTAUT framework). The models make the issue of relevance extremely fluid with a potential to change; however, the easier the access to information needed, the higher the likelihood of it being relevant to the information seeker. The scores for both UDL and Google Scholar are relatively closer to average, implying that there is an element of dual application of the platforms as students search for information.

Accessibility

Under this factor, it was vital to examine the perception of ease of use with which the platform would be accessible to the information seeker at the time and/or location of choice. The scores from the survey indicate that Accessibility varied between disagreement and neutrality as the mean scores for their responses were less than three (2.60±0.863 – 2.74±0.983) on the Likert scale for the use of UDL as a platform (see section 5.3.7). On the contrary, the mean scores for students to access Google Scholar varied between agreement and strong agreement, with the mean scores greater than four (4.14±0.998 – 4.20±0.874). Comparing mean scores for UDL and Google Scholar platforms shows that the ease with which learners were accessing Google Scholar led to a higher score than for the UDL. This shows that the systems feature of Accessibility plays a pivotal role in the search for information, and that Google Scholar was seen as the best platform under this feature. The response is to be expected, considering that the algorithm for Google Scholar is systems neutral so that it can allow universal application by the end user regardless of the browser they have access to. On the contrary, UDLs are designed to serve the learner with a predetermined systems environment that is presumed to befit the learner by the university's set criteria. If the information required or the goal of the information seeker can be sustained using Google Scholar, then the factor of Accessibility plays a pivotal role. On the contrary, if the information needed becomes complex, UDLs become useful; however, Accessibility can dictate the outcome, hence the link between other factors in the Wilson 2018 model and the UTAUT framework become apparently clear with the systems feature of accessibility.

Visibility

In the case of the Visibility of the system feature, respondents were asked to state their perceptions of the degree to which a system is observable or apparent in an organisation, as shown in section 5.3.8. This factor is critical, because if the university system was to block external search tools like Google Scholar, learners would face challenges using the platform. Therefore, even though the Google Scholar platform is not university specific, it is a tolerated tool accessible even on UDL platforms. The assessment of the respondents' perception of the visibility of their UDL and Google Scholar allowed an objective view to compare the two. The mean scores of the respondents in the UDL dataset indicated a disagreement and neutrality at less than three (2.74±0.936 – 2.95±1.104), while the mean scores of the respondents in the Google Scholar dataset indicated greater than four (4.05±0.855 – 4.23±0.788). The overall picture from the scores shows that respondents felt that Google Scholar was more visible than the UDL platforms. The results also tally with that of Accessibility and Relevance of the system features.

Motivation

The Wilson model included the factor of Motivation by arguing that there are various drivers for motivating information seeking. In the case of motivation for students in the UDL dataset, the data showed very low scores (between 2.30±1.299 and 2.88±1.215). The result shows that personal motivation to adopt a particular method plays a key role in the behaviour of the student, and that has been the case with the models stated in Chapter 2.5. In the case of UDL, students were not motivated to access them, meaning that the underlying factors causing learners to be demotivated to use UDL may not clearly manifest, but the outcome manifests under failure to use UDL. The motivation for students in using Google Scholar varied between neutrality and agreement, as the mean scores for their responses were greater than three on the Likert scale. Overall, the perceptions of the students in the Google Scholar dataset appeared to indicate a trend to agreement with the different statements related to motivation (3.09±1.464 – 3.93±1.165).

6.5.3 Individual Differences

Individual differences formed a critical part of testing the extent to which they increase the use of Google scholar or otherwise (RQ3b). Using descriptive results from section 4-3 it was vital to examine individual differences using the constructs of (i) domain knowledge; (ii) computer self-efficacy and (iii) computer experience.

(i) Domain Knowledge

Even though the Wilson's 2018 model does not specifically indicate "domain knowledge" as a factor, the conceptual model UTAUT states the importance of it. The descriptive mean scores indicated that international students in the UDL dataset were unsure how domain knowledge played a factor in choosing the platform for information search (2.58±0.740 – 2.65±0.735). On the contrary, the mean scores of the students in the Google Scholar dataset indicated that Domain Knowledge was critical in deciding to use it for information search (4.25±0.878 – 4.4±0.715). The overall picture from these scores indicated that the postgraduate students relied on their domain subject knowledge when thinking about using Google scholar. On the other hand, they were not of the view that domain knowledge was critical to know before using UDL as the information search platform.

(ii) Computer Self-Efficacy

Another key individual feature within the UTAUT model was computer self-efficacy- that was tested in terms of the participants' perceptions thereof concerning decision to use UDLs or Google Scholar. The means score for the influence of computer self-efficacy on UDLs dataset was very low (2.14±1.298 and 2.84±1.313). However, the mean score for influence of computer efficacy in the use of Google scholar was high (2.80±1.524 – 3.81±1.153). The results indicated that computer-self efficacy did not necessarily influence international students to use UDLs as it did the use of Google scholar as a means of information searching.

(iii) Computer Experience

The computer experience obtained over the years were considered vital in determining the influence on the choices made between UDLs or Google scholar as the platform for searching information. Therefore, computer experience under descriptive statistical testing results indicated that international students it as a vital factor in choosing UDLs with a mean score of 4.39±0.843. Their computer experience was a critical factor in choosing UDLs. Similarly, the decision to use Google scholar scored a mean of 4.48±0.501. This meant that the better the computer experience they had the higher the likelihood of using Google scholar as a means to search for information. It also meant that the higher the level of computer experience the students had, the easier it was to navigate the UDLs.

5.5.4 Response to RQ3

For the research to establish international postgraduate students' perceptions of and attitudes towards the University Digital Libraries (UDL) and Google Scholar, it was vital to integrate constructs from Wilson's model, four main constructs from the UTAUT model, and the response from the open question discussions from participants. While the individual differences and systems features have been explained using Wilson's model (Figure 6.5), it was important to state that correlating the factors led to clearer results for intention of use (Figure 6.6). For example, the intention of use for UDLs is largely centred on Performance Expectancy – the good results associated with the UDL sources. On the contrary, the Google Scholar dataset is driven by the ease with which citations could be accessed with simplest of search parameters. However, notice that there are also negatives of results being random, wrong, or less focused if the information search relies heavily on Google Scholar – as illustrated in Figure 5.6.

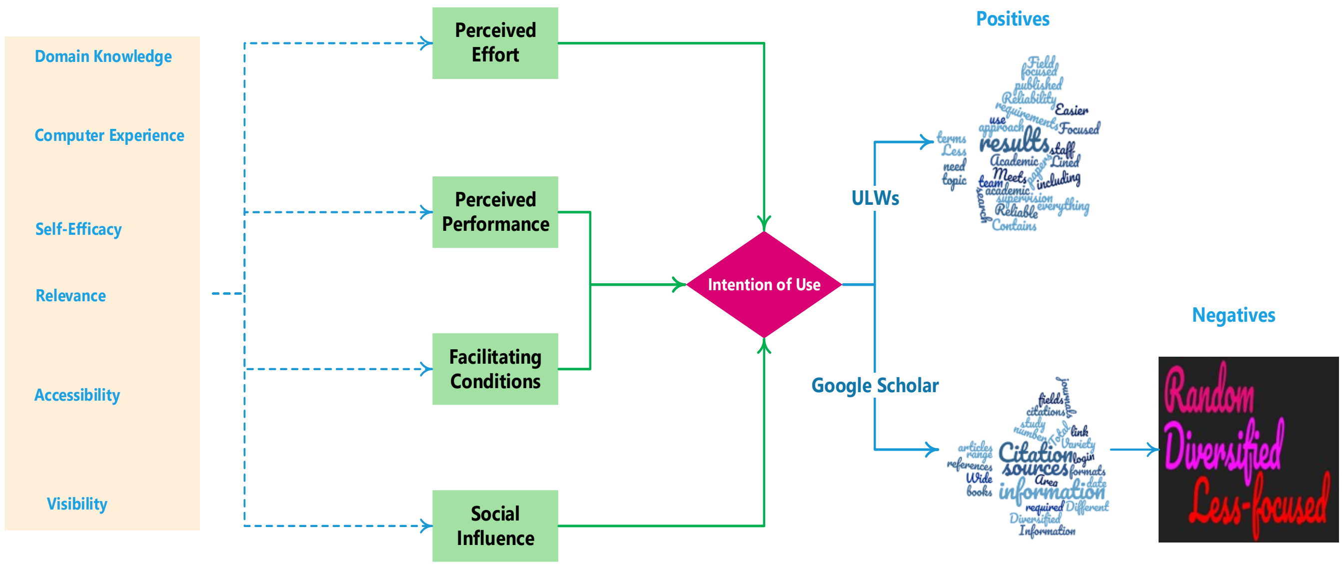

Figure 5.6 *Correlation of factors and open question response*

Therefore, the underlying factors such as Domain Knowledge, Computer Experience, Accessibility and the like (Figure 5.6) were critical in the determination of the perceptions and attitudes of international postgraduate students towards the University Digital Libraries (UDL) and Google Scholar – as indicated by dotted blue lines. International students, therefore, were able to use either UDLs or Google Scholar when they felt that they would easily access the information as well as perform better. Figure 5.6 shows that even though international students preferred Google Scholar when searching for information, they also believed that they could negatively impact the quality of the information search result.

5.5.5 Response to RQ4

RQ4: What is the current state of knowledge on student online search behaviour, with specific reference to their use of Google Scholar and university libraries?

The current state of knowledge on student online search behaviour, with specific reference to their use of Google Scholar and university libraries (RQ4), needed to take a holistic approach by integrating constructs from the UTAUT conceptual framework as well as the elements of the Wilson 2018 model by Mowbray (2018) (Figure 5.7). The integration of all the results from the constructs for this research has been illustrated in Figure 5.7; it contains the influencing context of system and individual features and their correlation with the core factors. Both System Feature and Individual Differences had sub-categories, such as Relevance, Accessibility and Visibility. From these factors, it was possible to establish a clear pattern that respondents preferred Google Scholar to the use of the UDL platform. For instance, the blue arrows show the influence of individual features on Perceived Effort. In addition, the influence of System Features on Perceived Performance and the purple arrows show Perceived Effort.

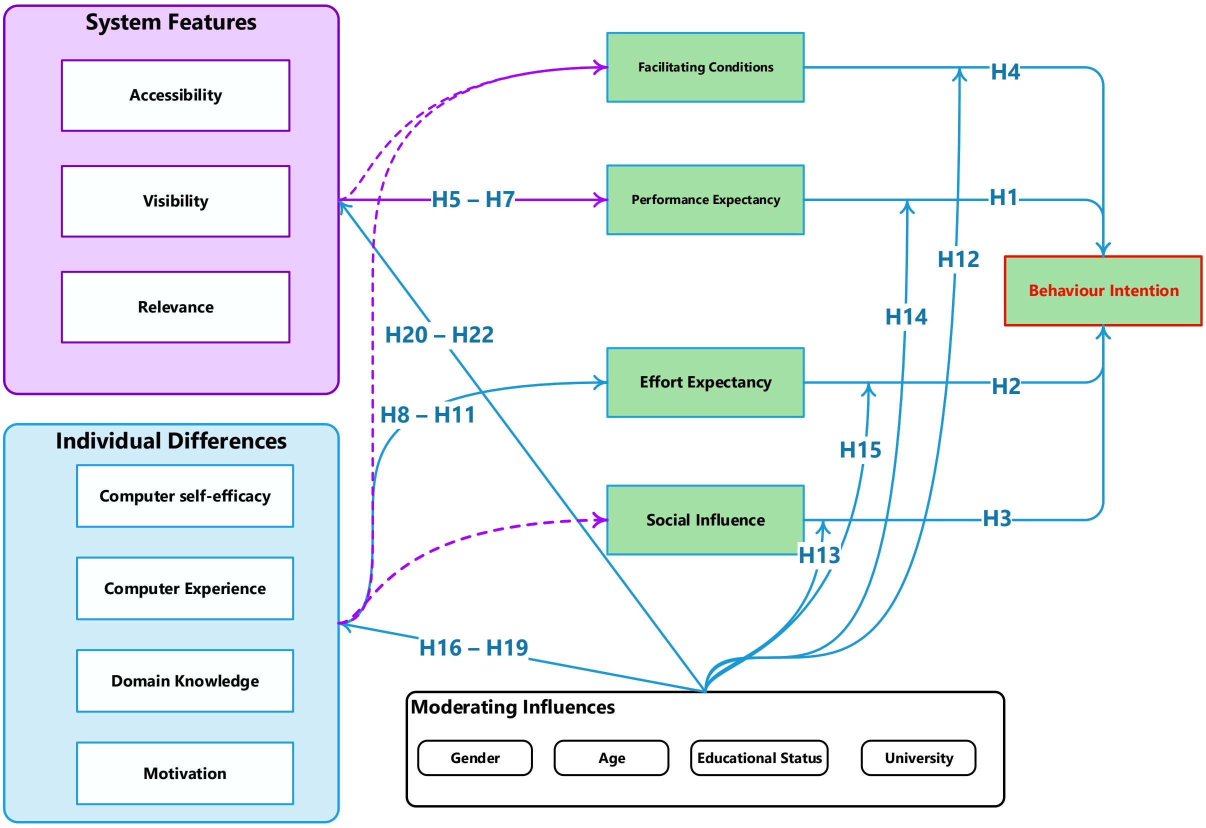

Figure 5.7 *Main constructs and their contextual influencing factors*

It was also critical to view other factors such as Social Influence and their impact on BI as a way of assessing factors on the UTAUT conceptual framework and Wilson's model. Correlation scores between usage of UDL and Google Scholar under the factor of Social Influence did not favour either Google Scholar or UDL's SI. In this research, it means 'the degree to which an individual perceives how important others believe is it that he/she should use the technology'; so, it was noticed that social influence was a factor, but the mean Likert scale between the use of UDL and Google Scholar were not significant enough to set a clear difference *per se*.

The significance of this score is that Behavioural Intention has a massive influence on the use of Google Scholar compared to the use of UDL. The integration of factors from the UTAUT conceptual framework and the Wilson 2018 model has led to the realisation that such factors have a mutually inclusive influence. For instance, the SI and BI of the learner are intricately connected, and both have an influence on the systems features used by students to decide on either the use of UDL or Google Scholar as platform for searching for information. Under objective (ii), the results show that the factors influence the use of Google Scholar more than the UDL.

Objective (v) states that the research needed to compare the factors that influence the use of Google Scholar and those that affect the use of University Digital Libraries (UDL). This objective was achieved by using the digital technology questions that captured any new factors influencing the intention to use UDLs or Google Scholar other than those mentioned in the questionnaire. From the qualitative data, the study found that the students' intention to use a certain tool was primarily related to the tool's coverage and scope. Other determinants were the effectiveness of the tool's search facilities and its functionality, availability of both the tool and information, accessibility of the tool, accuracy of information obtained using the tool, and ease of citation and reference. In general, the students indicated their preference to utilise Google Scholar over their UDL. Particular items of significance in this matter included their perception of the limited capacity of UDLs to provide access to and retrieval of current research articles, along with limited capacity to export them into citations for use in referencing. Thus, from the students' perceptions, it appeared that their preference for Google Scholar was driven by its user-friendliness and robust indexing capabilities in the matter of retrieval, access to, and exporting of research materials. However, it was critical to assess the level of interconnectivity of the factors (constructs) so that the results could be useful in the creation of the information search framework. A summary of the findings on the relationships of the constructs based on non-parametric statistical analysis as well as multiple regression modelling is provided in the following section.

5.6 Discussion from the perspective of developing a conceptual model and a framework for Information search in Digital Libraries

For this research to develop a conceptual model that could be useful in the contribution to knowledge through a framework, it was critical to discuss objectives (iv) and (vii) under section 1.4. Objective (iv) states that the research needed:

> "*To propose and test a conceptual model of the factors that affect international students' use of Google Scholar as opposed to the University digital library, and vice-versa*".

The information gathered from literature review (chapter 2 and Appendix IV) produced a generic understanding of the factors that affected students' use of Google Scholar as opposed to the University digital library, and vice versa. This meant that it would have been highly subjective for the research to arrive at particular factors without establishing an objective path of how some factors played a critical role than others. From the onset, all the critical factors were given equal weighting in accordance with the Wilsons Model (2018) and the UTAUT model (2019). The relevant factors that needed conceptual testing were all considered critical, and they include: Performance Expectancy (PE); Effort Expectancy (EE); Social Influence (SI); Facilitating Conditions (FC); Accessibility (AC); Visibility (VI); Relevance (RE); Computer Self-Efficacy (SE); Behavioural Intention (BI); Motivation (MO); Domain Knowledge (DK); and Computer Experience (CS).

The integration of these factors was implemented through the RQ 2 – which, asked for "the international postgraduate students' perceptions of and attitudes towards the University Digital Libraries (UDL) and Google Scholar". The initial step to developing the conceptual model was to apply the structural equation modelling (SEM) on the behavioural intent of information seekers in general. SEM was applied on the four main constructs: FC, PE, EE and SI in order to examine behavioural intention. The results from SEM commenced the process of creating a clear map of how these factors interacted, how they impacted on each other and how sensitive they were to each other.

Based on the SEM results, it was established that FC and PE had a positive influence on BI for UDLs while EE and SI had no impact on the BI for UDLs. This meant that the UDLs needed to have robust "facilitating conditions" for international students to take preference thereof; else, they would use google scholar. In addition, students were aware that "performance expectancy" under the UDLs could easily be achievable since UDLs are perfectly designed to ensure students performed well. When you consider the speed with which technology changes, it would be difficult and costly for UDLs to keep updating facilitating conditions each time the information search environment demands so. Most universities take a reactionary approach in terms of investment in digital libraries; hence, the issue of FC was considered critical in testing the conceptual model.

Using SEM results alone could not have clearly identified the underlying factors and how the cascade from the provisions of digital libraries to the use of Google scholar. For this reason, the research adopted various correlational coefficient scores between factors;

coupled with the use of multiple regression modelling. The results from RQ3 dealt with the cascading of root factors such as domain knowledge, computer experience, relevance, self-efficacy, accessibility and visibility. This led to establishing a link between the root factors and PE, EE, SI and FC regarding how they affect the intentional use (BI) of either UDLs or Google scholar (Figure 5.6).

It can, therefore, be argued that responses from RQ2 and RQ3 have been critical in establishing how factors from the Wilson's model of 2018 interacts with the factors established in the UTAUT model of 2019 – in creating an understanding of why it was that international students preferred to use Google Scholar over UDLs. It also leads to the understanding that the preference of Google scholar over UDLs was a deliberate choice despite students knowing the importance of UDLs regarding the fulfilment of performance expectancy in their submissions. An amalgamation of the said factors tested through qualitative and quantitative data analysis has been necessitated by objective (iv); hence, creating key pointers to the generation of a framework for information search in university libraries.

Meanwhile objective (vi) states that the research would "*develop an information driven framework that can be used by libraries to determine an information search strategy responsive to dynamic end-user (student) preferences*".

The results from the literature review (chapter 2 and Appendix IV) as well as the outcomes of the primary data analysis created a complex set of data. It was imperative that patterns were established through RQ 2 and RQ3. The fulfilment of objective (vi), therefore, lies in anchoring the research factors to the current perceptions of UDLs and Google scholar by international students.

The first factor identified from the responses of RQ2 and RQ3 were the type of student within the overall international student class. If the student undertook their undergraduate studies in an environment that supported UDLs their perception of the digital libraries varied from those that did not use UDLs. The results show that system features and individual preferences were interwoven; hence, impinging on the behavioural intention (BI) of the student as they undertake information search. The framework needs to realise the importance of understanding the student as the enter the university by allowing for detailed review of the student understanding and use of information search tools and environments.

The second factor emanating from RQ2 and RQ 3 data sets was the importance of the specialisation of the student (subject domain) as well as the domain knowledge. This refers to the UTAUT model where key factors as the knowledge domain were critical to the decision of either using UDLs or Google scholar.

The third issue to consider in the development of the framework for UDLs would not only consider the underlying factors such as system features and individual knowledge domain without evaluating the social-contextual influences. Proponents of the Wilson's model of 2018 viewed the social factors as critical as technological or systems features because social influence amongst student clusters was evident from the primary data

The fourth issue for the operationalisation of objective (vi) would be to examine the preferences made by international students when they search for information, especially with the availability of a myriad of technological platforms. For instance, if learners access UDLs using their mobile devices, how easy has it been for them to view Google scholar materials as compared to the UDL materials? This factor adds to the argument that primary data demonstrates behavioural intention of students amidst the available technological platforms availed to them directly by the university or indirectly by virtue of owning mobile devices.

5.7 Contribution to Knowledge and Practice

For the research to contribute to knowledge and practice, it should develop an information driven framework that can be used by libraries to determine information search strategy responsive to dynamic end-user (student) preferences. The framework should come from the general findings and be informed by the outcomes of the research; however, the main contribution to knowledge has been the identification of the key factors critical to information seekers' decision to use either UDLs or Google Scholar. These factors have been embedded in the proposed framework for considering when creating an ideal information seeking platform in an educational institution.

(i) Identified delay in the evolution of tools and techniques for capturing dynamic information needs of the library end-user

The first contribution that this research claims has been the identification of the delay in the evolution of tools and techniques for capturing dynamic information needs of the library end-user. The overarching argument herein has been that information seekers' behaviour and the process of information, as modelled by earlier proponents, is still valid to a large extent; the information seeking models have been ideal for explaining the cycle that an information seeker takes when they embark on their search. To this end, this research has established that UDLs have been using a highly technical approach to engage learners to deal with the search in the most efficient and logical approach possible.

Using the standard information seeking models as well as the technology acceptance model (TAM), this research found that it was not possible for the library services of an institution to establish the constant dynamism in the needs of the information seeker. This has resulted in the slow adaptability of the tools that can capture the ever-changing information needs and take care of the ever-changing technological enablers that have transformed the expectations of the end user.

(ii) Identified the ease of use platform for accessing information with limited restrictions

The second contribution to knowledge and practice in information search from this research has been the identification of ease of use on the search platforms being considered paramount by the information seeker. This research then compared the perceptions regarding Google Scholar and UDLs using the UTAUT model. The results indicate that the issue at the centre of the higher preference for Google Scholar over UDLs was the ease of use for the information search platforms. The search filters expected of a library user become not a necessity, but rather a hindrance – hence the preference for Google Scholar, which has been designed to hide the search algorithm. In addition, hand-held devices and the computing speed they possess has implied that instantaneous results from a search process was considered a critical issue.

(iii) Simpler platform that recognises Domain Knowledge, Computer Efficacy and Motivation

The third contribution to knowledge and practice this research makes is that information searching for learners should comprise a simpler platform that recognises Domain Knowledge, Computer Efficacy and Motivation – the key factors that have a positive influence on the behavioural intention of the learner. Simpler platforms that could map students' prior experiences to the use of library services (Domain Knowledge, Computer Efficacy, Motivation – speed to get results) implies that there should be built in flexibility in the information search platforms so that the learner could use their prior learning or domain knowledge as a critical factor in the search. Eventually, the platform could shepherd them to the international accepted standard of how to undertake a technical search for information.

(iv) Lack of awareness of the powerful search mechanisms available at UDL, leading to parallel use with Google Scholar

The results from the quantitative and qualitative data analysis indicated that learners preferred Google Scholar to UDLs; this was mainly because they were not aware of the powerful search mechanisms available at UDL, leading to parallel use with Google Scholar. This phenomenon was more apparent with international students' sample who clearly stated that they would start with Google Scholar then end up using UDLs. This phenomenon is linked to the research gap where there was no clear evidence that there has been scrutiny related to the usage of UDLs and Google Scholar as technology systems.

(v) The research has used multiple regression analysis (MRA) and structural equation modelling (SEM) to map the relationships between factors influencing information seekers

This research claims the contribution that it has used MRA and SEM to map the relationships between factors influencing information seekers, which in turn influences the behavioural intentions responsible for the decision to use UDLs or Google Scholar. The research identified the critical role of the UTAUT model to analyse factors that influence international postgraduate students' acceptance and usage of UDLs and Google Scholar. Based in the UTAUT model and the conceptual model, it was possible to establish factors needed to examine the information seeking behaviour of international postgraduate students. The behavioural intention was then linked to influence information seekers' inclination to adopt one technology system over another. Even though this processes of investigation used the extended Wilson model of Information Seeking Behaviour, it was not possible to verify the causal relationships between the said factors. However, this research adopted MRA and SEM as a means to establish factors that were critical in the design of the information-searching platform. Therefore, information seekers' behavioural intentions critical to the choice between UDLs or Google Scholar could be predictable if the factors are considered in the design of the information search platform.

5.8 Chapter Summary

This chapter took a holistic discussion of the information gathered under literature (Chapter 2) on how information seeking is conducted and the behaviour of the information seeker. There were models that are critical to the identification of the cycles that describe information seeking and their platforms. It was observed that even though models had been developed for information seeking, university libraries offered information search platforms that were based on their own assumptions of the ideal platforms (Chapter 3). Even though the process of creating UDL platforms was not in the scope of the research, it was found that UDLs had standard offering, even if one were to use a UK university or a university in the Kingdom of Saudi Arabia. Based on the information from literature (Chapter 2 and 3Appendix IV), it was possible to establish a research strategy that was capable of testing the UTAUT model as well as the Wilson 2018 model. The findings discussed in Chapter 5 have formed a basis for the analysis of the questionnaire data, as interpreted and discussed in the light of prior research. In general, the research discussion herein stated that even though there were established factors affecting information seeking and the behaviour of the information seeker, it was difficult to establish a causal relationship until the adoption of MRA and SEM in the analysis. The significance of the factors, as tested against other variables, was well established and learners consistently preferred Google Scholar to UDLs. Moreover, the study found that System Features were found to influence Performance Expectancy and Individual Differences were found to influence students' Effort Expectancy. Further, Performance Expectancy was found to directly influence students' Behavioural Intention. However, mixed outcomes were found in the matter of Effort Expectancy, as this was found to directly influence students' Behavioural Intention in the GS dataset but not the UDL dataset. Similarly, mixed outcomes were found in the matter of Facilitating Conditions as this was found to directly influence students' Behavioural Intention in the UDL dataset but not the GS dataset. However, Social Influence was not found to directly influence students' Behavioural Intention. The next chapter provides the conclusion to the thesis.

Chapter 6: Conclusion

6.1 Introduction

This research conducted a detailed comparison of the perceptions of international postgraduate students regarding Google Scholar and University Digital Libraries (UDL). This chapter concludes the research by stating general overarching findings that have been used in proposing the way forward in harnessing the behavioural intentions of information seekers in higher institutions of learning.

6.2 Research Findings for Information Seeking Behaviour

Based on the results from the research conducted herein, and the conceptual model developed from the adapted version of Wilson's information needs and seeking model, it was possible to examine factors influencing the search behaviour of the participating international students. The following findings have been drawn from the research:

(i) There were clear factors that influenced international students' behaviour and intentions regarding the processes they used when searching for information. Despite some intervening variables such as emotional, demographic, interpersonal, role-associated, environmental, and source features, with the understanding that these could influence their searching behaviour, there was a pattern, which indicated that more factors had a role to play.

(ii) The perception of international students regarding usability of a system and their awareness of the systems used in the information search process was very strong, because the systems used were a key determining factor in how they approached the information search so that they could maximise the potential outcome of the desired goal without complicating the search process.

(iii) The perception of international students varied concerning the influence of individual features, namely Domain Knowledge, Computer Experience, and Computer Self-Efficacy. However, they indicated that these features played a significant role in the motivation to choose Google Scholar over the UDLs. These factors acted as motivation and were fuelled by Social Influences.

(iv) Even though international students chose Google Scholar over UDLs, it did not act as a barometer for the quality of the information obtained; rather, it was to do with the ease of accessing information as well as the speed of getting to the required information without participating in setting up the search criteria themselves. On the contrary, international students felt that the quality of information obtained from UDLs was of a very high standard.

(v) Lecturers and supervisors positively influenced students to use UDLs as the main information search platform that could assure quality search results. This implies that there are intervention points from universities to create a situation that would benefit the information seeker. However, there was no realisation of the challenges faced by the students in undertaking the search for information by setting their own criteria.

(vi) With the availability of digital devices, international students found it easier and faster to access information via Google Scholar as the starting point of their search. They then moved onto using UDLs as a final stage to access information that may have accessibility restrictions on Google Scholar.

(vii) It was found that the perceptions of Google Scholar and UDLs were varied once you compare them under the variables of Relevance, Accessibility, and Visibility – particularly in the matter of information search. In addition, their objectives for information searching were related to their academic requirements along with information sharing.

(viii) Regarding the main constructs of the extended UTAUT model, the findings indicate that the Behavioural Intention of students was influenced by Performance Expectancy and Facilitating Conditions, but not by Effort Expectancy and Social Influence. Moreover, System Features were found to directly influence students' Performance Expectancy, whereas Individual Differences were found to directly influence Effort Expectancy.

(ix) Again, in the Google Scholar dataset, with regard to the main constructs of the extended UTAUT model, Performance Expectancy and Effort Expectancy were found to directly influence students' Behavioural Intention to use Google Scholar while Facilitating Conditions and Social Influence did not. On the other hand, System Features and Individual Differences were again found to directly influence students' Performance Expectancy and Effort Expectancy, respectively.

(x) Scrutiny of the moderating variables on the constructs of the UTAUT model showed that the variable of gender affected students' perceptions related to Social Influence and Performance Expectancy, and the variable of university of study affected students' perceptions related to Social Influence in the UDL dataset. The other variables did not have any impact. None of the moderating variables affected any of the constructs in the Google Scholar dataset.

6.3 Implications of the Research

The findings of this study have several implications with regard to the field of information-science knowledge, specifically concerning Google Scholar and University Digital Libraries (UDL):

- This study is among the first, to the best of the researcher's knowledge, to examine UDLs as technology systems through the lens of an extended UTAUT model. The results from the research have be useful in setting out clear intervention points for institutions of learning.

- This study is also among the first to examine Google Scholar as a technology system through the lens of an extended UTAUT model; hence, there is potential to reduce the clumsiness for customisation of the search criteria. The less the better, because it makes the search process much easier and more adaptable.

- This study is among the first, to the best of the researcher's understanding, to examine the intention to use Google Scholar and UDLs through the lens of Wilson's information needs and seeking model; hence, the behaviour of the information seeker can be modelled in a generic way to help institute measures for changing perceptions towards UDLs.

- In particular, the study is the first to use Wilson's information needs and seeking model and the Unified Theory of Acceptance and Use of Technology (UTAUT) to scrutinise the perceptions of international students with regard to their usage of Google Scholar and their UDLs. Hence, the research creates an opportunity for universities to engage international students from the entry point to the time they sit classes (or commence research). The engagement would focus on searching and the behaviour of the information seeker.

- The study provides valuable insights on the influence of the usability of a system and international students' awareness of the usage of a technological system.

- Insights are offered regarding the key factors that influence international students' usage of Google Scholar and their UDLs.

6.4 General Conclusion

The following conclusions have been drawn from the research:

(i) With the help of both secondary data from the literature review and primary data collected from the two versions of a questionnaire on international students' preference between UDLs and Google Scholar as a platform for information searching, it was found that students were using these platforms in parallel. This meant that students started using one platform and ended up using the other platform.

(ii) It can also be concluded that international students preferred to use Google Scholar over their UDLs for conducting a search for information, mainly because of the ease with which they could control the search process and get to the outcome as quickly as possible.

(iii) An amalgamation of factors under System Features and Individual Differences were found to be directly influencing students' Performance Expectancy and Effort Expectancy with regard to both Google Scholar and their UDLs. In turn, Performance Expectancy influenced students' Behavioural Intention with regard to both Google Scholar and their UDLs. However, the interconnectivity of the constructs (herein called variables) was found to be critical to how information seekers decided on what platform to use at any point in time.

(iv) It can be concluded that international students had a better perception of Google Scholar's usability in contrast to that of a UDL; their awareness of Google Scholar was better than their awareness of the UDLs. International students' intention to use Google Scholar more than UDLs was found to be influenced by attributes pertaining to themselves as well as the technological system that was available to them at any point in time.

(v) Based on the data gathered, it was possible to determine a string of factors that influence the behavioural intentions of the information seeker. These factors have been examined by different proponents on information seeking and technological acceptance models; however, this research established that they can be grouped into (i) Individual Differences (Domain Knowledge, Computer Experience, Computer Self-Efficacy, and Motivation); and (ii) System Features (Relevance, Visibility, and Accessibility), Effort Expectancy, Performance Expectancy, Facilitating Conditions, and Social Influence. These factors have been influencing the Behavioural Intention of the students (learner or information seeker).

a. The pattern in the string of factors that highly influenced the international students in their behavioural intentions to use either Google Scholar or UDLs were Domain Knowledge, Computer Self-Efficacy, Systems Features, and the Performance Expectancy of the student. These factors were critical in the prediction of the intentional behaviour that students demonstrate when they search for information.

b. With Domain Knowledge, it was found that international students were likely to commence their search from the premise of what they knew; thereafter, they could embark on a search process based on the technology available (devices used) as well as on social influences from other end users.

6.5 Review of the Research Objectives

Objective (i): 'to examine student online search behaviour, with specific reference to their use of Google Scholar and university libraries'.

It was critical to review the literature (Chapter 2) on how learners go about searching for information as well as the theories that back up their decisions. Additionally, the first objective was attained through the evaluation of the behaviour of information seekers as they conduct their business either through UDLs or Google Scholar. Objective (i), therefore, played a significant role in setting the scene for establishing theory and practice on the dynamics of information searching in higher institutions of learning, including student online search behaviour, with specific reference to their use of Google Scholar and university libraries.

This was achieved through a review of literature related to digital libraries; Google Scholar; information seeking/searching behaviour of students; theories related to information seeking/searching behaviour and technology acceptance and adoption; and students' usage of digital knowledge resources.

Objectives (ii) and (iii): 'to examine international students' perspectives on the factors that affect their use of Google Scholar and University Digital Libraries (UDL)'.

For the research to examine the perceptions of the Google Scholar and the UDL platforms, it was critical to examine current provisions in the United Kingdom and the Kingdom of Saudi Arabia. The status quo of the information searching processes allowed the research to establish a benchmark of the search protocols (Chapter 3). Therefore, objectives (i) and (ii) were useful in establishing the basis upon which international students' perspectives on the factors that affect their use of Google Scholar and UDLs could be formulated. The two objectives were achieved through the use of two questionnaires to obtain data from international students and the subsequent analysis of the data using SPSS. Please see Chapter 5 for details of these analyses.

Objectives (iv) and (v): 'to propose and test a conceptual model of the factors that affect international students' use of Google Scholar as opposed to the University library, and vice-versa', and 'compare the factors that influence the use of Google Scholar and those that affect the use of University Digital Libraries (UDL)'.

The fourth and fifth objectives were to propose and test conceptual models of the factors that affect international students' use of Google Scholar and University Digital Libraries (UDL), which were then used to analyse the factors and their influence on information seekers. The two objectives were achieved through the use of a literature review about information seeking models, and then the developed conceptual model was used in the questionnaire survey data collection. The resultant data were tested both qualitatively and quantitatively using statistical tests, including exploratory and confirmatory factor analysis (EFA and CFA) and structural equation modelling (SEM). Please see Chapter 5 for details of these analyses. The fifth objective was also achieved through the use of two questionnaires to obtain data from international students and the subsequent analysis of the data using SPSS.

Objective (vi): ‘to develop an information driven framework that can be used by libraries to determine information search strategies responsive to dynamic end-user (student) preferences’.

This was operationalised through the recommendation of a flow-chart based framework proposed as a means to implement the findings of the research.

6.6 Framework for the Determination of Information Search Strategy

Overall, the study found that international students preferred to use Google Scholar over their UDLs. This was evident from the various statistical analyses of the questionnaire data and the content analysis of the responses to the open-ended questions. Based on the results from the data analysis and discussion of results, it was envisaged that objective (vi), whose focus was ‘to develop an information driven framework that can be used by libraries to determine information search strategies responsive to dynamic end-user (student) preferences’ was achievable. Figure 6.1 proposes the workflow steps needed to develop a robust framework that can depict the integration of research results. Each rectangle symbolises a set of steps to achieve a task; the trapezium means the data needed while the diamond signifies the decision to be made based on the binary selection system. The oval shape stands for the start or the end of the process.

Step 1: Determine the Level of Entry – helps to raise awareness of the information given by the applicant to the university. From the information given, it is possible to determine the level of entry.

Step 2: Determine that the student is international – Figure 7.1 shows how the institution could determine the origin of the student. This is important to determine the pitch that searching online intervention could be implemented.

Step 3: Subject specific (Domain) – helps to ensure that the international student can be categorised in a specific subject. For example, are they into medicine, social science, engineering, or commerce? The determination of the subject specifics would help align the intervention points.

Step 4: Awareness of the Domain Knowledge Base (Body of Knowledge) – a detailed assessment of the student so as to determine their domain knowledge within the area of specialisation (as shown in Step 3). This factor has been influenced by the importance of the domain specific factor from the UTAUT model.

Step 5: Assessing level of Social Engagement (Peer to Peer) – a detailed evaluation of the availability and, if possible, location of peers on the course or social acquaintances outside the course. Regardless of the source of peers, there is a likelihood that these would have an influence on how the students undertake information searching. This factor was found to be critical to the way students obtain behavioural intention to choose methods of searching.

Step 6: Likelihood of Social Influence – this can be determined using fairly basic questions so that the student can be shown the potential influence friends will have.

Step 7: Shared Information Search Behaviour – at this stage it would be interesting to detect group norms and information search techniques that students use.

Step 8: Preferred Information Search Approach – it is important to allow the students to identify the process that they prefer to use. This helps to ascertain where the intervention points could be designed. Currently, there is no clear plan for which a student could be trained based on their deficiencies; rather, they use static training programmes for all students.

Step 9: Preferred Digital Technology Available – assesses the available technologies and tools that the students find useful. This process establishes the baseline for the student.

Step 10: Specific Search – establishes the preferred search protocol that they are used to. Note that all the steps from 1 to 10 are about allowing the student to have enough opportunity to undertake their information search in a manner that they are used to. It also allows for the possibility of influences from peers or people within their social circle.

Step 11: Google Scholar/University Library Website – marks the starting point of creating an opportunity to undertake positive invention and change in the way they perceive the UDLs and Google Scholar. If the international student prefers Google Scholar to UDLs, the university would have information with regards to specific search patterns. At this stage the student could be redirected to a training programme that optimises the use of Google Scholar in tandem with the use of UDLs.

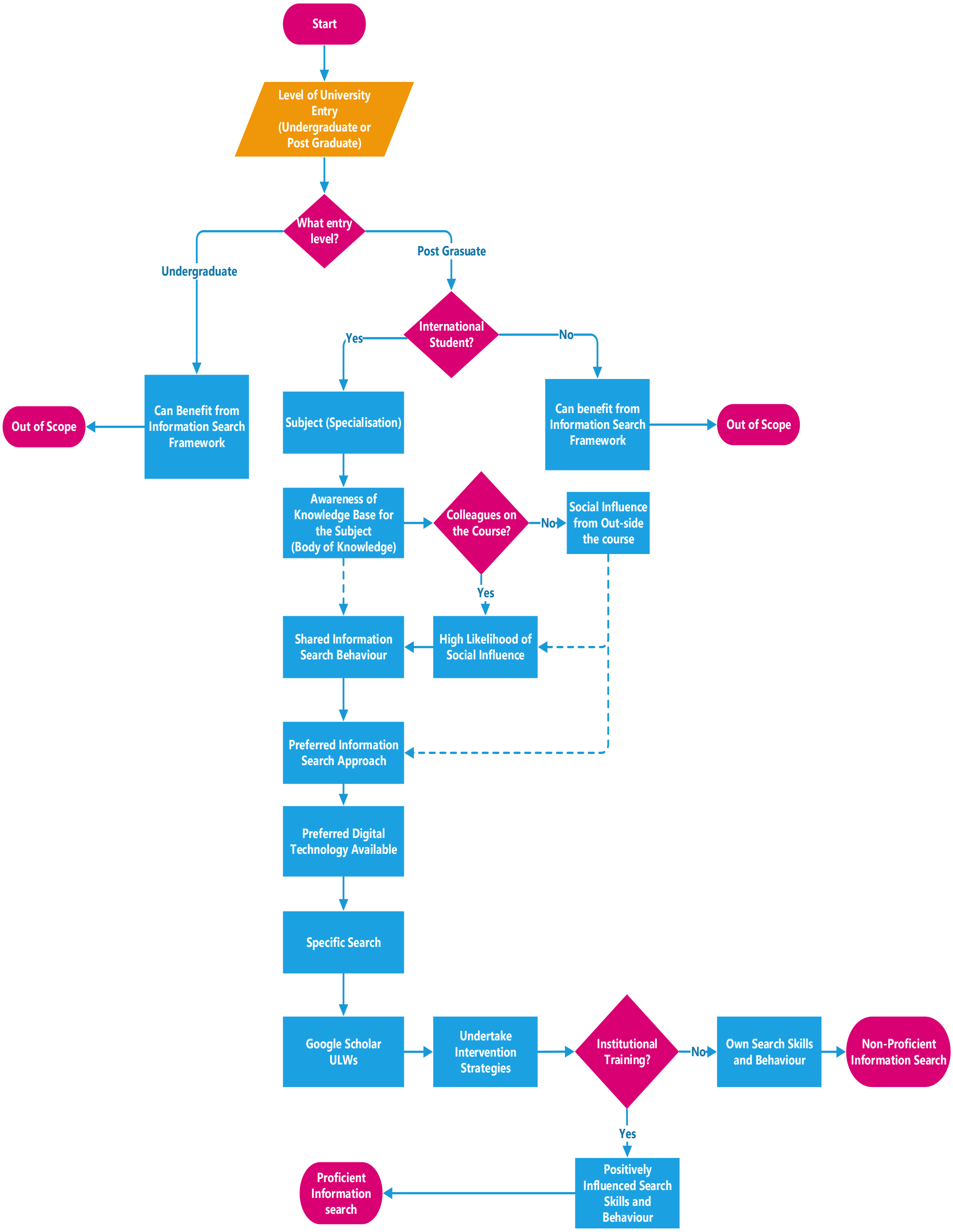

Figure 6.1 Framework for the Determination of Information Search Strategy

Step 12: Undertake Intervention Strategies – this is the stage a university or an education institution can tailor the training to fill the identified gaps in the information search processes. Having asked students about how they search for information it is possible that students could be shown how to better apply the search tools and platforms, as shown in Figure 6.2. However, such training should only be a recommendation and not mandatory. This would help the students realise the importance of understanding technical information searching with their own criteria.

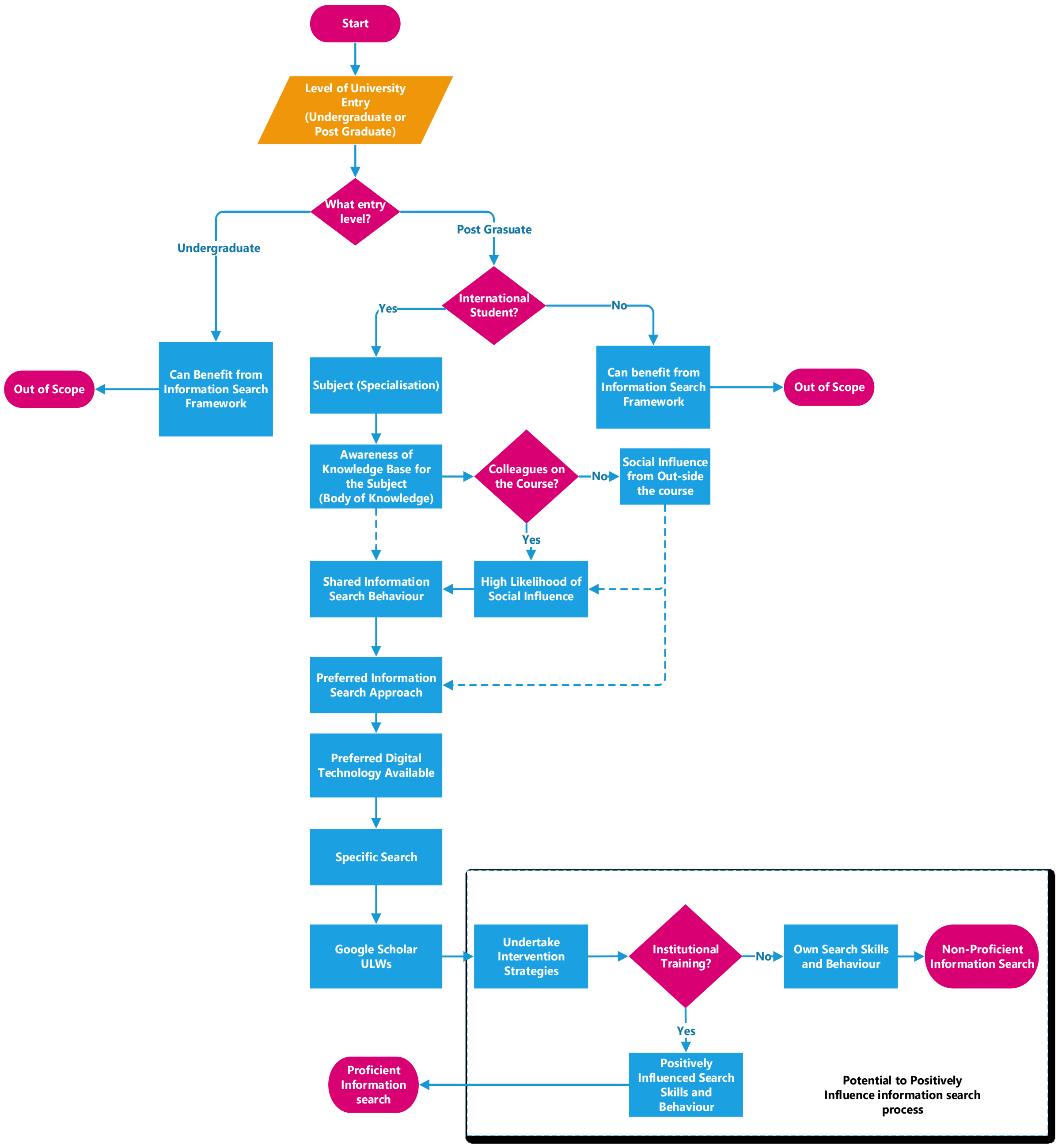

Figure 6.2 *Ideal intervention points within the framework for the determination of information search strategy*

Once training has been offered, a decision point is created so that the binary option can be ascertained.

Step 13: Positively Influenced Search Skills and Behaviour – is for international students who undertake the university planned training on the procedures used to undertake a technically approved training programme. The outcome is reflected in the expected performance of the student with high levels of proficiency.

Step 14: Own Search Skills and Behaviour – this option shows the situation where the student declines the training and is likely to end up with weak proficiency in information searching.

The overall picture promoted in the framework is that the student narrations from the open-ended questions were the factors reflected on word clouds. The same factors have been identified using non-parametric statistical results as well as descriptive statistics in Chapter 5. These factors have had an influence on the way students choose Google Scholar over UDLs. Apart from the ease of use and ease with which students can obtain results, access to technological devices were critical to driving behavioural intentions. It was also clear that information seekers did not find it easier to undergo the many search steps as a way of setting their own search criteria because they wanted less (if not, no) involvement in the determination of the search criteria.

One of the highlights of the discussion was that international students might have opted for easier ways to search for information, mainly because they may not know the setting of the search criteria (genuine lack of understanding of location for quality items). On the contrary, when you look at the Effort and Performance anticipations, it could be seen that speed and ease of use were critical. Even though the research has used technics that would be useful as a way of explaining the factors and the linkages (collinearity) that MRA could not address, it was vital to propose a simple workflow on how to change negative perceptions of UDLs.

6.7 Recommendations of the study

In the light of the study's findings, the following recommendations can be set forth:

- Induction programmes for international students at universities in the UK must include awareness and training sessions on the features and facilities of the UDLs. This has been proposed in the framework (Figure 6.2).
- UDL design must emphasise usability to ensure that users find the interface intuitive and simple to use.
- Accordingly, usability testing must be a critical facet of UDL design and implementation.
- UDL designers must keep abreast of changing technology trends and incorporate aspects as and when feasible.
- Faculty can ensure that international students are given assignments and exercises that involve the usage of the UDL. This will help increase their familiarity with the system and hence encourage their use of it.

6.8 Limitations of the study and opportunities for future research

The following limitations were observed in the study, some of which could be translated to future research.

- The study was limited to international postgraduate students. Future research could consider involving other academic users of UDLs, such as faculty and undergraduate students.
- An in-depth scrutiny or comparison of UDLs could not be undertaken to explore the facets that limit its usage or how its usage could be enhanced. This could be addressed by a future researcher.
- The quantitative focus of the study resulted in limited qualitative data through a single open-ended question. A future study could include qualitative methods such as semi-structured interviews, observations, and focus group discussions to obtain profound data related to students' perceptions of why they did or did not use a UDL.
- The nationality of the participating international students was not considered for its moderating influence on their perceptions. Consequently, the potential underlying impacts to social influence due to nationality could not be explored – an undertaking that could be of use in future research as this could inform the design of UDLs.

- The study's participants were restricted to a limited number from only one group of universities in a particular city (Manchester). A future researcher could compare perceptions from different university towns.

- Although the participants were international students, the study did not seek their perceptions of their home UDLs. Again, future researchers could seek to contrast students' perceptions with regard to national and foreign UDLs. This could inform measures to improve the design and effectiveness of UDLs.

- This study found that international students typically utilised GS and UDLs in parallel. Hence, a question that could be answered by future research is "*How do students make use of both GS and UDL in parallel to meet their information needs?*".

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Appendices

Appendix I: Questionnaires

International Postgraduate Students' views of using Google Scholar

The purpose of the survey is to gather postgraduate student views on the information resources they use to support their research

This survey is conducted as part of the research project of a PhD student from the Department of Languages. Information & Communications at Manchester Metropolitan University. Your contribution is highly appreciated and critical to the success of this research. All information provided will remain confidential. If you have any queries, please contact the PhD researcher on ***faiz-abdullah.a.alotaibi@stu.mmu.ac.uk***.

A: Your information seeking context

Please use three keywords to indicate the topic of your thesis/ dissertation

………

B: Your evaluation of your information seeking

Please indicate the extent to which you agree with the following statements:

C	**Thinking about looking for information on this topic**	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
DK1	I am familiar with the subject domain that I search for					
DK2	I am knowledgeable in the topic to search for					
DK3	I have previous experience searching in this subject domain					
DK4	I have the domain knowledge that it necessary to search for what I want to find					
CS1	I am confident in using computers					
CS2	I think I am efficient in the use of a computer to complete my task					
CS3	I can use a computer even if there is no one around to show me					
CS4	I am happier if there is someone around to ask for help					
D	**Thinking about using Google Scholar for your research**					
RE1	It has resources that relate to my area of interest					
RE2	It has enough resources for my study					
RE3	It provides current information in my area of interest					
RE4	It is a very efficient study tool					
RE5	It is limited in its coverage of my area of interest					
AC1	I find it easy to navigate					
AC2	I am able to use it whenever I need it					
AC3	I find it easy to get access to					
AC4	It is easily accessible					
AC5	I can locate the resources I need					
VI1	People at my university know that it exists					
VI2	People know where to look to find it					
VI3	I find that it is always available					
SE1	I feel confident in my ability to use it					
SE2	I can use it even if there is no one around me to show me					
SE3	I don't need a lot of time to complete my task using it					
SE4	I often find it difficult to use it for my studies					

SE5	I am confident in using it					
EE1	It is easy for me to become more skilful in using it					
EE2	I will continue to find it easy to use					
EE3	Learning to use it does not require much effort					
EE4	My interaction with it will continue to be clear and understandable					
E	**Using Google Scholar**	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
MO1	Helps me achieve in my studies					
MO2	Really encourages me in developing my areas of interest					
MO3	I feel I am working within a community of scholars in my area					
MO4	Helps even when the task is challenging					
MO5	I don't always feel in control of the outcome					
MO6	Makes me feel really involved in my studies					
FC1	It is suitable to the way I study					
FC2	I can get help when I have difficulty					
FC3	The help can direct me to the information I need					
FC4	The help supports me in my tasks/research study					
FC5	Other students show me how to use it					
FC6	I have been trained to use it					
SI1	People whose opinions I value prefer that I use it					
SI2	People who are important to me at my university think that I should use it					
SI3	People who influence my study think I should use it					
SI4	I am encouraged to use it by people who assess my work					
SI5	I use it because people around me do					
SI6	Not using it makes me feel I am falling behind others					
G	**I think that continuing to use Google Scholar will**					
PE1	Improve my study performance					
PE2	Enable me to achieve study/research task					
PE3	Help me accomplish my study more quickly					
PE4	Increase my productivity					
PE5	Be beneficial to my study					
BI1	I intend to use Google Scholar for my study in the future					
BI2	I intend to increase my use of Google Scholar in the future					
BI3	I predict I will use Google Scholar in the future					
BI4	I plan to use Google Scholar in the future					

F: About you

- **When searching for information on your research, which of the following would you prefer to use**

Google scholar		**Your University Library Website**	

- **What is your gender?**

Male	

Female	

- **What is your age?**

Under 23	

24-30 years	

31-40 years	

41 or older	

- **What is your current status:?**

Master's student	

Doctoral student	

- **Where do you study?**

MMU	

Manchester University	

Other	

Thank you for completing this survey.

International Postgraduate Students' views of using Your University Digital Libraries

The purpose of the survey is to gather postgraduate student views on the information resources they use to support their research.

This survey is conducted as part of the research project of a PhD student from the Department of Languages, Information & Communications at Manchester Metropolitan University. Your contribution is highly appreciated and critical to the success of this research. All information provided will remain confidential. If you have any queries, please contact the PhD researcher on *faiz-abdullah.a.alotaibi@stu.mmu.ac.uk*.

A- Your information seeking context

- Please use three keywords to indicate the topic of your thesis/ dissertation
  Sport Policy, Elite sports, Sports for All

………

B-Your evaluation of your information seeking

Please indicate the extent to which you agree with the following statements:

C	Thinking about looking for information on this topic	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
DK1	I am familiar with the subject domain that I search for					
DK2	I am knowledgeable in the topic to search for					
DK3	I have previous experience searching in this subject domain					
DK4	I have the domain knowledge that it necessary to search for what I want to find					
CS1	I am confident in using computers					
CS2	I think I am efficient in the use of a computer to complete my task					
CS3	I can use a computer even if there is no one around to show me					
CS4	I am happier if there is someone around to ask for help					
D	**Thinking about using your university library website for your research**					
RE1	It has resources that relate to my area of interest					
RE2	It has enough resources for my study					
RE3	It provides current information in my area of interest					
RE4	It is a very efficient study tool					
RE5	It is limited in its coverage of my area of interest					
AC1	I find it easy to navigate					
AC2	I am able to use it whenever I need it					
AC3	I find it easy to get access to					
AC4	It is easily accessible					
AC5	I can locate the resources I need					
VI1	People at my university know that it exists					
VI2	People know where to look to find it					
VI3	I find that it is always available					
SE1	I feel confident in my ability to use it					
SE2	I can use it even if there is no one around me to show me					
SE3	I don't need a lot of time to complete my task using it					
SE4	I often find it difficult to use it for my studies					

SE5	I am confident in using it					
EE1	It is easy for me to become more skilful in using it					
EE2	I will continue to find it easy to use					
EE3	Learning to use it does not require much effort					
EE4	My interaction with it will continue to be clear and understandable					
E	**Using university website library**	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
MO1	Helps me achieve in my studies					
MO2	Really encourages me in developing my areas of interest					
MO3	I feel I am working within a community of scholars in my area					
MO4	Helps even when the task is challenging					
MO5	I don't always feel in control of the outcome					
MO6	Makes me feel really involved in my studies					
FC1	It is suitable to the way I study					
FC2	I can get help when I have difficulty					
FC3	The help can direct me to the information I need					
FC4	The help supports me in my tasks/research study					
FC5	Other students show me how to use it					
FC6	I have been trained to use it					
FC1	People whose opinions I value prefer that I use it					
FC2	People who are important to me at my university think that I should use it					
FC3	People who influence my study think I should use it					
FC4	I am encouraged to use it by people who assess my work					
FC5	I use it because people around me do					
FC6	Not using it makes me feel I am falling behind others					
G	**I think that continuing to use my university library website will**					
PE1	Improve my study performance					
PE2	Enable me to achieve study/research task					
PE3	Help me accomplish my study more quickly					
PE4	Increase my productivity					
PE5	Be beneficial to my study					

F- About you

- **When searching for information on your research, which of the following would you prefer to use**

Google scholar		**Your University Library Website**	

- **What is your gender?**

Male		**Female**	

- **What is your age?**

Under 23		**31-40 years**	

24-30 years	

41 or older	

- **What is your current status?**

Master's student	

Doctoral student	

- **Where do you study?**

MMU	

Manchester University	

Other	

Appendix II: Information & Consent Form

<u>Information Sheet for Consent Form</u>

Please read the following information sheet carefully before you consider consenting to take part in this research.

Title of Research Project	Perceptions of e-Libraries as an information source: perspectives of the international postgraduate student
Name of Researcher conducting today's interview.	Faiz Abdullah Alotaibi
Researcher's Contact Details	Faiz Abdullah Alotaibi PhD program in Information Management Department of Languages, Information & Communications Manchester Metropolitan University Geoffrey Manton Building Rosamond Street West Off Oxford Road Manchester M15 6LL Tel: 00966555708042 Email:faiz-abdulah.a.alotaibi@stu.mmu.ac.uk
Aims of this research	The research aims to: The aim of the study is to establish the postgraduate students' Perceptions of use of E-libraries as a source of Information at King Saud University, Saudi Arabia
What will the outcomes of the research be?	The research will form part of my PhD thesis.
Why do you want me as a participant?	You are invited to take part in the study because you are a postgraduate student at King Saud University and it is very likely that you

	use the university libraries, including the digital library, in your research.
What will this involve?	Participation involves responding to a questionnaire and answering an interview questions.
How will my data be recorded?	Using a digital recording device. Notes will then be transcribed by the researcher.
Will this be confidential?	Yes. Your data will be stored securely. Only the researcher will have access to your data. Your data will be destroyed after the project is completed. When the findings are reported, individuals will not be identifiable. This means that your name will not be used in the thesis. It also means that we will not include information about you in the thesis that would allow other people to identify you.
What if I change my mind?	If at any point during the interview or afterwards you want to withdraw, you may remove your consent from the research and your data will be destroyed.

Consent Form

Title of Project: Postgraduate Students' Perceptions of the Use of E-Libraries as a Source of Information at King Saud University, Saudi Arabia

Name of Researcher: Faiz Abdullah Alotaibi____________________________

Name of Participant: ____

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected.

3. I agree to take part in the study.

Name of Participant	Date	Signature
Name of person taking Consent	Date	Signature

Appendix III: Participant Information

Participant Information Sheet

Dear Postgraduate Student,

I am a PhD student at Manchester Metropolitan University, United Kingdom. I am conducting a research which aims to explore “Perceptions of e-Libraries as an information source: perspectives of the international postgraduate student.” The study tries to:

A. To examine key factors that influence postgraduate students’ acceptance and usage of e-library services as a source of information.

B. To determine the postgraduate students perceptions of and attitudes towards the e-library services as a source of information at King Saud University in Saudi Arabia.

C. To investigate the micro and macro factors that contributes to students’ acceptance and usage of e-library services.

D. To develop a model to define the information literate student with reference to their effective engagement with and usage of the e-library.

E. To formulate recommendations to promote the acceptance and effective use of e-libraries by postgraduate students. You are invited to take part in this study because you are a postgraduate student at King Saud University, and you are very likely to use your university’s libraries including the e-library in your research. Therefore, your contribution is very valuable to the outcome of the research. I would be very grateful if you can help the research by completing a questionnaire, which will take about 15 minutes to complete, and taking part in an oral interview. The interview will be recorded by recording machine and it is expected to last for about 30 minutes. Interviews will be conducted in the library building in King Saud University. The interviews will be conducted by the researcher himself. Interviews will take the form of face-to-face meetings. A copy of the interview questions will be sent to all participants in advance. Your contribution will be treated confidentially and it will not be archived for future use. You will never be identified.

You will not be paid for your participation, but your participation will be a valuable addition to my research and findings which, I hope, will lead to a better understanding of the perceptions of e-libraries. Participation in the study is completely voluntary and you are free to withdraw at any time without giving a reason.

If you have any further comments or suggestions, please use the additional sheet provided. Please do not hesitate to e-mail me if you have any questions or require clarification and I will be more than happy to reply.

Many thanks for your interest and support.

Faiz Abdullah Alotaibi
PhD programme in Information Management
Department of Languages, Information & Communications
Manchester Metropolitan University
Geoffrey Manton Building
Rosamond Street West
Off Oxford Road
Manchester
M15 6LL
Tel: 00966555708042
Email: faiz-abdulah.a.alotaibi@stu.mmu.ac.uk

Appendix IV: University Digital Libraries (UDL)

Introduction

For this research to measure the extent to which library e-resources are utilised, it was critical to examine literature that could address objectives (iii) and (iv): "to propose and test a conceptual model of the factors that affect international students' use of Google Scholar as opposed to the University library, and vice-versa". And "compare the factors that influence the use of Google Scholar and those that affect the use of University Digital Libraries (UDL)". To realise these objectives, this chapter strives to identify and investigate the factors that facilitate or hinder the use of University e-resources in comparison to the use of Google Scholar by postgraduate international students. Generally, the interaction between library end-users is dictated by many factors relating to information seeking and the behaviour that goes with it, as explained in Chapter 2. Over the years, however, it has been observed that the approaches used by libraries to interact with end-users have changed along with the very character of their services. Take academic libraries in particular; an online presence has been fundamental owing to the enhanced rate of internet use among library users, both students and professors, resulting in a changed perspective that library websites are a digital gateway to the resources and services associated with a library (Mierzecka & Suminas, 2018).

This section, therefore, provides a brief overview of the usability of UDLs. It describes the services provided by the UDLs of different universities; and to highlight the differences. The discussion on usability was deemed to be necessary to the present study as this could potentially be a factor influencing the usage of a UDL by an international postgraduate student. This chapter contextualised the literature on library services using a comparative approach between a university in the Kingdom of Saudi Arabia (KSA) and the UK. Firstly, the literature focused on library services at the King Saudi University in Saudi Arabia. The justification to use the King Saudi University was because the researcher originates from the KSA. It was necessary to assess how library services at a top university in the KSA would relate to universities in other countries, such as the UK, wherein this research has been conducted. Secondly, as an international student pursuing his doctoral studies in the Manchester Metropolitan University, it was believed it would be an appropriate choice due to his proximity and personal use of the UDL. Other library services in universities within the city of Manchester were also reviewed.

The literature on library services found that the influx of international students into universities across the world has resulted in a new concern; namely, that of helping these students overcome their challenges (individual or study-associated) (Hughes, 2010). These challenges could include language differences and lack of familiarity with the social and educational environment into which they have entered. From the perspective of university libraries, these challenges may affect the manner in which international students use the libraries and interact with the librarian and other associated staff, with far-reaching consequences such as limiting the extensiveness and hence effectiveness of their research (e.g., Hughes, 2010; Liao et al., 2005; Mittermeyer, 2005; Weber et al., 2018; etc.). The chapter concluded that the identifiable challenges faced by learners are critical to the assessment of the University Digital Library (UDL). It also argues that responsive UDL services could primarily address such challenges, hence aiming to alleviate several of the challenges associated with face-to-face interaction in a physical library context. Nevertheless, this also signifies that a UDL must possess certain attributes which would increase its usability across diverse types of users.

Usability of University Digital Libraries

Usability is an essential attribute in the development of products and applications (Bahn, Lee, Jo, Suh, Song, & Yun, 2007; Seffah, Donyaee, Kline, & Padda, 2006). The International Organisation for Standardisation (ISO, 2018) defines usability as “the extent to which a system, product or service can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use” (ISO 9241-11). Rubin and Chisnell (2011) suggest that a system is usable when the intended tasks can be performed by the intended users without their being disappointed. Moreover, they stated that “to be usable, a product or service should be useful, efficient, effective, satisfying, learnable, and accessible” (*ibid*., p.4). An early pioneer in the field, Jacob Nielsen (1993), envisioned usability as a multi-dimensional attribute with each of the dimensions in turn consisting of diverse elements. Nielsen (1993) utilised five aspects, namely learnability, efficiency, memorability, errors, and satisfaction, to describe usability. Learnability denotes the extent to which a beginner can utilise the system whereas efficiency indicates an expert’s efficient usage of the system. On the other hand, memorability signifies the condition where the system is put to occasional use.

In the context of the present study, it could be inferred that the usability of UDLs is contingent on whether or not their content and services match users’ expectations. Users can quickly accomplish tasks with the least possible errors; users feel contented after they use the website; the method of accomplishing tasks is straightforward to learn; and the website can be accessed by users with disabilities or in diverse technical environments (Pant, 2015). Consequently, it is not surprising that there is a considerable amount of research attention related to examining the various aspects of UDLs from the perspective of what contributes to their usability. For instance, in a study involving students of a Polish (University of Warsaw) and a Lithuanian (Vilnius University) university, Mierzecka and Suminas (2018) reported that five functions of academic library websites seemed to be of great significance to students. First, these websites had to promote use of the collection, conventional and electronic. This could be achieved through online library catalogues; communication about library schedules; access through user accounts; electronic collections; floor plans; and other elements of lesser significance such as, rules related to use of the collection, copying documents, reserving of rooms set apart for self-study, contact lists, and so on. Second, library websites could facilitate the promotion of culture by disseminating information about cultural events coordinated or supported by the library, indicating that students might look to academic library websites to satisfy some of their social needs. Third, such websites should provide entrance to finding further information on the web, implying that library websites should serve to authorise (and perhaps endorse) other web sources. Fourth, academic library websites should perform an educational function using different means such as, hosting webinars, running courses, and so on. Finally, the online image of the library must be created. This could involve gaining the attention of students by customising the website to meet their information needs.

Another detailed examination of 1,469 academic and public library websites as part of a countrywide study comprising all the states of the United States of America by Chow, Bridges, and Commander (2014) scrutinised the site management, content, design, layout, and usability of the library websites under consideration. The study's findings revealed that there were generic styles with regard to design of the homepage, navigation of the website, and architecture of information. Typical information provided on the library websites were hours of operation, details of the library location, news and events, access to online public access catalogues (OPACs), online renewal, contact information, and provision to provide feedback. Moreover, librarians were the principal designers and managers of the websites by virtue of their professional responsibilities (Chow et al., 2014).

The study by Chen and Chengalur-Smith (2015) found that the most common reasons for using a UDL placed emphasis on locating information for research assignments (projects or papers); responding to instruction or support from professors; locating quality information; making service transactions; and obtaining assistance. This study used the technology acceptance

(TAM, Davis, Bagozzi, & Warshaw, 1989; Venkatesh & Davis, 2000) and information systems (IS) (Delone & McLean, 1992, 2003) success models as the theoretical basis to examine the direct influences on students' usage of a UDL such as user satisfaction, voluntariness of use, and competing resources (that is, Google, other search engines, public web portals). An exploratory study by Alzahrani, Mahmud, Ramayah, Alfarraj, and Alalwan (2017) developed a research model using Delone and McLean's (2003) IS success model. The findings from the empirical study revealed that satisfaction, behavioural intention, and variance in actual use are strongly influenced by the quality factors of digital library systems. Quality factors include the quality of systems, information, and service (Alzahrani et al., 2017).

Other studies have placed emphasis on user testing of UDLs to enhance their usability and thus their effectiveness. A study by Denton, Moody, and Bennett (2016), for instance, highlighted the benefits of user testing as a cost-effective and simply managed method to obtain information about the effectiveness of a website. In other words, user testing is a method to assess the usability of a website. This study reported the experiences of a user experience (UX) team which utilised user testing to help refine the home page of an academic health sciences library website. The test methodology involved the use of in-person testers and the 'think aloud' method. The outcomes of the test revealed that design and redesign were problem areas in the home page design. Overall, this study confirmed the benefits of user testing not only as a means to involve users, but also to offer feedback to constantly enhance the home page. Other studies have also reported the usefulness of user testing in refining home pages and certain web-based attributes (Augustine & Greene, 2002; Swanson & Green, 2011). Swanson and Green (2011), for instance, reported the outcomes of a usability study performed in the Moraine Valley Community College Library using Nielsen's (1993) guidelines. The objectives of the study were to ascertain how the library website was being used by students and to inform its redesign. The study's findings indicated that the existing gateway design of the website was a more effective entry to library resources than a dummy site which included a Google-style central-search box on its homepage. On the other hand, the usability study by Augustine and Green (2002) revealed that students use the internal search engine of a library website to find information in preference to navigating through pages. In contrast, Chow and colleagues (2014) reported that it appeared that usability testing of the websites was not a priority for the majority of the UDLs scrutinised in their study.

A study by Becker and Yannotta (2013) found that testing usability through the course of the design process is a valuable method to build a website that mirrors the needs and likings of users along with having the capacity to be changed in a straightforward manner, as necessitated by the emerging of innovative resources and technologies. An earlier study by Fagan, Mandernach, Nelson, Paulo, and Saunders (2008) reported the outcomes of a usability test performed by James Madison University (JMU) to study the usability and usefulness of the EBSCO Discovery Service (EDS). Findings of the study indicated that the participants encountered usability issues resulting in the proposal of some interface changes for EDS and the customisations added by JMU for EDS. Again, George (2005) reporting on the usability testing utilised by the Carnegie Mellon Libraries while redesigning their UDL revealed that usability is increased by consistency in design. The testing approach included the use of a web-based survey to ascertain user requirements and use of the think-aloud protocol to identify the strengths and limitations of the website's final design. The usability of the website of the Central Science Library (CSL) (University of Delhi) was evaluated by Pant (2015) using a multi-method study design. A usability assessment tool (Pant 2013) was utilised to evaluate the usability of the CSL website on a sample of 35 representative users. Pant (2015) considered six usability attributes namely, 'usefulness', 'efficiency', 'effectiveness', 'learnability', 'satisfaction' and 'accessibility'. The findings of the study indicated that the website required improvement from the perspectives of efficiency, usefulness, and learnability. Moreover, the features most preferred by the participants included notice board, search facility, services catalogue, FAQs, and user guides. A need to improve the website's visual appeal was also felt.

Another approach to assessing the usability of UDLs appears to be the use of heuristics. Aitta, Kaleva, and Kortelainen (2008) presented usability heuristics for the assessment of the web services of public libraries. Their findings revealed three categories of heuristics based on Nielsen's standard list of heuristics and the outcomes of prior usability studies, namely heuristics essential from the perspective of usability; heuristics regarding significant issues; and heuristics related to trivial, but still significant, usability issues and related to web design conventions. Babayi and Aminu (2018) also used the heuristic approach to assess the UDLs of the American University of Nigeria (AUN) Yola and University Of Nigeria Nsukka. They found that these websites had been suitably designed and encompassed all the significant information that facilitated the easy navigation of library users through the website and also their ability to find and retrieve pertinent information. Recommendations forthcoming from the study included the need to include the date of last update after every update of the website's content, and the provision of web forms to submit feedback, ask queries, and obtain help. Moreover, the need for the availability of help for resources presented through the website was expressed, along with the need to enhance the visual appeal of the websites through suitable background colours, an appropriate banner, usage of applicable visuals, and the provision of distinct buttons for navigation.

Library Services at King Saud University, Saudi Arabia

As a student from Saudi Arabia, the researcher has been exposed to the different facilities in the country's universities during the course of his undergraduate and postgraduate studies. The King Saud University (KSU) was chosen for scrutiny in this study since it was the first university set up in the country, in 1957. Moreover, as the one of the foremost universities in the country, it has the privilege of typically being the first to provide different services to students, the library being a case in point.

The library at the KSU was established in 1974 with the objective of offering services to society, scientific research and education and includes as its key elements library services, academic staff and students. The objective of the library services is to offer different services for users, but specifically to provide access to sources of information for society in general, academic staff, and students. The library administration and technical oversight deals with all affairs related to libraries, including support services, administration sections, and technical departments for the central library and its branches. Moreover, the KSU Library often represents the KSU University at international, Arab, regional, and national levels; distributes print editions of university publications; and is also responsible for book exhibitions in terms of participation and organisation.

The KSU Library is composed of the Central Library and several branches. The Central Library plays a significant role in promoting academic research and curriculum studies within a modern context, and also forms the central core of resources that are essential to achieve continuous curriculum development. The research academic library service aims for excellence in its support for students and academic staff, and its processes are regularly developed, upgraded and reviewed. The university library service also provides encouragement to students to access its resources efficiently, and facilitates teaching programmes and professional services.

In keeping with the cultural environment of Saudi Arabia, separate library facilities are offered for male and female students by the Central Library. Facilities for male students include the Deanship Library Preparatory Year which was first established in 2009. This facility offers important support services for new students and is an important component of the deanship.

Other library facilities provided to male students include the College of Pharmacy Library, King Khalid University Hospital Library and School of Medicine (est. 1978), Community College Library (est. 2003), Teachers' College Library (est. 1985), and the King Abdulaziz University Hospital Library (est. 1980). Library facilities available for female students include the Women's Hall of King Salman's Central Library, Female University Housing Library, Nursing College Library, Library of the College of Applied Studies and Community Service, Library of the College of Applied Medical Sciences, and the College of Dentistry Library.

In the context of the present study, KSU also has a digital library project (KSU e-lib; https://library.ksu.edu.sa/en/node/1187) to highlight the importance of modern technology, electronic publishing, and databases, so that students become confident in searching digital or electronic forms of information sources and other data. The advantages identified by this digital library project include enabling access to larger quantities of data and information that meets the needs of different fields of study within the university. It was helping students to quickly search digital resources and to efficiently retrieve the information required. Hence, ensuring that digital resources can be easily controlled by users so that searching for data is simplified; enhancing collaboration between different universities, so that horizons of students are widened; creating economic advantages with long-term investment; and reducing the need for large spaces required by traditional library resources.

Overall, it would appear that the emphasis of the KSU libraries (digital and physical) is to provide library services and facilities to students in Saudi Arabia of Saudi origin or from its neighbouring countries. This is because the principal language of the website is Arabic (with English translation being available). This constraint has been somewhat overcome by the introduction of the Saudi Digital Library (SDL) which transcends university boundaries (Alasem, 2013).

The SDL (https://portal.sdl.edu.sa/english/) was established in 2010 by the Saudi Ministry of Higher Education (MoHE). According to the library's website, the aims of this library include to supporting the educational process and meeting the needs of researchers, students, and professionals in higher education. The website hosts more than 24,000 full text e-books in different scientific specialties. Additionally, the SDL has subscriptions to nearly 300 national, regional, and global publishers (Alasem, 2013; SDL, 2015).

The following services are available to users of the SDL from the library homepage:

- Arabic databases
- eBooks
- FAQ
- Theses-related services
- SDL vision, mission, goals
- Training
- SDL address

In addition, users can browse for SDL news, SDL partners, Support Centre, and Policy (Figures 1a and 1b). Provision is also available for registration to the website.

Figure 1a SDL Home Page (English)

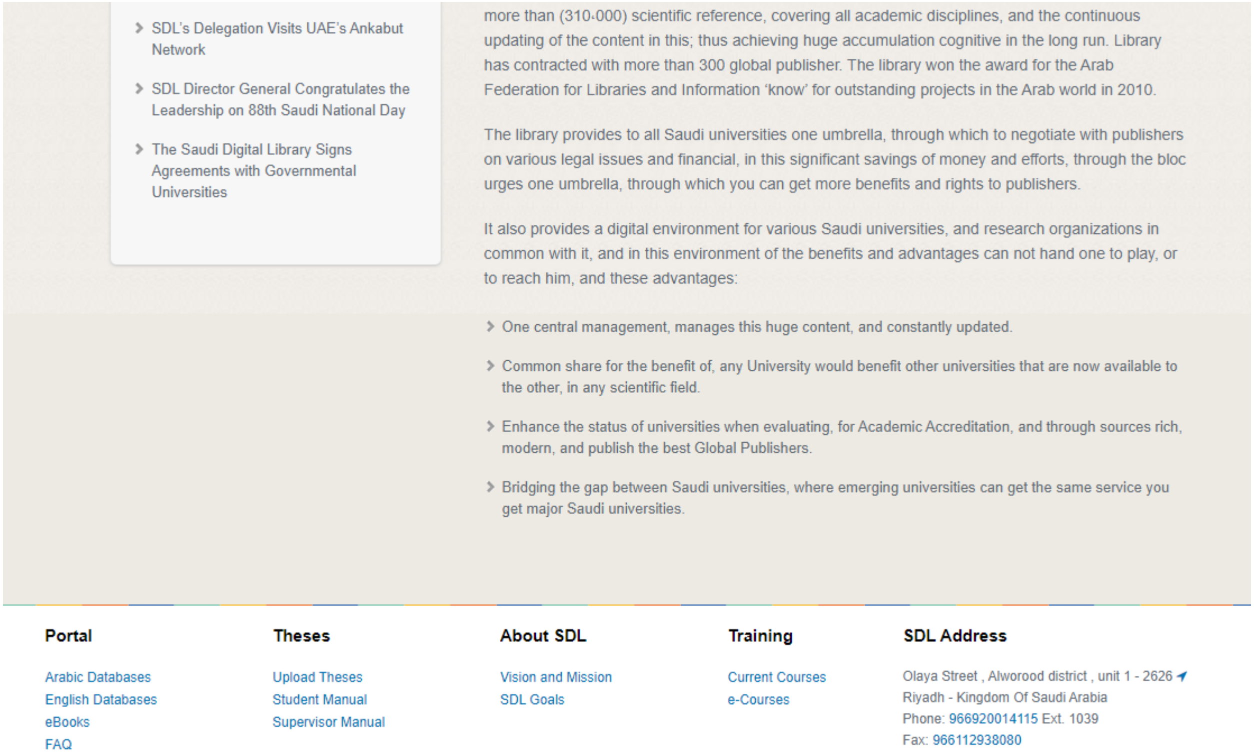

Figure 1b SDL Home Page (English)

The technological platform upon which the library services of the King Saudi university has been set, herein shown in Figures 1a and 1b, typifies that found in many universities whereby there is no deliberate uptake and promotion of the Google Scholar search engine. The UDL, therefore, reflects the position that the institution feels would serve the learner. Figure 1 indicates the general availability of online reading materials including links to information databases that have been subscribed to by the university. At this point, it was impossible to use available information from the library services to examine how search platforms have been designed; neither could one tell how learners' preferences would have been incorporated. Considering the information obtained from library services in the King Saudi university, it was vital to review library service with Manchester Metropolitan University, as detailed in section below.

Library Services at Manchester Metropolitan University

As mentioned previously, the researcher chose this university to examine the services provided by the UDL since he is a student in the university and thus is also an international student utilising the UDLs services. From the perspective of the present study, this facet provides the researcher with a better understanding of what the target participants of the study experience in their day-to-day academic existence.

The Manchester Metropolitan University (MMU) is a leading university in the United Kingdom with a history that can be traced back to 1824 (MMU, 2019a) and a student population of more than 38,000 students (MMU, 2019b).

The UDL (https://www.library.mmu.ac.uk/) at MMU provides the following resources for users:

- Library search
- Subject guides
- Reading lists
- Library catalogue
- A-Z guides
- Useful tools
- Open access

In addition, users are provided information about their library account, and information/services related to borrowing such as renewing, borrowing, loan periods, how to make a reservation, fines, inter-library loans, and so on. Moreover, information about the library such as opening hours, library sites, maps and floor plans, photocopying, printing and scanning, PC availability, etc., is also accessible from the landing home page (Figures 2a and 2b).

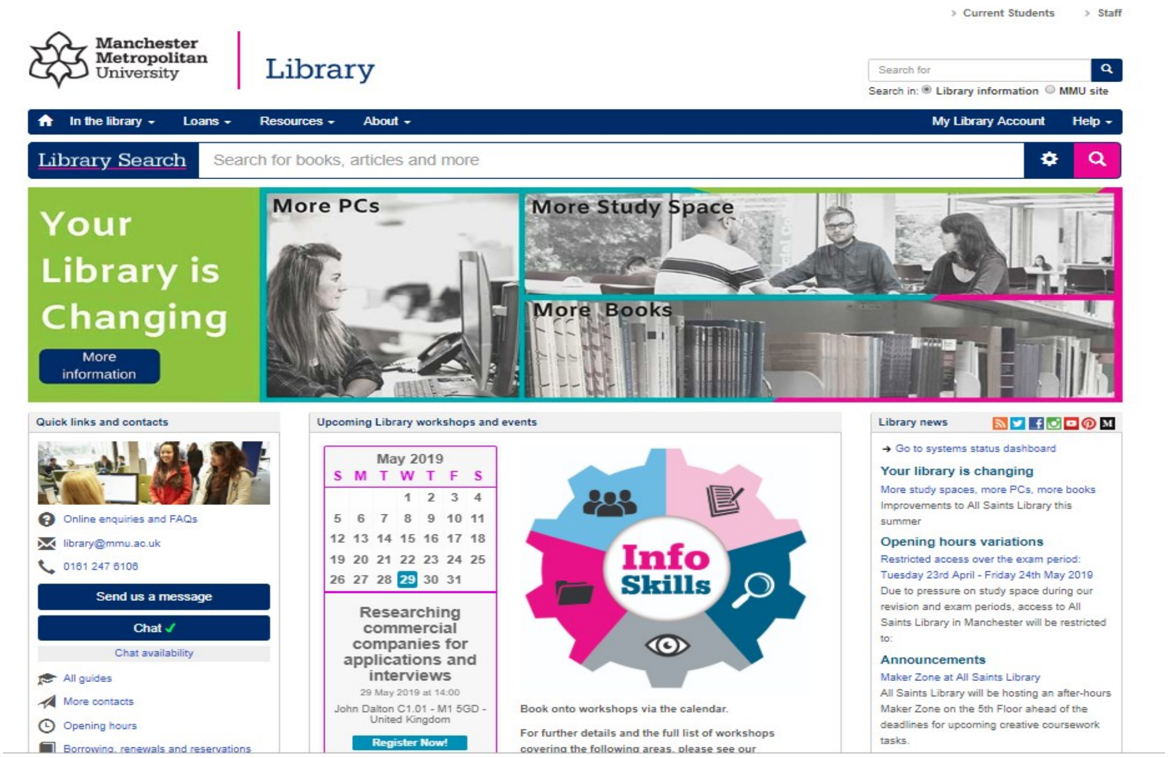

Figure 2a MMU Library Landing Page

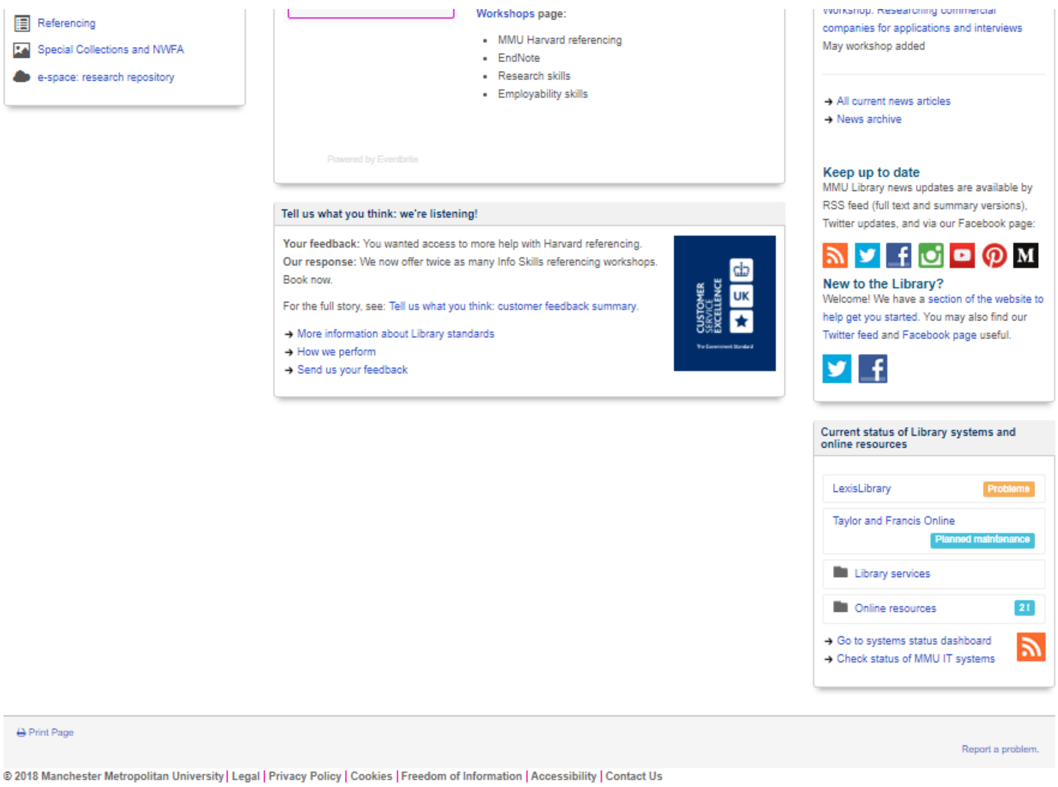

Figure 2b MMU Library Landing Page

The library services found on the website for MMU provide, among other things, access to computerised information databases and online resources that would not be available using a typical online search engine. Figures 2a and 2b paint a picture that one could not foretell factors behind design of the access to library resources by learners, other than the point that authentic resources permeate the university library services. There is no clear link to Google Scholar on the UDL for MMU, unless the learner uses the website to deliberately seek for information using Google Scholar.

Library Services at the University of Manchester

The University of Manchester, in its current structure, was formed in 2004 by the unification of the University of Manchester Institute of Science and Technology (UMIST) and the Victoria University of Manchester, both of which had existed independently and cooperatively for a century (University of Manchester, 2019a). The university is ranked 33rd in the world according to the 2019 Academic Ranking of World Universities and is the eighth best university in Europe, and the sixth best in the UK (University of Manchester, 2019b). Moreover, it has a student population of >40,000 making it one of the largest student populations in Europe (University of Manchester, 2019c). The university is also home to one of the largest numbers of international students in the UK (University of Manchester, 2019d).

The following resources are provided by the University's library website (https://www.library.manchester.ac.uk/):

- Search resources
- Using the library
- Locations & opening hours
- Special collections
- Help & support
- Library search interface
- Library chat interface
- Links to the library's social media accounts.

Moreover, users are provided links to The John Rylands Library, Help and Support, Special Collections, Find a PC on campus, News, Supporting Wellbeing, My Manchester (students), Order a book (students and staff) from the landing page (Figures 3a-c).

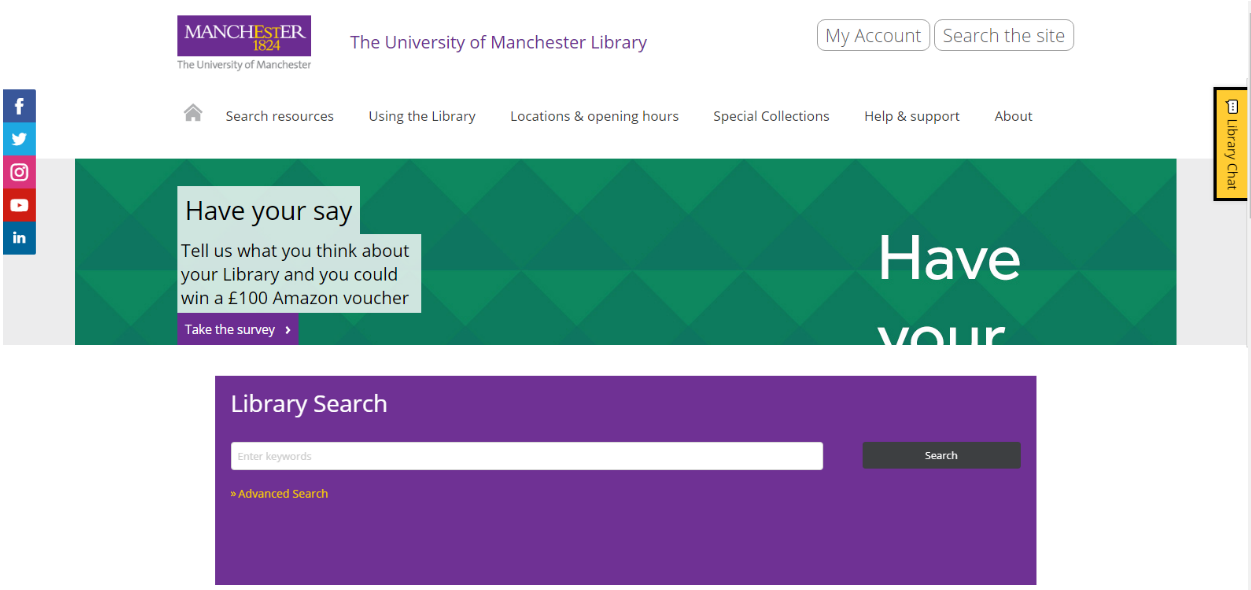

Figure 3a University of Manchester Library Landing Page

When the library service end user is able to log in the university online services at the University of Manchester, as shown in Figures 3a and 3b, they are directed to both physical and electronic library services in general. Such a service is an indicator of how the university has tailor made the services so that the search for information can be easier for the end user. However, looking at the information from Figure 3a and 3b, it could be challenging to pinpoint how learners have been an influence in the way the UDL services herein.

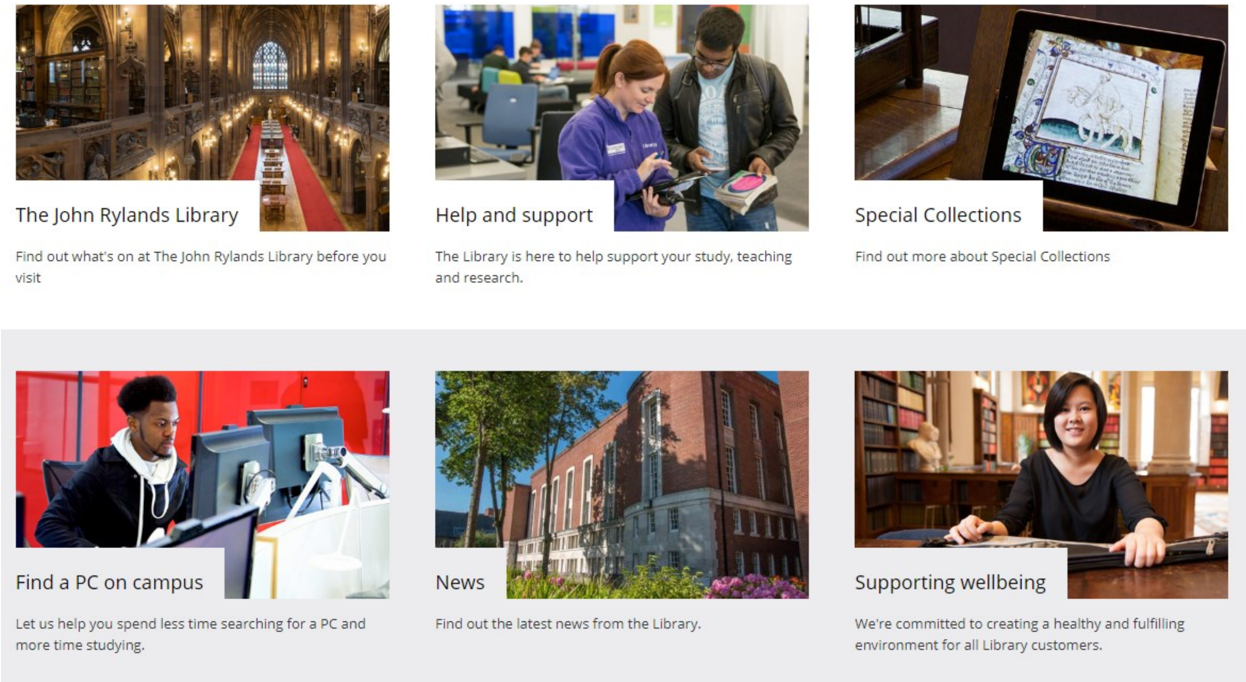

Figure 3b University of Manchester Library Landing Page

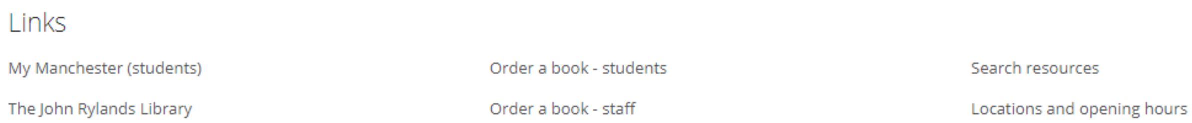

Figure 3c University of Manchester Library Landing Page

A typical service provision at the University of Manchester looks to be similar in many ways to that of other Universities because there is no deliberate link for which students could be directed to Google Scholar as a clearly marked source of information that could be useful for the end user of the library services.

Library Services at the University of Salford

The origins of the University of Salford can be traced back to the Pendleton Mechanics Institute (1850) and the Salford Working Men's College (1858) which were merged into the Royal Technical Institute, Salford, in 1896. Renamed in 1921 as the Royal Technical College, Salford, the Institute further split into two separate organisations in 1958: The Royal College of Advanced Technology and the break-away Peel Park Technical College. The latter was rechristened Peel Park Technical Institute in 1961, the Salford College of Technology in 1970, and finally University College Salford in 1992. The Royal College of Advanced Technology became the University of Salford by Royal Charter in 1967. The present day University of Salford was created by the merging of the University College Salford and the University of Salford in 1996 (University of Salford, 2019). The University is presently home to more than 20,000 students and 2,500 staff (University of Salford, 2019).

The following facilities are provided on the University library website (https://www.salford.ac.uk/library):

- Research
- Use the library
- Resources
- Get help
- Archives
- About us
- Tell us
- A-Z

Additionally, users are provided links to online FAQs; library opening times; borrow, return, request; skills for learning; printing credit; printing; library account login; library room booking; access e-resources; past exam papers; eBooks; and you want it, we get it (Figures 4a and 4b).

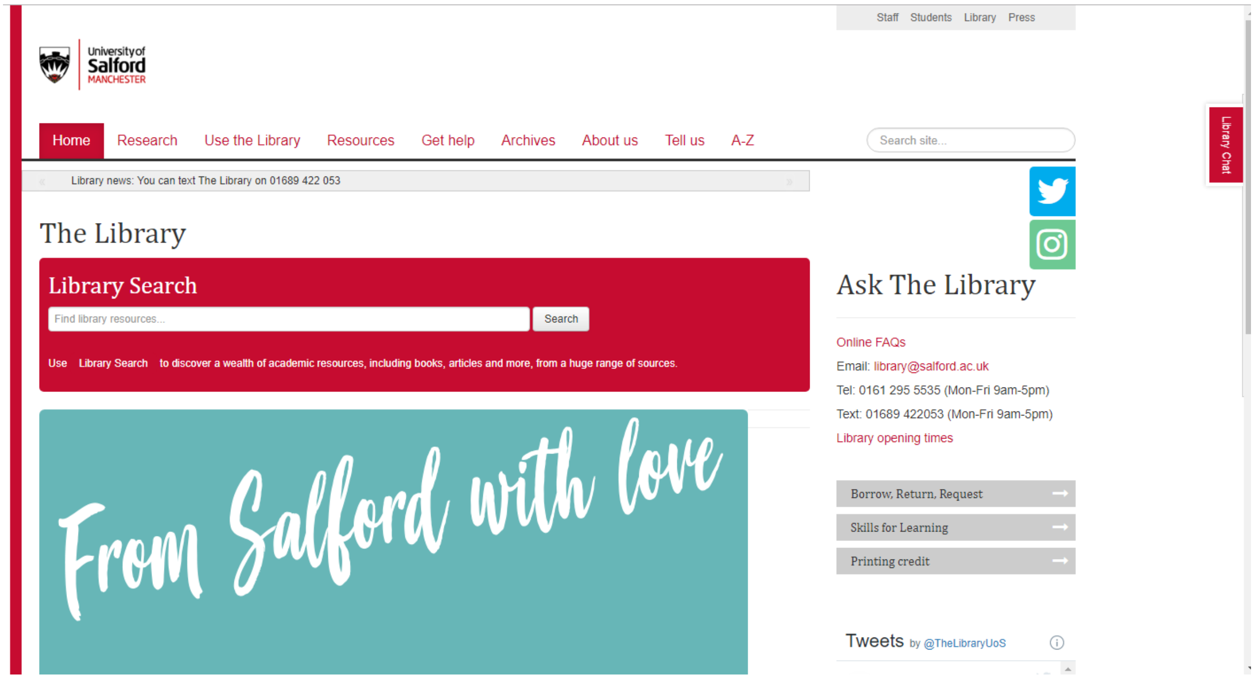

Figure 4a: University of Salford Library Landing Page

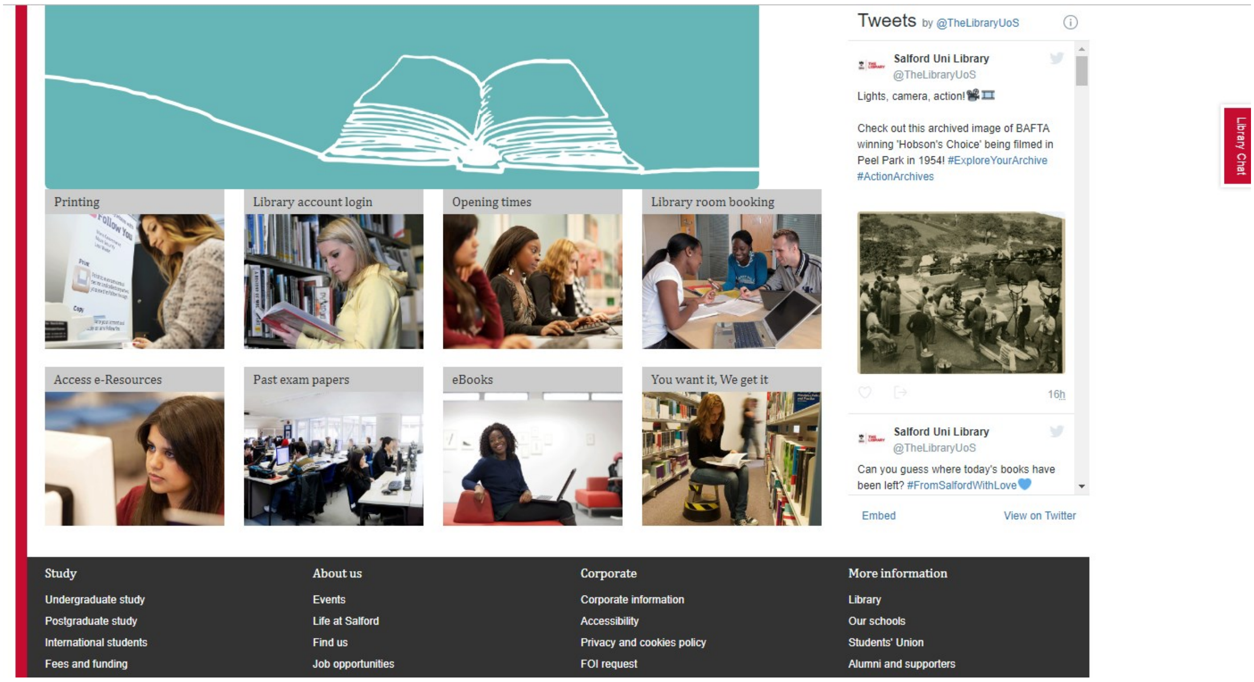

Figure 4b University of Salford Library Landing Page

Based on the information presented on Figure 3.4a and 3.4b, the provision of library services in the University of Salford does not deviate from the established norms. Similarly, it could be difficult to establish how the library service takes into account the possibility of end-user preferences and patterns of search, as indicated in the information seeking and behavioural models. The current provisions of the library services, therefore, cannot be used as a basis for examining how well information seeking patterns work for end users; rather, the service level is critical in the identification of factors that affect international postgraduate students' choice to use Google Scholar over their University Digital Libraries (UDL).

Summary

This chapter has provided a brief overview of the usability of UDLs and also has described the services provided by the UDLs of the universities being considered in the course of this study, namely King Saud University, Manchester Metropolitan University, the University of Manchester, and the University of Salford. It can be seen that the effectiveness of a UDL seems to depend on its usability, which in turn is determined by the availability of specific features on a UDL. Moreover, it would seem that there are several methods to evaluate the usability of a UDL ranging from theoretical models (e.g., TAM, IS success) to user testing (using 'think aloud', for instance) and the use of heuristics. In keeping with the context of this study, it could be inferred that the perceptions of users would determine their extent of usage of a UDL.

A brief scrutiny of the library services provided by the UDLs of King Saud University and the Manchester universities considerable disparity in the service provision of these libraries. Moreover, it would seem that while the Manchester libraries seem to provide the more desirable facilities of a UDL as prescribed by prior research, the Saudi Digital Library is in a more nascent stage of development. In addition, it appeared that usability testing had perhaps been more effective in the case of the Manchester UDLs at the time of writing of this chapter.

The overarching view of the library services provided in Chapter 3 found that even though universities claim to be setting up library services that focus on helping these students overcome their challenges (individual or study-associated), there is no evidence of how they go about it. Links to search engines independent of the university library website cannot be found on established service platforms. This indicates that if the learner does not conform to the UDL provisions they are likely to underutilise the information capturing services. There are many challenges to this effect, some of which include language barriers and lack of familiarity with the social and educational environment into which they have entered. From the perspective of university libraries, these challenges may affect the manner in which international students use the libraries and interact with the librarian and other associated staff with far-reaching consequences, such as limiting the extensiveness and hence effectiveness of their research (e.g., Hughes, 2010; Liao et al., 2005; Mittermeyer, 2005; Weber et al., 2018; etc.). However, existing UDL services do not reflect or paint a picture that demonstrates the ability to deal with end-user challenges. It can be concluded that the identifiable challenges faced by learners are critical to the assessment of the University Digital Library (UDL). It also argues that responsive UDL services could primarily address such challenges – hence aiming to alleviate several of the challenges associated with face-to-face interaction in a physical library context. Nevertheless, this also signifies that a UDL must possess certain attributes, which would increase its usability across diverse types of users, hence the need to bring out some of these factors in the design of the research methodological strategies to be adopted for this research.

Appendix V: University Digital Libraries Primary Data

Descriptive Statistics Tables

Descriptive Statistics for Domain Knowledge

Statement	UDL Dataset		GS Dataset	
	Mean	Std. Deviation	Mean	Std. Deviation
I am familiar with the subject domain that I search for	2.62	0.684	4.40	0.715
I am knowledgeable in the topic to search for	2.65	0.735	4.37	0.696
I have previous experience searching in this subject domain	2.58	0.740	4.25	0.878
I have the domain knowledge that it necessary to search for what I want to find	2.66	0.830	4.26	0.851

Descriptive Statistics for Computer Experience

Statement	UDL Dataset		GS Dataset	
	Mean	Std. Deviation	Mean	Std. Deviation
I am confident in using computers	4.27	0.830	4.36	0.695
I think I am efficient in the use of a computer to complete my task	4.23	0.837	4.48	0.501
I can use a computer even if there is no one around to show me	4.24	0.834	4.45	0.528
I am happier if there is someone around to ask for help	4.39	0.843	4.07	1.037

Descriptive Statistics for Computer Self-efficacy

Statement	UDL Dataset		GS Dataset	
	Mean	Std. Deviation	Mean	Std. Deviation
I feel confident in my ability to use it	2.47	1.169	3.55	1.377
I can use it even if there is no one around me to show me	2.68	1.111	3.81	1.153

I don't need a lot of time to complete my task using it	2.53	1.084	3.76	1.335
I often find it difficult to use it for my studies	2.14	1.298	2.80	1.524
Helps even when the task is challenging	2.84	1.313	3.49	1.307

Descriptive Statistics for Motivation

Statement	UDL Dataset		GS Dataset	
	Mean	Std. Deviation	Mean	Std. Deviation
Helps me achieve in my studies	2.58	1.209	3.53	1.349
I use it because people around me do	2.45	1.336	3.14	1.449
I have been trained to use it	2.30	1.299	3.09	1.464
I am confident in using it	2.56	1.026	3.93	1.165
I don't always feel in control of the outcome	2.47	1.295	3.27	1.465
Makes me feel really involved in my studies	2.88	1.215	3.69	1.193

Descriptive Statistics for Relevance

Statement	UDL Dataset		GS Dataset	
	Mean	Std. Deviation	Mean	Std. Deviation
It has resources that relate to my area of interest	2.85	1.284	3.62	1.193
It has enough resources for my study	2.90	1.442	3.30	1.219
It provides current information in my area of interest	2.99	1.226	3.77	1.066
It is a very efficient study tool	2.81	1.086	3.92	1.048
It is limited in its coverage of my area of interest	3.03	1.538	3.07	1.205

Descriptive Statistics for Accessibility

Statement	UDL Dataset		GS Dataset	
	Mean	Std. Deviation	Mean	Std. Deviation
I find it easy to navigate	2.65	0.924	4.16	0.946

Statement	UDL Dataset		GS Dataset	
	Mean	Std. Deviation	Mean	Std. Deviation
I am able to use it whenever I need it	2.70	0.941	4.17	0.903
I find it easy to get access to	2.72	0.979	4.15	0.948
It is easily accessible	2.60	0.863	4.20	0.874
I can locate the resources I need	2.74	0.983	4.14	0.998

Descriptive Statistics for Visibility

Statement	UDL Dataset		GS Dataset	
	Mean	Std. Deviation	Mean	Std. Deviation
People at my university know that it exists	2.95	1.104	4.05	0.855
People know where to look to find it	2.84	1.000	4.14	0.825
I find that it is always available	2.74	0.936	4.23	0.788

Descriptive Statistics for Effort Expectancy

Statement	UDL Dataset		GS Dataset	
	Mean	Std. Deviation	Mean	Std. Deviation
It is easy for me to become more skilful in using it	2.96	0.953	4.19	0.773
I will continue to find it easy to use	2.70	0.757	4.39	0.647
Learning to use it does not require much effort	2.82	0.918	4.24	0.752
My interaction with it will continue to be clear and understandable	2.84	0.894	4.30	0.716

Descriptive Statistics for Performance Expectancy

Statement	UDL Dataset		GS Dataset	
	Mean	Std. Deviation	Mean	Std. Deviation
Improves my study performance	2.93	0.975	4.11	0.847
Enables me to achieve study/research task	2.92	1.072	4.00	1.017
Helps me accomplish my study more quickly	2.91	1.085	3.95	1.038

Statement	UDL Dataset		GS Dataset	
	Mean	Std. Deviation	Mean	Std. Deviation
Increases my productivity	2.95	1.099	3.99	0.982
Is beneficial to my study	2.86	0.880	4.29	0.732

Descriptive Statistics for Facilitating Conditions

Statement	UDL Dataset		GS Dataset	
	Mean	Std. Deviation	Mean	Std. Deviation
It is suitable to the way I study	2.68	0.977	4.03	1.068
I can get help when I have difficulty	2.93	1.030	3.99	0.992
The help can direct me to the information I need	3.11	1.086	3.94	0.941
The help supports me in my tasks/research study	3.04	1.171	3.86	1.052
Really encourages me in developing my areas of interest	3.12	1.052	3.99	0.930
I feel I am working within a community of scholars in my area	2.69	0.989	4.02	1.070

Descriptive Statistics for Social Influence

Statement	UDL Dataset		GS Dataset	
	Mean	Std. Deviation	Mean	Std. Deviation
People whose opinions I value prefer that I use it	3.11	1.229	3.69	1.101
People who are important to me at my university think that I should use it	3.02	1.242	3.69	1.141
People who influence my study think I should use it	3.27	1.205	3.76	1.024
I am encouraged to use it by people who assess my work	2.93	1.373	3.39	1.259
Other students show me how to use it	2.49	1.374	3.17	1.415
Not using it makes me feel I am falling behind others	2.81	1.434	3.23	1.259

Descriptive Statistics for Behavioural Intention

Statement	UDL Dataset		GS Dataset	
	Mean	Std. Deviation	Mean	Std. Deviation
I intend to use UDL/Google Scholar for my study in the future	2.55	0.556	4.46	0.557
I intend to increase my use of UDL/Google Scholar in the future	2.69	0.804	4.20	0.908
I predict I will use UDL/Google Scholar in the future	2.68	0.671	4.39	0.655
I plan to use UDL/Google Scholar in the future	2.72	0.688	4.34	0.690

Multiple Regression Results

Descriptive Statistics for impact of Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions on Behavioural Intention – UDL Dataset

	Mean	Std. Deviation
Behavioural Intention	2.660	0.564
Performance Expectancy	2.913	0.796
Effort Expectancy	2.829	0.736
Social Influence	2.934	0.816
Facilitating Conditions	2.925	0.745

Model Summary for impact of Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions on Behavioural Intention – UDL Dataset

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.418a	0.175	0.158	0.51743	0.175	10.315	4	195	0.000

a. Predictors: (Constant), Facilitating Conditions, Social Influence, Effort Expectancy, Performance Expectancy

Coefficients of Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions – UDL Dataset

	Unstandardized Coefficients		**Standardized Coefficients**		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	1.426	0.213		6.687	0.000
Performance Expectancy	0.143	0.053	0.202	2.688	0.008
Effort Expectancy	0.097	0.052	0.127	1.856	0.065
Social Influence	0.023	0.047	0.033	0.486	0.627
Facilitating Conditions	0.163	0.056	0.215	2.918	0.004

a. Dependent Variable: Behavioural intention

Descriptive Statistics for impact of Performance Expectancy, Effort Expectancy, Social Influence and Facilitating conditions on Behavioural Intention – Google Scholar Dataset

	Mean	**Std. Deviation**
Behavioural Intention	4.346	0.555
Performance Expectancy	4.065	0.755
Effort Expectancy	4.279	0.600
Social Influence	3.487	0.880
Facilitating Conditions	3.970	0.826

Model Summary for impact of Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions on Behavioural Intention – Google Scholar Dataset

R	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Change Statistics**				
				R Square Change	**F Change**	**df1**	**df2**	**Sig. F Change**
.369[a]	0.136	0.118	0.52136	0.136	7.662	4	195	0.000

a. Predictors: (Constant), Facilitating Conditions, Effort Expectancy, Social Influence, Performance Expectancy

Coefficients of Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions – Google Scholar Dataset

	Unstandardized Coefficients		**Standardized Coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	2.762	0.320		8.624	0.000
Performance Expectancy	0.190	0.062	0.259	3.085	0.002
Effort Expectancy	0.200	0.063	0.217	3.198	0.002
Social Influence	-0.062	0.049	-0.098	-1.278	0.203
Facilitating Conditions	0.043	0.054	0.063	0.789	0.431

a. Dependent Variable: Behavioural intention

Descriptive Statistics for impact of Accessibility, Visibility and Relevance of the System on Performance Expectancy – UDL Dataset

	Mean	**Std. Deviation**
Performance Expectancy	2.913	0.796
Relevance	2.903	0.549
Accessibility	2.678	0.763
Visibility	2.842	0.876

Model Summary for impact of Accessibility, Visibility and Relevance of the System on Performance Expectancy – UDL Dataset

R	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Change Statistics**				
				R Square Change	**F Change**	**df1**	**df2**	**Sig. F Change**
.317[a]	0.100	0.086	0.76045	0.100	7.276	3	196	0.000

a. Predictors: (Constant), Visibility, Accessibility, Relevance

Coefficients for impact of Accessibility, Visibility and Relevance of the System on Performance Expectancy – UDL Dataset

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.684	0.309		5.448	0.000
Relevance	0.275	0.110	0.190	2.500	0.013
Accessibility	-0.045	0.078	-0.044	-0.582	0.561
Visibility	0.194	0.067	0.214	2.879	0.004

a. Dependent Variable: Performance Expectancy

Descriptive Statistics for impact of Accessibility, Visibility and Relevance of the System on Performance Expectancy – Google Scholar Dataset

	Mean	Std. Deviation
Performance Expectancy	4.065	0.755
Relevance	3.506	0.507
Accessibility	4.162	0.805
Visibility	4.123	0.777

Model Summary for impact of Accessibility, Visibility and Relevance of the System on Performance Expectancy – Google Scholar Dataset

				Change Statistics				
R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
.431[a]	0.186	0.174	0.68632	0.186	14.941	3	196	0.000

a. Predictors: (Constant), Visibility, Relevance, Accessibility

Coefficients for impact of Accessibility, Visibility and Relevance of the System on Performance Expectancy – Google Scholar Dataset

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	1.542	0.389		3.962	0.000
Relevance	0.538	0.101	0.361	5.308	0.000
Accessibility	-0.018	0.078	-0.019	-0.233	0.816
Visibility	0.173	0.079	0.178	2.188	0.030

a. *Dependent Variable: Performance Expectancy*

Descriptive Statistics for impact of Computer Self-Efficacy, Computer Experience, Domain Knowledge and Motivation on Effort Expectancy - UDL Dataset

	Mean	Std. Deviation
Effort Expectancy	2.829	0.736
Computer Self-efficacy	2.875	0.643
Computer Experience	3.585	0.563
Domain Knowledge	2.625	0.577
Motivation	2.713	0.566

Descriptive Statistics for impact of Computer Self-Efficacy, Computer Experience, Domain Knowledge and Motivation on Effort Expectancy - UDL Dataset

				Change Statistics				
R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
.300[a]	0.090	0.071	0.70902	0.090	4.809	4	195	0.001

a. *Predictors: (Constant), Motivation, Computer Experience, Domain Knowledge, Computer Self-Efficacy*

Descriptive Statistics for impact of Computer Self-Efficacy, Computer Experience, Domain Knowledge and Motivation on Effort Expectancy - UDL Dataset

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.

(Constant)	1.015	0.485		2.095	0.038
Computer Self-efficacy	0.258	0.080	0.226	3.216	0.002
Computer Experience	0.091	0.090	0.069	1.004	0.317
Domain Knowledge	0.148	0.088	0.116	1.695	0.092
Motivation	0.132	0.091	0.101	1.454	0.147

a. *Dependent Variable: Effort expectancy*

Descriptive Statistics for impact of Computer Self-Efficacy, Computer Experience, Domain Knowledge and Motivation on Effort Expectancy - Google Scholar Dataset

	Mean	**Std. Deviation**
Effort Expectancy	4.279	0.600
Computer Self-efficacy	3.562	0.694
Computer Experience	4.339	0.506
Domain Knowledge	4.316	0.611
Motivation	3.350	0.648

Descriptive Statistics for impact of Computer Self-Efficacy, Computer Experience, Domain Knowledge and Motivation on Effort Expectancy - Google Scholar Dataset

				Change Statistics				
R	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**R Square Change**	**F Change**	**df1**	**df2**	**Sig. F Change**
.261[a]	0.068	0.049	0.58522	0.068	3.550	4	195	0.008

a Predictors: (Constant), Motivation, Computer Experience, Domain Knowledge, Computer Self-Efficacy

Descriptive Statistics for impact of Computer Self-Efficacy, Computer Experience, Domain Knowledge and Motivation on Effort Expectancy - Google Scholar Dataset

	Unstandardized Coefficients		**Standardized Coefficients**		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	2.562	0.512		5.009	0.000
Computer Self-efficacy	0.157	0.061	0.182	2.595	0.010
Computer Experience	0.151	0.082	0.128	1.844	0.067
Domain Knowledge	0.088	0.069	0.090	1.286	0.200
Motivation	0.036	0.065	0.038	0.549	0.584

a. *Dependent Variable: Effort Expectancy*

Correlations of System Features

Correlations of System Features

			Estimate
Accessibility	<-->	Visibility	.719
Relevance	<-->	Visibility	.334
Accessibility	<-->	Relevance	.318

Correlations of System Features – UDL dataset

			Estimate
Accessibility	<-->	Relevance	.336
Accessibility	<-->	Visibility	.400
Relevance	<-->	Visibility	.316

Correlations of System Features – Google Scholar Dataset

			Estimate
Accessibility	<-->	Visibility	.639
Accessibility	<-->	Relevance	-.190
Visibility	<-->	Relevance	-.160

Correlations of Individual Differences

			Estimate
Computer Experience	<-->	Domain Knowledge	.096
Motivation	<-->	Domain Knowledge	.323
Computer Experience	<-->	Motivation	-.104
Computer Experience	<-->	Computer Self-efficacy	.099
Domain Knowledge	<-->	Computer Self-efficacy	.457
Motivation	<-->	Computer Self-efficacy	.495

Correlations of Individual Differences – UDL dataset

			Estimate
Computer Self-efficacy	<-->	Motivation	.327
Computer Self-efficacy	<-->	Computer Experience	.187
Computer Self-efficacy	<-->	Domain Knowledge	.061
Motivation	<-->	Computer Experience	-.155
Motivation	<-->	Domain Knowledge	-.108
Computer Experience	<-->	Domain Knowledge	.036

Correlations of Individual Differences – Google Scholar Dataset

			Estimate
Motivation	<-->	Computer Self-efficacy	.415
Motivation	<-->	Domain Knowledge	-.012
Motivation	<-->	Computer Experience	-.040
Computer Self-efficacy	<-->	Domain Knowledge	.064
Computer Self-efficacy	<-->	Computer Experience	.061
Domain Knowledge	<-->	Computer Experience	.179

Co-variances using UDL dataset

	Estimate	**S.E.**	**C.R.**	**P**	**Label**
System Features	.209	.060	3.474	***	
Individual Differences	.050	.022	2.237	.025	

Correlations using UDL dataset

			Estimate
Individual Differences	<-->	System Features	1.099

Squared Multiple Correlations using UDL dataset

	Estimate
Social Influence	.000
Effort Expectancy	.446
Performance Expectancy	.086
Facilitating Conditions	.000
Behavioural Intention	.122
Domain Knowledge	.004
Computer Experience	.007
Motivation	.095
Computer Self-efficacy	.122
Relevance	.320
Accessibility	.466
Visibility	.274

Correlations using Google Scholar dataset

			Estimate
Ind Diff	<-->	Sys Features	.895

Squared Multiple Correlations using Google Scholar dataset

	Estimate
Social Influence	.000
Effort Expectancy	.304
Performance Expectancy	.097
Facilitating Conditions	.000
Behavioural Intention	.143
Domain Knowledge	.018
Computer Experience	.047
Motivation	.031
Computer Self-efficacy	.170
Relevance	.149
Accessibility	.751
Visibility	.468